2021 ANNUAL REPORT

DEMAND-SIDE MANAGEMENT

SUPPLEMENT 2

EVALUATION

MARCH 15 **2022**

SAFE HARBOR STATEMENT

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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 validation of energy savings and demand reduction, and the efficient management of its programs. Idaho Power considers primary and secondary research, 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 2021, Idaho Power contracted with ADM Associates and Tetra Tech to conduct program evaluations for the A/C Cool Credit (impact, ADM Associates), C&I Custom Projects (impact and process, Tetra Tech), Flex Peak (impact, Tetra Tech), Heating and Cooling Efficiency (impact and process, ADM Associates), and Irrigation Peak Rewards (impact, Tetra Tech) programs.

In 2020, Idaho Power contracted with DNV to conduct a process evaluation on the Home Energy Reports program. However, due to some late findings, additional analysis was required to complete the evaluation, which was finalized in June 2021. Idaho Power also contracted Tetra Tech to conduct a process evaluation on the Small Business Direct Install program in 2020. The start of the evaluation was delayed until the second quarter of 2021 to allow time for additional installs to be completed after the program was suspended in early 2020 due to the COVID-19 pandemic. The evaluation was completed in October 2021.

AM Conservation Group conducted a program summary analysis of Student Energy Efficiency Kits and Commercial Saving Kits programs. Harris Utilities conducted a summary analysis for the Home Energy Reports Program. While external impact evaluations were conducted on all three demand response programs, the company also conducted internal analyses for the Flex Peak and Irrigation Peak Rewards programs.

Throughout 2021, 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 listed above are included in this *Demand-Side Management 2021 Annual Report*, *Supplement 2: Evaluation.*

EVALUATION PLAN

Energy Efficiency 2010–2023 Program Evaluation Plans

Program Evaluation Schedule	2023	2022	2021	2020	2019	2018	2017
Residential Energy Efficiency Programs							
Educational Distributions				I/P			
Energy House Calls					I/P		
Heating & Cooling Efficiency Program			I/P				I/P
Home Energy Audit	I/P						I
Home Energy Reports		I		P			
Multifamily Energy Savings Program	I/P					I/P	
Rebate Advantage				I			
Residential New Construction Program	I				I/P		
Shade Tree Project	I				O	O	
Weatherization Assistance for Qualified Customers	O			O			
Weatherization Solutions for Eligible Customers	O			O			
Commercial/Industrial Energy Efficiency Programs							
Commercial Energy-Saving Kits		I/P					
Custom Projects			I/P			I	P
New Construction		I/P			I		P
Retrofits		I/P			I		P
Small Business Direct Install	I		P				
Irrigation Energy Efficiency Programs							
Irrigation Efficiency Rewards	I			I/P			
Demand-Response Programs							
A/C Cool Credit	O	O	I	O	I	O	O
Flex Peak Program	O	O	I/O	O	O	O	O
Irrigation Peak Rewards	O	O	I/O	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 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 Program							
Shade Tree Project			P				
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	I	I	O		P	O	
Flex Peak Program	I/O	I/O		P/O		O	
Irrigation Peak Rewards	O	I/O	I/O	O		O	

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

Program not yet in existence: (shaded)

[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 10, May 5, August 12, and November 10, 2021.

Energy Efficiency Advisory Group (EEAG)
Notes dated

Present:

Wil Gehl–City of Boise
Donn English–Idaho Public Utilities Commission
Diego Rivas–Northwest Energy Coalition
Connie Aschenbrenner–Idaho Power
Anna Kim–Public Utility Commission of Oregon
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
Katie Pegan–Office of Energy & Mineral Resources
John Chatburn-Idaho Governor's Office
Quentin Nesbitt*-Idaho Power
Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Haley Falconer-City of Boise
Jim Hall-Wafd
Sid Erwin–Idaho Irrigation Pumpers Association

Guests and Presenters*:

Theresa Drake*–Idaho Power
Chellie Jensen*–Idaho Power
Shawna Potter*–Idaho Power
Paul Goralski–Idaho Power
Tracey Burtch–Idaho Power
Annie Meyer-Idaho Power
Chad Severson-Idaho Power
Dahl Bietz-Idaho Power
Kathy Yi-Idaho Power
Zack Thompson-Idaho Power
Melissa Thom-Idaho Power
Chad Ihrig - CLEAResult
Chris Pollow-Idaho Power
Kevin Keyt-IPUC
Morgan Brummund- Office of Energy & Mineral Resources
Taylor Thomas-IPUC
Brad Iverson-Long-IPUC
Sheree Willhite-Idaho Power
Becky Arte Howell-Idaho Power
Mindi Shodeen-Idaho Power
Chris Pollow-Idaho Power

Note Takers:

Zack Thompson (Idaho Power), Paul Goralski (Idaho Power) with Kathy Yi (Idaho Power)

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30 am

Quentin kicked off the meeting with an agenda overview and turned it over to Rosemary for introductions. There were no comments or questions on the November meeting notes.

9:35 am-Announcements

Theresa shared an Idaho Power CR&EE leadership update that Chellie Jensen has been selected as Commercial, Industrial, and Irrigation leader, after Juliet Petersen's transition to a new role with our Construction group.

In a Regulatory update, Connie highlighted the Idaho Public Utilities Commission approved the Company's request to increase the Energy Efficiency Rider collection percentage to 3.10% from 2.75%, effective January 1, 2021. Additional evaluation of the future Energy Efficiency Rider funding level would occur once the amount of energy efficiency potential included in the 2021 IRP has been set as part of the IRP process.

9:39 am - 2020 Savings / Financial Results—Quentin Nesbitt

Quentin provided preliminary energy savings results for 2020, including a comparison going back to 2002, showing 2020 had been another strong year with the second highest savings, just below the 2019 peak. Energy savings results were reviewed by energy efficiency sector and for the demand response programs, along with Idaho and Oregon 2020 year-end Rider balances.

9:47 am – Commercial, Industrial, and Irrigation Programs—Chellie Jensen

Chellie provided a review of preliminary 2020 savings results for the commercial, industrial, and irrigation programs, which had a strong year, specifically the Custom offering and Irrigation, with the sector achieving 155% of 2020 target savings

Retrofits savings decreased in 2020 from 2019, and Idaho Power has heard some hesitation from customers to invest in energy efficiency due to COVID impacts and potential cash needs for future operations, inventory/supply issues, and contractors currently more focused on new construction. The Company is making modifications to its offerings, first in March for Retrofits lighting, and in June for New Construction and Retrofits non-lighting measures. Modifications being evaluated include measure additions and changes to incentives, as well as evaluating state-level measure changes with the use of the UTC perspective in Idaho and TRC perspective in Oregon.

Chellie reminded EEAG that the Small Business Direct Install program restarted activity October 2020 and concluded the year with 139 projects. The response to a January postcard mailing to potential participants has been good and the contractor is expanding the installer pool to respond to that anticipate demand.

An update was provided on cohort activity for water/wastewater as well as schools for saving achievement, upcoming trainings, and where participants are on the SEM timeline. Going forward opportunities will be in smaller districts and one-offs, and Idaho Power is looking to engage with these schools as we hear about their interest with some support from current cohort community.

Break: 10:16-10:25

10:26 am - 2020 Residential Programs—Shawna Potter

Shawna started her presentation with 2020 Residential programs performance which were 151% of target goal. Impacts from activity suspensions which occurred or remain ongoing due to COVID-19 were noted in program savings. An EEAG member asked a question on the preliminary well-above 2020 goal Home Energy Report savings and the likelihood of final savings being near the reported value. Quentin responded that when the 2020 goal was set, it was based on the pilot phase of the offering and because of the unknowns of the permanent offering, did not consider as many participants as ultimately were included in the rollout. Quentin also highlighted that we are still finalizing actual results and completing an evaluation now.

A refresh of COVID-19 impacts to programs was provided, and Shawna shared Idaho Power is creating waitlists and providing customer updates on program statuses, as well as evaluating virtual home energy audits. A marketing update included using electronic billboards which are weather triggered allowing the message to change based on weather and continuing social media marketing presence with a focus on energy efficiency tips.

An update on energy savings kits distribution noted that the mail by request kit program ended December 31, 2020 due to decreasing cost effectiveness and participation saturation. Welcome and student kits will continue, and the Company is looking at replacement options for the mail by request kits.

The residential new construction pilot program is transitioning program management as NEEA is ending their management and returning administration back to utilities at the end of February. Idaho Power has found a replacement vendor in Washington State University and transition to this vendor will occur over the next few months and new Idaho building codes, effective January 1, 2021, will also be included in program metrics.

Shawna shared that the Shade Tree program will be back in 2021 after events in 2020 were canceled due to COVID-19. A spring event will occur in the Treasure Valley and a fall event will occur in the Magic Valley. Trees will be mailed to customers' homes to maintain participant, company, and vendor safety.

The Simple Steps retail lighting buydown replacement program managed by Bonneville Power Administration (BPA) ended in September 2020. The Company will use CLEAResult as the vendor to manage a replacement program and is still evaluating a proposal from the vendor with the potential to launch a similar retail lighting buydown program in the next two months.

Finally, a timeline on the weatherization deep dive was provided and an update that Idaho Power had met with weatherization managers already and is incorporating their feedback before the deep dive session. Quentin will send a doodle poll to EEAG members to set the day of the March weatherization deep dive.

10:57 am – Software/CRM Update—Theresa Drake

Theresa shared an update on software/administrative tools used at Idaho Power. The Company built a home-grown tool over 15 years ago, which was adapted to include DSM activity tracking the last 10 years. This tool is used for budgets, outages, energy efficiency incentive payment management, and marketing, among other uses. In developing a road map to implement a more effective customer information management tool, the idea of a CRM concept was introduced which can pull all customer insights together in once system. The CRM tool would alleviate the need to have several disparate applications to pull information together to get necessary customer insights. The CRM tool will be a company product, so not all of the functionality would be in direct support of energy efficiency activity, but Idaho Power plans to allocate the proportion which is to Rider expense.

11:04 am – Wrap up

- Excited about the upcoming weatherization workshop and receiving more information of future changes impacting Oregon activity. Appreciate seeing all the great work adjusting programs and offerings through COVID. A question on the Shade Tree program was asked if there were energy savings associated or just marketing? Quentin responded that we do claim energy savings and have completed evaluations supporting those claimed energy savings.

- Good meeting, nice to get prior year update. Idaho Power did good work in challenging times, looks good for next year. CRM program is interesting, have heard about in a variety of contexts, good to see evolution.

- Echo other EEAG member comments, savings during pandemic being second highest ever are fantastic. The weather-based electronic billboard is cool, Idaho Power is continuing to pursue more opportunities.

- Good meeting, interested in additional COVID impacts as things move forward. Initial industrial impacts were in the context of employee health, and while some health improvements or restrictions have improved on local basis, many customers are still locked down. For the residential sector – interested to see data that more people working remotely and what impacts this might have on home energy use.

- Wanted to say "thank you" to Idaho Power and team for efforts last year, dedicated to maintaining activity. For the residential new construction pilot program, understand builders are already building above code so are we paying for something already occurring? Would like to follow up with Idaho Power in next few weeks to talk about concern. Idaho Power committed to reach out to follow up on member's concern and provide an update to EEAG at a future meeting.

- Would also be interested in residential new construction information around builders already building above code and would also like to hear more about how net to gross is treated in future. In response to question on COVID-19 impact to residential energy use, NEEA is completing end use survey, studying meter info which will track changes in energy use consumption over the COVID period. In terms of today's presentations, wanted to highlight that sharing trainings with EEAG provided opportunity to share with colleagues, appreciated the openness to expand the training participation. Nice job in last year.

- Similarly echo appreciation, presentations and great work turned into great savings. Suggested that wrapped into the Weatherization 101 presentation might be how programs look going forward as 2020 was abbreviated and what happens to funding.

Rosemary noted May 5 is next meeting, EEAG has webpage on Idaho Power website with meeting dates.

Quentin thanked EEAG for participation and positive comments on how 2020 went and results with all the challenges.

11:17 Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated May 5th, 2021
Webinar

Present:

Sid Erwin–Idaho Irrigation Pumpers Association
Wil Gehl– City of Boise
Quentin Nesbitt*-Idaho Power
Connie Aschenbrenner–Idaho Power
Diego Rivas–Northwest Energy Coalition
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
John Chatburn–Office of Energy & Mineral Resources
Anna Kim–Public Utility Commission of Oregon
Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Jim Hall-WAFD

Guests and Presenters*:

Chellie Jensen*-Idaho Power
Shawna Potter*-Idaho Power
Chad Ihrig: Business development Franklin Energy
Lynn Tominaga–Idaho Irrigation Pumpers Association
Katie Pegan–Office of Energy & Mineral Resources
Emily Her- Office of Energy & Mineral Resources
Taylor Thomas-IPUC
Nick Sayen: Oregon PUC staff
Bob Turner Idaho Groundwater
Paul Goralski–Idaho Power
Theresa Drake–Idaho Power
Chris Pollow – Idaho Power
Annie Meyer*-Idaho Power

Note Takers:

Chad Severson (Idaho Power) & Kathy Yi (Idaho Power)

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30am

Rosemary convened the meeting with introductions. There were no comments or concerns regarding the February 10th notes. Theresa announced that Billie McWinn will be coming back from her temporary duty assignment to lead the Residential team and that this will be Shawna Potters last EEAG meeting. Quentin announced that the DSM Annual Report was completed in March and the company submitted its DSM Prudence filing with the Idaho Public Utilities Commission (IPUC) and Public Utility Commission of Oregon (OPUC). He asked members to email him if they wanted a hard copy of the DSM report mailed to them.

9:45 am-First Quarter Savings & Financial Results—Quentin Nesbitt

Quentin provided portfolio energy savings and expenses, savings amounts by sector, and the Oregon and Idaho Rider balances through March 31st, 2020. He discussed that the company recognizes the rider percentage needs to increase and the company is waiting for Integrated Resource Planning (IRP) process to get farther along to complete a forecast and to determine timing. The company will engage with EEAG prior to making any final recommendation on percentage increase or timing. One member pointed out that balance doesn't dictate energy efficiency activity, and that the company direction is to pursue all cost-effective energy efficiency. One member commented that it is good to see Idaho Power continue to pursue all cost-effective EE and would like the company to come up with a funding strategy that takes a longer-term view of matching rider expenses with collection.
Quentin also reviewed the program evaluation plan for 2021 and 2022.

9:55 am Commercial/Industrial/ Irrigation Programs—Chellie Jensen

Chellie provided updates and year-to-date savings for the commercial, industrial, and irrigation programs. She also provided an update on the status of prescriptive measure changes for the Commercial & Industrial program, performance data for Commercial Energy-Saving Kits, Small Business Direct Install, Energy Management Audit tool, compressed air audits, and the Cohort projects. She also discussed a new cohort for 50,001 certifications that Idaho Power is partnering with Department of Energy on. The company asked EEAG for input on ideas to reach more commercial customers with the Energy-Saving Kits. One member suggested that Idaho Power field reps go door to door with the kits and to hand out at trade shows. Chellie asked for ideas on promoting 50,001 Ready Cohort. One member commented that since it applies to larger customers, the Idaho Power Energy Advisors could provide outreach and advise customers. Chellie also presented a Day in the Life of a Custom Project highlighting the Simplot Cold Storage project. Don Strickler also discussed the project from Simplot's point of view. He commented that Simplot was able to streamline transportation and logistics and consolidate storage site. There have been other benefits to the company and sustainability efforts. Chellie asked for any comments or questions:

There was a recommendation to get the data points from the first M&V. One member thanked Don and Simplot for highlighting the extra benefits of their project. They also brought up something that John Gardner brought up before, the great french fry battery. Super cool. DR. It was stated that Simplot does participate in demand response at the site. This is the first year and they were a little nervous. They had to reduce their nomination but after this year, they will look at it and will raise it in the future.

Chellie also provided an update on enrollments for Flex Peak and Irrigation Peak, the company's demand response programs**.**

10:45 am- Residential Programs—Shawna Potter

Shawna provided preliminary year-to-date energy savings by program and customer participation. She also provided an update on COVID 19 impacts. She highlighted changes that have been made to the Shade Tree program, followed up with EEAG on future investigation on ways to improve the Weatherization programs, some new residential measure exploration, and a market transformation effort that the company is working on with Avista for Ductless Heat Pumps. There were questions and comments around the recent stimulus bills that will provide funds for weatherization and what Idaho Power's plan is for using that money. Shawna responded that there is money from the CARE's Act and Idaho Power will work with the CAP Agencies to promote them. The company has increased efforts via social media, there is a pop up on My Account, and postcards have been mailed to customers. The company has promoted Energy Assistance and Project Share. Idaho Power has also worked with CAP Agencies in Oregon on ways to engage with the Health and Welfare Department to identify key contacts and other agencies that the company can partner with to promote the availability of this funding source. Theresa added that the company has been in contact with agencies on a regular basis, not just for weatherization but also Energy Assistance. One member asked if the company knows what is driving lower participation but higher savings in the Residential New Construction program. The company responded that there is a custom calculation for each home, so it could be any number of reasons. It could be a mix of single-family vs. multi-family homes, a percentage above code, or even a mix of different measures for each home.

One member asked about the costs of Shade Tree. The company will follow up with those numbers later. One member thanked the company for providing a Weatherization 101 and keeping EEAG updated. The company should streamline its process to reduce admin costs and increase impact. Another member suggested the company look at the potential study to explore the economic potential of measures. One member asked how the company plans on addressing how savings will be calculated in the Brio DHP pilot. The Regional Technical Forum has done a lot of research on savings based on if these are an add on to a home instead of a replacement. Shawna stated that the company will work with Brio

11:30 am- Marketing Overview—Annie Meyer

Annie provided an update on the types of energy efficiency marketing the company has done and is doing during COVID-19. She discussed social media posts for residential and business customers, EE awareness campaign, Summer EE Guide, Summer EE contest, Renters Guide, Energy@Work newsletter, Lighting campaign and a NEEA heat pump water heater campaign. There were no comments from EEAG members.

11:45 am- Demand Response as a Resource—Quentin Nesbitt

Quentin presented 2021 IRP analysis of DR programs and how the analysis has changed the premise of Idaho Power's demand response programs from supplying peak needs to supplying net peak needs which moves the need to be later in the evenings. Quentin discussed plans to go about modifying the programs with a goal to do so in time for the 2022 demand response season. There were questions and comments about the company's decision to move so quickly on changes to the program and that the timeline seems so rushed. Quentin commented that in order to make changes for next summer, a regulatory filing would need to happen this fall. This gives the company time to promote program changes this winter. The company has heard comments from IPUC Staff that they would like to see changes to the program happen by 2022. These comments have come out of the IPR process and are urging the company to look at ways to make demand response programs more useful. Another member stated that if there are obvious changes that need to be made for 2022 then it makes sense. But it does feel like the company is rushing especially since the analysis of the 2021 IRP process will not be complete until September. One other member echoed these comments and stated that a demand response potential study could be beneficial. They also mentioned that when Jackpot Solar comes online, it won't be the end of new solar projects. The impact and effect will be broader and stronger. A tweak in programs might make sense, but the company should continue to look at things holistically.

One member asked when will Idaho Power expect to see peak load shift. Quentin answered that the shift is already there, however it gets worse when Jackpot solar is added and then next resource after that.

One member stated they will be interested how much will be realized when the time is shifted later. Quentin said it is also a concern from Idaho Power's perspective and that it will be harder to get

irrigation participation that late. Similar for commercial. It is a labor issue and controlling things is not as conducive/easy on industrial side. Also, a concern on commercial side because loads that are targeted are already off after earlier.
One member stated that they have 4 sites that participate. A couple of them run 24/7 and a couple of them don't, but in past, they were able to shut down early one day and pick up the next day. Going into September, some participants might not have significant load going into September. Right now, they nominate on a weekly basis. If they participate in June/July but not August, they can reduce their nomination, but not sure about flexibility in 5-10 pm time frame. They would be able to participate in the first part of an event.
One member stated that it is important for the company to do the analysis based on changing resources and they appreciate it.
Connie stated it is Idaho Power's intent to continue to analyze in tandem with the 2021 IRP. Idaho Power recognized that at the early stages of the IRP that changes that would be beneficial in 2022, that's what is driving the September filing. Specific changes will be brought back to EEAG as we work through 2021 IRP.
12:25 pm-Wrap/Up Discussion.

Rosemary announced that the next meeting is August 12th, and that it has not been determined if it will be in person or virtual. Rosemary asked for comments from members on the meeting overall.

- Thanks for a good meeting.
- I appreciate everyone's feedback and please reach out to Idaho Power if you have other thoughts or comments.
- Thank you, I enjoyed the meeting. Thanks to Chellie for highlighting one of the Simplot projects that we're proud of.
- I. would rather go to an in-person meeting. My hearing is getting questionable and it is difficult to hear everything. I appreciated the demand response presentation. I have been in some discussion with different people on this over the past several months. I think the power company will need to adjust quicker than what a new look would allow. I endorse Idaho Power's thought to making corrections in current program as we look at making changes in the future.
- Thanks, it was a good meeting If there's more info at the next meeting on how the company will manage backlog especially with Weatherization Solutions and Easy Savings. Those customers have been impacted so I am interested to see how we'll reach out to them.

12:35 pm Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated 8/12/2021
Webinar

Present:

Don Strickler–Simplot
Wil Gehl- City of Boise
Taylor Thomas–Idaho Public Utilities Commission
Sid Erwin–Idaho Irrigation Pumpers Association
Diego Rivas–Northwest Energy Coalition
Dainee Gibson-Webb-Idaho Conservation League-sitting in for Ben Otto
Jim Hall-WaFd Bank
Quentin Nesbitt*-Idaho Power
Anna Kim–Public Utility Commission of Oregon
John Chatburn–Office of Energy & Mineral Resources
Connie Aschenbrenner–Idaho Power
Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Evie Scrivner-Community Action Partnership Assoc.

Guests and Presenters*:

Billie McWinn*-Idaho Power
Tracey Burtch*–Idaho Power
Shelley Martin–Idaho Power
Trevor Shultz*–Idaho Power
Melissa Thom*–Idaho Power
Todd Greenwell–Idaho Power
Chellie Jensen*–Idaho Power
Zack Thompson-Idaho Power
Curtis Willis-Idaho Power
Andee Morton-Idaho Power
Brad Iverson-Long- Idaho Public Utilities Commission
Kevin Keyt- Idaho Public Utilities Commission
Gabriel Neimark-Idaho Power Intern
Sheree Willhite-Idaho Power
Erica Shiflet-Idaho Power
Mindi Shodeen-Idaho Power
Andres Valdepena Delgado-Idaho Power
Dahl Bietz-Idaho Power
Chad Severson*–Idaho Power
Theresa Drake–Idaho Power
Andrea Simmonsen–Idaho Power
Annie Meyer-Idaho Power
Cheryl Paoli–Idaho Power
Zeke VanHooser-Idaho Power
Chris Pollow–Idaho Power
Kathy Yi*-Idaho Power
Denise Humphreys-Idaho Power
Donn English- Idaho Public Utilities Commission
Terri Carlock- Idaho Public Utilities Commission
Nick Sayen- Public Utility Commission of Oregon
Tonja Dyke-Idaho Power
Krista West-Idaho Power
Katie Pegan-Office of Energy & Mineral Resources
Kieran Sprague
Peter Richardson-Industrial Customers of Idaho Power

Note Takers:

Shawn Lovewell (Idaho Power) with Kathy Yi (Idaho Power) and Zack Thompson (Idaho Power)

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30am

Rosemary started the meeting with EEAG member and guest introductions. There were no comments or questions on the May notes. Quentin highlighted the meeting agenda and Theresa announced that Billie McWinn is back in the Customer Relations and Energy Efficiency department. She was working as a Regional Customer Relations Manager in the Canyon region.

9:40 a.m.-2021 System Load—Trevor Schultz

Trevor provided an overview of Idaho Power's late June system load and the new system peak that occurred on June 30th. There were questions about the resource breakdown for the June 30th peak and the company's comfort level of the EIM imports vs. non-firm transmission. Trevor stated that the company is more comfortable with EIM imports because of the resources available to replace that load. One member asked about current water conditions and what the hydro forecast looks like.

9:49 a.m.- Lighten the Load—Melissa Thom

Melissa provided an overview of the company's #LightentheLoad campaign. In response to the extreme hot weather, the Corporate Communications media team reached out to customers to ask them to conserve energy through press releases, energy efficiency tips on the website, and a lighten the load specific webpage. Customers started to share how they were conserving energy via social media. Melissa asked the group if they saw any of Idaho Power's communications and how they participated in #lightentheload.

- I didn't do much, but I did raise my thermostat to 73 degrees on my AC. I normally like it much cooler than that.

- I raised my thermostat to 74 degrees. I did remember hearing that lighten the load was promoted to prevent blackouts. I also thought it was good that the company explained the reasoning behind the 4pm-9pm timeframe.

10:02 a.m.-Financials—Quentin Nesbitt

Quentin provided an update on the Oregon and Idaho Rider balances and the year-to-date energy savings and expenses by sector and program. There were no comments or questions from EEAG members.

10:06 a.m.- Cost-Effectiveness Quick Look—Kathy Yi

Kathy provided a brief look at cost-effectiveness for all programs but focused the discussion on the Commercial Energy-saving kits (CSK), Irrigation Efficiency Menu offering, and the Heating and Cooling Efficiency program (H&CE). There were questions and comments on items that are included in the CSK and if they incorporate items that could impact refrigeration savings. Kathy answered that the items within the kit would not impact refrigeration savings, but the company can investigate that as part of the RFP responses. One member asked what the savings breakdown is between heating and cooling. Kathy answered that the majority is heating savings as cooling savings is minimal.

10:41 a.m.-Commercial, Industrial, & Irrigation programs—-Chellie Jensen

Chellie introduced new employees Andee Morton and Curtis Willis, and summer intern Gabe Neimark. She provided an update on program performance year-to-date and highlighted measure changes for the New Construction and Retrofit programs implemented June 15th, 2021. Updates on the commercial and industrial trainings, school cohorts, and the Integrated Design Lab trainings were provided. Chellie also covered the Irrigation Menu changes and the company's proposed timeline for implementation. There was no comment from EEAG members on this timeline.

There were questions and comments about the 50001 Ready Cohort participants and if they would be candidates for other Idaho Power offerings. Chellie stated that it is a Department of Energy program, and customers were eligible to participate if they haven't participated in an existing Strategic Energy Management program. It is a platform for Idaho Power to inform them what other programs they can participate in and if they achieve savings, they could earn an energy management incentive. One member asked if there were customer survey postcards provided in the Commercial Energy Saving kits that a customer could self-report installations. The Program Specialist answered that there is a survey included. The kit vendor offers a $100 monthly sweepstakes to encourage participation. One member asked if the company has been able to quantify load reduction during the most recent heat wave. Quentin answered that they have reached out to the Load Research to see if that is a possibility. It will likely be difficult to do so, but he will report back at the November meeting with any new information.

11:30 a.m.-Residential Programs—-Billie McWinn

Billie provided preliminary year-to-date energy savings by program and customer participation, she provided an update on the programs that have been impacted by COVID, the Weatherization Solutions job cost calculator, and is seeking EEAG input on the 2022 Shade Tree events, and the new customer welcome kits.

Weatherization managers are transitioning to a new state auditing tool in October. Because Idaho Power had built in integration with the existing auditing tool for job cost calculations the company has been working and will continue to work with Program Managers and CAPAI to develop and improve a new job cost calculator. Idaho Power will discuss calculator improvements with EEAG at the November meeting. One member asked if these tools affect Oregon calculations or just Idaho. The Program Specialist answered that it is for both Oregon and Idaho. Energy savings will be calculated based on the whole home.

Billie provided an overview of the changes made in 2021 for tree delivery in the Shade Tree program. Trees were mailed to customer instead of having in person events due to COVID. She is seeking EEAG input for 3 proposed delivery options for the company to pursue for 2022.

EEAG Feedback

- There seems to be more risk with having an in-person event, so I am in favor of continuing with another year of the direct mail event.

- I am in favor of the hybrid model. This will allow someone with safety concerns to still participate. The company needs to communicate that direct mail trees will be smaller to address customer satisfaction concerns. The in-person events seem to be more effective. I like giving people options.

- I also like the hybrid model. We participated in the program this year and the trees showed up on our door without notice. We were on our way out of town and the tree may have died over the weekend on our front porch.

Billie stated that she is hearing a preference toward the hybrid model and not much appetite for in-person events only option.

The company is looking to change the contents of its Welcome Kits due to the decrease in lighting savings. She highlighted the different kit options the company is exploring with the associated costs, savings and cost-effectiveness ratios.

EEAG Feedback

- No matter what modifications are made, it doesn't appear that they will be cost-effective. The company should focus on marketing, customer satisfaction, and education while minimizing costs. It could just be a kit that contains a night light and educational materials.

- The difference in UCT is not that significant given that they are all around .30. I wouldn't put too much weight on that parameter. I like option 4.

- I think I put preference on option 4 if the intent is education. Looking at this as a welcome kit then this is a good reminder for customers. I don't think people should be stockpiling bulbs in their closets. Most people probably don't install all 4 bulbs at once.

Billie informed the group of a new online marketplace that the company is exploring. This marketplace will allow customers to explore the purchase of energy efficient products and is intended to increase buyer education. Customers could also receive instant markdowns on the purchase of approved energy efficient products. She highlighted some of the features incorporated into the marketplace, such as product comparisons, buying guides, and marketing examples. At the next EEAG meeting the company will provide updates on progress with the vendor.

12:30 Lunch

1:04 Meeting Reconvened

1:04 p.m.-Energy Trust of Oregon (ETO) Energy Efficiency Pilots—Chad Severson

Chad reviewed all the energy efficiency measures piloted by the ETO between 2018-2020. He discussed the fourteen pilots that Idaho Power analyzed and solicited input from EEAG on Idaho Power's recommended path forward.

EEAG Feedback

- Extended Capacity Heat Pumps have the potential for a lot of savings in colder heating zones but also have installation challenges. In the next 6-12 months there should be more savings information available.

- There needs to be an educational component to the automated thermostat optimization since it is an opt-in feature. If they are going to be used for energy savings, then the company should consider making sure a customer is aware of the features and how they help save more energy.

- As commercial buildings continue to see increased electrification there may be more savings potential associated with installation of commercial smart thermostats.

- The pay for performance model has come and gone. Early on there were concerns about gaming the system due to changing household characteristics. I would advise the company to be cautious with this model.

- I would encourage Idaho Power to keep exploring and monitoring the manufactured home replacement program. It might be worth looking at the potential savings numbers associated with running a program like this, and not just cost-effectiveness.

- I would also encourage the company to continue to monitor a manufactured home replacement program. I recognize there is a large cost but there are great benefits. It might be worth exploring or looking into co-funding with other partners. I do recognize that it is not an easy program to implement.

1:45 p.m.-Demand Response Update—Quentin Nesbitt

Quentin provided a brief overview of the company's existing three demand response programs and the current program parameters. He explained the effective load carrying capacity of demand response and changes to the program design that are under consideration.

There were questions and comments from EEAG members on the proposed program changes

- Would 2 hours still be considered an "event?" Quentin stated that yes, 2 hours is still an event.

- Would the Flex Peak program change to Monday thru Saturday or stay the same? Quentin answered that it would stay the same for now, Monday-Friday.

- Has the company thought about using thermostats instead of switches for the AC Cool Credit program? Quentin answered that the company has looked and will continue to look at that option, but a significant investment has already been made in the switches and software.

- Will the company speak about other demand response offerings that it is looking at? Quentin stated that these other offerings have been discussed at the Integrated Resource Planning meetings. The focus of this presentation is to discuss how existing programs need to change.

- Could there be some problems associated with increased marketing push with larger than expected enrollment and costs? Quentin stated that in AC Cool Credit program, marketing does drive participation and that marketing can be controlled or paused if participation numbers are too large to keep up with. In the irrigation program marketing is to all customers all at once. This was also done prior to the settlement agreement however, an installation fee was charged to the small pumps to help cover the cost and keep the program cost effective, this also influences participation. The company will be proposing an installation fee for smaller pumps.

- What is the capacity difference between automatic and manual pump participation? Quentin stated that manual pump participation is around 80MW.

- Would switches be removed from non-participating irrigation customers and be used for new participants? Quentin stated that yes, switches can be tested and reused. Typically for irrigation, switches are not removed due to lease and renting of farms, unless a customer specifically asks for it to be removed it stays.

- What is the useful life of a switch? Quentin stated that it is not really know but a number of switches are replaced each year due to a variety of reasons. The failure rate is built into the cost of the program.

- The company should consider using the 7-11pm timeframe to target the automatic switching irrigators. Quentin stated that the way the program is structured, those customers can choose that timeframe.

2:23 p.m.- Marketing—Tracey Burtch

Tracey updated EEAG on marketing efforts the company is pursuing for the commercial, industrial, and residential programs, the Summer EE Contest, and Summer EE Guides. The Summer EE Contest ran for ten days and customers were asked how they save energy on their summertime laundry. The company received 5,000 entries with a chance to win a new energy efficient washer and dryer. The company recently launched some weather-triggered digital billboard ads that would provide energy efficient tips based on how the temperature changed outside. These messages helped maintain awareness and gave customers one simple action that they could implement right away to save energy. The company also increased marketing for the Residential New Construction program during the second and third quarter of 2021. A direct mailing was sent out to contractors that included a letter and program brochure.

2:30p.m.-Wrap-up

- I appreciated the meeting and discussion
- It was a good meeting, thanks
- I will still be participating in the demand response program with some reluctance of the 11p.m. timeframe. There are a lot of economic pressures on irrigators so there is need for irrigators to stay in or join the program
- It was a good meeting with a full agenda. I know we are having a 5th Flex Peak event today. As we get the proposed changes, I will work with our sites, we have 4 that participate.
- I look forward to hearing more about the new Marketplace offering
- Thank you, I enjoyed this meeting
- Thank you, I appreciated the program discussions today

2:36 p.m. Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated November 10, 2021
Webinar

Present:

Tina Jayaweera – Northwest Power Planning and Conservation Council
Sidney Erwin – IIPA
Anna Kim – OPUC
Kacia Brockman – OPUC
Taylor Thomas – IPUC
Diego Rivas – Northwest Energy Coalition
Don Strickler - Simplot
Ben Otto - ICL
Connie Aschenbrenner – Idaho Power
Wil Gehl – City of Boise
Jim Hall – WaFd Bank
Quentin Nesbitt – Idaho Power

Not Present:

John Chatburn Office of Energy and Mineral Resources
Evie Scrivner – CAPAI

Guests and Presenters*:

Alexa Sakolsky-Basquill – Didn't get affiliation
Andee Morton - Idaho Power
Andrea Simmonsen - Idaho Power
Becky Arte Howell –Idaho Power
Billie McWinn* – Idaho Power
Chad Ihrig – Franklin Energy
Chad Severson – Idaho Power
Chellie Jensen* – Idaho Power
Cheryl Paoli – Idaho Power
Chris Pollow - Idaho Power
Curtis Willis - Idaho Power
Dahl Bietz – Idaho Power
Don Reading – Industrial Customers of Idaho Power
Jordan Prassinos – Idaho Power
Kathy Yi* – Idaho Power
Kevin Keyt – IPUC
Kimberly Bakalars* - Tetra Tech
Krista West - Idaho Power
Mark Bergum* - Tetra Tech
Melissa Thom - Idaho Power
Michelle Toney – Idaho Power
Mindi Shodeen - Idaho Power
Nick Sayen – OPUC
Peter Richardson – Industrial Customers of Idaho Power
Rosemary Curtin - Moderator
Shelley Martin – Idaho Power
Sheree Willhite - Idaho Power
Terri Carlock – IPUC
Theresa Drake – Idaho Power
Todd Greenwell - Idaho Power
Tonja Dyke – Idaho Power
Tracey Burtch* - Idaho Power
Zack Thompson – Idaho Power

Note Takers:

Chad Severson (Idaho Power), Zack Thompson (Idaho Power), Kathy Yi (Idaho Power)

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30 a.m. – Introduction

The facilitator, Rosemary Curtin, welcomed and introduced EEAG members and guests. There were no questions on the August meeting notes. Quentin highlighted the meeting agenda.

9:40 a.m.-Announcements

Quentin introduced the new members of EEAG and Idaho Power or Company Energy Efficiency (EE) teams:

- Evie Scrivner – New CAPAI CEO
- Michelle Toney – Joining Research Analysis Group

Idaho Power followed up on a question from the August meeting regarding whether Idaho Power could quantify the impact of the Lighten the Load Campaign in summer 2021. Jordan Prassinos, Idaho Power's Load Research and Forecasting Manager provided information on the campaign stating there are a lot of variables that make it difficult to get an accurate result. The demand profiles of the average residential customer – before, in the middle, and after the heat dome – seem to indicate a demand reduction but are unable to attribute the decline to the campaign effort. One member commented about how this is an interesting problem to quantify and suggested if the company does the campaign again next summer, to send out messages such as, "Last year, the campaign saved us X." The member believes this would help increase customer participation.

9:50 a.m.-Year-To-Date Financials & Savings & Evaluation Plans – Quentin Nesbitt

Quentin presented the current Rider balances, YTD savings, and the evaluation plans for 2022 and 2023. Confirmed the Idaho Rider's under-collected balance is diminishing partly because there are some fewer expenditures due to Covid and some higher revenue due to the hot summer.

Quentin provided an overview of the Evaluation Plan for 2022. Home Energy Audits and Multifamily are being pushed back another year. The Shade Tree calculator will update with 2022 audit information.

EEAG Questions and Feedback:

- There was a question about addressing the negative Idaho Rider balance or when it would be addressed. Connie commented that the company would continue to monitor the Rider balance, however there isn't a plan for a near-term adjustment. The timing and impact of rate increases make it challenging, especially with current conditions. Ideally, the company would prefer to time increases to the Rider with rate reductions.
- Are the savings and expenses tracking to budget? Quentin responded that in general, they are not entirely tracking to budget. Activity hasn't kicked back up, but it's closer for Commercial and Irrigation (C&I). Yet, the activity is down from last year as 2020 was a high year of EE savings. He advised Chellie and Billie will go over program-specific details.

- There was a question about the Demand Response (DR) impact evaluations completion date. Quentin responded that the evaluations are ongoing and will be done for our annual DSM report.

- One member wanted to know what 'other' evaluation is. Quentin advised they are Impact Evaluations that are conducted internally. For example, the company does evaluation on the DR programs each year and another example, the WAQC program, the company will use the tools prior evaluators used and run that evaluation internally between third-party evaluations.

10:00 a.m.-NWPCC 2021 Power Plan – Tina Jayaweera

Tina Jayaweera presented the 2021 NWPCC draft Power Plan published in August. She presented that the plan shows a paradigm shift where there is less low-cost energy efficiency.

Tina commented that the world is very different from the 2016 Power Plan, as clean energy policies affect how EE is cost-competitive with large renewable energy builds and significant coal plant retirements. As seen in California, the 'duck curve' is starting to move north. The study included the influence of climate change and how that impacts generation and load. Demand response and energy efficiency will be necessary for minimizing risks in a more dynamic market. Energy efficiency is about half of what it was. Renewables are more cost-competitive, and low-cost EE has been accomplished, for the most part. To be competitive, EE now needs to be $30-$40 per MWh because it's more challenging to deliver energy efficiency measures to the residential sector. Most EE is now in C&I, where there is still lighting available and good potential with motors. Tina presented that traditional DR is still important and is what Idaho Power is currently doing. Also looking for DR that can be frequently deployed with little impact on customers.

EEAG Questions and Feedback:

- There was a question about distribution voltage regulation’s (DVR) impact on industrial locations as it seems it would be more sensitive than a home. Tina stated most customers won't notice. The potential for industrial and agriculture is reduced because there will be impacts. She estimates about 20% of industrial loads could be impacted by DVR.

- There was a statement about the value of energy efficiency changing and that EE needs to address the flexibility within the grid and the narrowing ramping times. It was stated that in the past, one cause for concern was the block of hours during summer afternoons. It was stated that Efficiency can help address the need hours, but they are shifting. There was a question on whether there is value in a narrower band of hours and not larger blocks? Does the plan show what EE measures people implement in their homes? Tina commented about how load shapes support materials and details of cost-effectiveness methodologies. She further added load shape is overlaid on pricing and the ones that save energy have the most value during peak times. There are some uncertainties with load shapes, as the information must be accurate. Therefore, further study about the methodologies is needed. Practical measures are shifting to help with the 'net' loads. Energy prices are now high at 'net' need and not in the middle of the day.

- There was a question about the measures installed five years ago, where today, an implementer wouldn't consider those measures? What is significant now? Tina said with their increasing knowledge, they better understand the measures that are working during high-demand hours.

There are significant differences in the value of efficiency during the summer months. In the past, the season wasn’t as important as the region. Today, the time of day is more notable year-round. Some measures that had no value, now have a higher value such as engine block heaters.

- Another question was if there are other examples in the plan that identify the important measures? Tina answered there is a workbook posted that has a cost calculation per measure for value calculations. Tina also mentioned the public comment period for the Power Plan and that questions and comments are welcomed.

10:35 a.m.-Cost-Effectiveness View – Kathy Yi

Kathy gave an overview of cost-effectiveness by program and a detailed look at some programs requiring attention. She's requested feedback on Commercial Saving Kits. Due to time constraints, additional discussion regarding the Commercial Saving Kits will occur during the C&I update. Three options for Commercial Energy Saving Kits were presented:

1. Keep as is

2. Remove items that the RTF has deactivated

3. Make one kit and deliver it as a Welcome Kit

A 4th option emerged during the conversation where a single kit was made for all customers but delivered using the current 'by request' method.

Kathy presented the Demand Side Management (DSM) avoided cost comparison, 2021-2022 program assumptions, residential DSM Programs, and Commercial, Industrial, and Irrigation (CI&I) DSM Programs.

Kathy provided an overview of the program’s cost and benefit value per home for 2019 Multifamily Energy Savings and Energy House Calls programs, noting both were impacted by COVID and are a focus for 2022. The Energy House Calls program offers free services from contractors for all-electric manufactured homes with a furnace or heat pump. Kathy provided the costs for the program, which include travel costs and test fees but not admin fees.

The Multifamily Energy Savings Program involves free direct installs of selected energy efficiency measures for property owners and managers who have multifamily properties with electric water heaters. Kathy provided an overview of the program's cost and benefit value per home for 2019 and the benefit value per home for 2022 savings and RTF updates for both programs. She stated the company would further discuss these programs in future EEAG meetings.

EEAG Questions and Feedback:

- What is causing the 2025 and 2026 increase in avoided costs for the 2017 and 2019 IRP graph lines? Does this suggest that capacity is on day one in 2015? Kathy said the increase is caused by the inclusion of a capacity benefit when there is a capacity deficit.

- Are there any cooling savings for Heat Pumps? Kathy acknowledged the savings for cooling but added the season is too short, and the savings are small.

- What is the waitlist timeframe for Energy House calls and how long will it take to get through it? Billie advised there are about 125 jobs on the waitlist, but there are also supply chain issues that will be discussed during the residential portion of the EEAG meeting.

- I would like to see the cost of the Commercial Saving Kit – Option 3 – as compared to the current kits. Have the Commercial ESK been evaluated? Kathy answered the kits would cost less and be distributed to more customers. Quentin said the evaluation will come next year.

- What is the difference in delivery systems for the options, would Option 3 be sent to all new customers, and will they be delivered differently than Option 1? Kathy stated the intent for Option 3 is to send to all new commercial customers. Chellie added she will dive more into this during the C&I presentation.

11:05 a.m.-5 Minute Break

11:10 a.m.-Meeting Reconvened-Residential update – Billie McWinn

Billie presented an update of year-to-date savings in comparison to last year. She said due to lighting, savings are lower than the previous year. As of October, in-home work has resumed for many programs. She advised while many EE programs have resumed normal operations, some are facing contractor staffing shortages and supply chain issues.

EEAG Questions and Feedback:

- There was a question about residential new construction and how the program works with the new codes and standards. Billie answered in the following year, we consider any changes after savings are locked in.

- When did the code go into effect? Todd said decisions for the new code were made on Jan 1, 2021 and are implemented in 2022. Billie added that she will check in with the Program Specialist, Becky, for a more detailed response. Todd advised that the software that calculates the savings is under modification. Therefore, Becky would need to comment.

- One member asked about the Multi-Family Direct Install. Wants to know if the company has researched common area type measures such as lighting, adding how Avista includes common area measures in their program. Kathy answered the savings have been on measures installed in the units themselves and haven't included common area measures. She will follow up if we have evaluated common areas or have offered this in the past.

Billie presented an update to the Brio Pilot, stating the focus is on ductless heat pumps (DHP). This pilot aims to drive customer uptake of residential DHP installations by collaborating with DHP manufacturers, distributors, and contractors to increase installations and identify DHP supply chain needs.

EEAG Questions and Feedback:

- It's great that manufacturers are helping. But there are concerns about the savings that will come out on the other end because they may not be well-targeted applications, and many may not result in much savings. Wants to raise caution and maybe target installations going forward after the pilot. Billie added that DHPs are meant to test this market transformation concept (using supply chains to move the market). The company will continue to monitor cost-effectiveness and savings. With manufacture's cost-sharing, maybe the company can decrease costs enough for participants to gain higher interest.

Billie presented updates for EE Programs. She noted, as suggested at a previous meeting, the company is using a hybrid method for the Shade Tree Program. The company believes 500 trees is a manageable amount to test spacing out pick-ups, and should there be a need to cancel events, the company will have the ability to look at alternatives for those trees. Plus, getting larger trees should lead to earlier energy savings and higher customer satisfaction.

Billie provided new measures being considered for Heating and Cooling Efficiency. The company is exploring additional program measures due to program changes over the last year. The company strives to continually assess programs to ensure customers are provided with the best options.

A follow up from the last meeting about Welcome Kit options – increased cost configurations for 2022. The company can get higher lumen bulbs, resulting in higher savings. Billie also noted the consideration of 2 LED nightlights.

EEAG Questions and Feedback:

- What are the assumptions of what an 1100 lumen bulb will be replacing? I also like option 2. My initial gut reaction is that people like bright lights. Denise and a member both commented, 1100 lumen is 75-watt equivalent.

- I like option 2 as well.

- Another member added Option 2 (brighter bulbs) is more likely to be used. Maybe there isn't a need for 4 bulbs, as 2 or 3 would be good.

- I don't remember the details but how many 60-watt equivalents are in a person's house vs. 75-watt? I think there might be more 60-watt. Option 2 and 3 - it's probable that the 1100 lumen bulbs are replacing the 60-watt. If there are both bulbs, people are more likely to use them in the wrong locations. Gather a little more into what's known about households and validate the need for higher lumen bulbs.

- I tend to agree with the others regarding more of the high lumen bulbs (Option 2). Option 3 might be worthwhile but offer education on where to put the bulbs.

- One member was surprised to see the cost of the nightlight kit at $14. Denise offered that a large part of the costs is shipping and putting together the kit and the cost of shipping is the same ($7.25) no matter which kit is sent.

Billie presented an update on Idaho WAQC funding and solicited feedback on ideas for spending the growing carry-over balance. In recent years, the agencies haven't been able to spend the funds allocated for weatherization and the impacts from COVID resulted in a large amount of unspent funds accumulated in 2020 and 2021. The company presented several possible ideas for consideration, including replace older HVACs with heat pump or looking for ways to give back some funds to customers through a one-time transfer to the Idaho Rider, the PCA, or possibly other low-income channels.

EEAG Questions and Feedback:

- When was WAQC program restarted? Billie answered in June 2020.

- I don't like the idea of a give-back mechanism as the weatherization need is too big. I agree heat pump installations have merits. In Montana, the approximate cost was the same for a one-time fund that was for home repair costs, but some simply couldn't be weatherized because of the use of federal money. An option could be to use these funds for home repairs such as fixing a hole in a roof then weatherizing the home.

- Offer one-time funding for special projects. The Idaho Commission approved a similar program with Avista, so this could be an option.

- I don't like the idea of reducing the balance by giving back the amount. I like the idea of major projects on homes and old projects for heat pumps. I would like to discuss the waitlist and energy assistance for those with electric resistance heat and other opportunities for creative ideas.

- I'm curious to know what this is looking like regionally, across our CAP agencies. Idaho Power answered some typically spend all, some have a tough time, but the last two years have been difficult for most agencies.

- There seems to be an increase in funding for state weatherization's but it's coming out of the infrastructure bill. The ability to get workers out to homes can be difficult. How can the throughput be increased? The need is there, the money is available, but need to close the gap and get the work done. Suggest we take some time to figure out how to get more homes weatherized with additional funds likely pending.

12:30 p.m.-30-Minute Lunch Break

1:00 p.m.-Meeting Reconvened with C&I&I Program update – Chellie Jensen

Chellie presented program savings and participation updates on the current year vs. previous years, focusing on new construction where the savings were nearly doubled. She explains this is due to payments coming through for several large projects.

Chellie went over the increased lighting incentives and stated that the company is ahead of where it was last year. Project submittals are down, and summer numbers are lower than 2020. The company is hopeful that incentive increases will help fill the pipeline.

Chellie presented an update on the outreach strategy for the Small Business Direct Install Program. She advised invoices for April-June haven't been processed, so those projects are not reflected in the data and discussed COVID impacts. The Eastern Region is completed, and the SBDI started outreach in the Southern Region.

For Custom Projects, Chellie stated the company had more projects and more savings at this time last year. However, the future project list looks good, and the pipeline is healthy.

Chellie went into further detail about Commercial Savings Kits, presented in the Cost-Effectiveness presentation. She said the company is on track to meet targets and get bids for kits from other vendors. Idaho Power is searching for ways to reduce the cost and look at simplifying the kits. There is a gap in service with supply chain issues and/or a new contract with a new vendor. Chellie also noted the kits program was before Small Business Direct Install, and there will be an evaluation next year. The options for ESKs – Option 1 – No change, savings are based on survey results which may not be reliable. Option 2 – Modify kit, savings assumptions are locked for 2022. Attempt to improve the cost-effectiveness by removing items that do not provide much benefit or that have been removed from RTF. Option 3 – Simplify kit, to one kit configuration to encourage participation in other programs. The purpose is to target small businesses. Therefore, SBDI would be a better program and will have a report of customers who have already received a kit.

EEAG Questions and Feedback:

- How long are the contracts for this program? Can the program be changed in the middle of a contract if they aren't modified? Chellie answered contracts generally are multi-year and can be canceled or changed.
- Option 3 looks like a separate program and seems to have a lot of different savings regarding installation percentages. The evaluation of Option 3 demonstrates a loss of validity.
- Option 3 does appear to be a different program. Option 1 doesn't seem to be an option. Spray valves are standard (non-measure). Power strips don't show savings as well.
- Keeping these measures is a waste because there are minimal savings. I have no opinion on 2nd exit sign LEDs. I like Option 3, but it is a different program and that is too much change for the evaluation.
- Chellie added that Option 3 doesn't necessarily have to be a Welcome Kit type of program where we send to everyone. She suggested it could be just one kit, available upon request.
- One member said that Option 3 sounds good considering the evaluation issues are resolved.
- Three other members commented they also liked Option 3.
- What are the measures that are being taken out? If a spray valve is old, can that be replaced? A member explained retrofits vs. replacement when broken. The replacements would get efficient units.

- Maybe SBDI could do retrofits of these measures? A member said these are kits. It isn't known what was in there before.

- Chellie proposed a new option, Option 4 - simplifying kits to a single kit like Option 3 but keeping the current delivery mechanism. Many members liked the idea.

- Let the evaluation guide between options 2 and 4. If it's Option 4, let's keep track of where the kits are going (restaurant, retail, office) instead of creating new kits.

- I think it would be great if it can go to existing folks but also for new contacts. Maybe those can be measured differently. Maybe the kit can be for anyone.

Chellie presented updates for the Energy Management Programs along with the development and progress. She shared the Find and Fix offering and the development of the Commercial Assessment Tool, which is a one-stop-shop offering. The idea is that we can visit the site, perform the updates right there, and quickly identify the immediate savings. Chellie added the company is incorporating a standard method for quantifying energy savings associated with air leak identification and repairing compressed air leaks.

The company had an opportunity to recruit customers to participate in a new Technical Assistance Program sponsored by DOE to further the adoption of 50001Ready with industrial customers. The program will offer free support to organizations who commit to developing an energy management system. The program supports efforts to gather data and insights to better understand the drivers, challenges, opportunities, and successful strategies to advance improved energy management throughout the US economy. They started a 5-member cohort in May/June and we were able to encourage 2 Idaho Power customers to participate plus we Langley Gulch, our combined cycle plant, is participating. DOE approved a second cohort to start in the fall and out of 6 potential Idaho Power customers that were initially interested, we had one customer sign up. For a total of 4 Idaho representatives in the 2 cohorts.

Chellie introduced a potential new cohort for industrial wastewater customers. This cohort will be focusing on the technical opportunities to give operators the skills that they can use right away and will have webinars, treasure hunts and trainings, much like our other program designs. For most industrials the focus is typically on the product. Wastewater part of the plant is backburner and not a lot of time is spent optimizing them. Chellie shared that we are optimistic that this cohort will have success with savings if we can have a successful recruitment.

EEAG Questions and Feedback:

- For sustained cohorts: are they steady, or are there improvements? Is there tracking? Chellie said the company had taught them and transitioned them to be sustaining on their own. It is up to them to continue the models and are not being tracked or incentivized for savings. We will support them if they have an issue with the model or need re-baselining. We will invite them to future workshops for additional learning and sharing their experiences.

- Regarding the industrial wastewater cohort: I think this is a good idea. Reliability is key. There are energy savings, and people are interested but may not be the most efficient due to reliability. There are also concerns regarding confidentiality and the need to overcome that in a cohort.

- One member said their organization is a big fan of any program that saves energy and cleans up wastewater. It appears to be a good program. He appreciates the comments regarding confidentiality and competition. Chellie mentioned there might be fewer individuals sharing out in workshops to account for the confidentiality.

- Another member mentioned that he understands the Irrigation Peak Rewards program will need to change. Suggested to keep in mind that most participants are happy with the Peak Rewards DR.

1:55 p.m.-5-minute break

2:00 p.m.- Meeting Reconvened with Evaluation Presentation – Tetra Tech

Kimberly Bakalars and Mark Bergum from Tetra Tech organized a presentation on the evaluations, methods, results, and recommendations for the 2020 program year for Irrigation Peak Rewards and Small Business Direct Install Programs.

There was a comment from a member about how he uses these incentives and can provide some perspective. The Menu Incentive works for customers with pivots who regularly upgrade sprinklers and pressure regulators. Some incentives encourage the proper use of equipment. However, the incentive must be high enough to ensure the customer will do the work. Custom incentives are generally long-term matters and long-term energy savings.

2:45 p.m.-Marketing Update - Tracey Burtch

Tracey presented a company marketing effort update. She shared a KTVB spotlight (commercial) for residential, the fall contest, and some educational bill inserts and emails. For C&I, she gave updates about the Energy@work newsletter than a video on the new building for the Swan Falls High School. One member stated he likes the Swan Falls video and the inclusion of features that save energy. It gave specific measures on the incentives customers can potentially receive and ways to save energy.

3:00 p.m.-Discussion-Wrap-up – Rosemary Curtin

- Thanks! Great materials and presentations. A lot of information was covered well. I appreciate that. What's on my mind is the big burst of federal money coming into energy efficiency and seeing what can be done with that.

- Good job emphasizing the areas you're seeking feedback. I think a lot is going on with EE and more to come.

- Don't have anything to add right now. I appreciate the chance for the commission’s staff to sit in.

- Thank you for the opportunity.

- Thank you for the discussion. Lots of information and dedication to cost-effective EE. I'll see what I can do at my house to do my part.

- Thank you for the opportunity for me to present NWPCC the plan. I liked having the opportunity to share and how the points of feedback were called out.

- Don't have anything else to add. I appreciate Tina's presentation.

- Thought the presentations had a lot of good information. I learned things I didn’t know. I liked the call-out for feedback.

- Michelle Toney will be reaching out regarding the dates for the 2022 meetings. Looking at the same cadence of February, May, August, and November.

3:15 p.m.-Meeting Adjourned

NEEA MARKET EFFECTS EVALUATIONS

Report Title	Sector	Analysis Performed By	Study Manager
2015 Washington State Energy Code Energy Savings Analysis—Commercial Provisions	Commercial	Mike D Kennedy	NEEA
2018 Washington Residential Code Energy Savings Analysis	Residential	Ecotope	NEEA
2020 BOC Dataset Analysis	Commercial, Industrial	BrightLine Group	NEEA
2020 Luminaire Level Lighting Controls Incremental Cost Study	Commercial, Industrial	Energy Solutions	NEEA
2020 Residential Lighting Market Analysis	Residential	Apex Analytics. DNV	NEEA
2025 Strategic Planning Briefing Paper: Diversity, Equity and Inclusion Trends	Residential, Commercial, Industrial	NEEA	NEEA
2025 Strategic Planning Briefing Paper: Market Transformation Trends	Residential, Commercial, Industrial	NEEA	NEEA
2025 Strategic Planning Briefing Paper: National Trends	Residential, Commercial, Industrial	NEEA	NEEA
2025 Strategic Planning Briefing Paper: Northwest Regional Trends	Residential, Commercial, Industrial	NEEA	NEEA
ASHRAE 100 Users' Guide	Residential, Commercial, Industrial	RDH Building Science	NEEA
Building Commissioning 2020 Long-Term Monitoring and Tracking Report	Commercial, Industrial	The Cadmus Group	NEEA
Combi System Field Study	Residential	Energy 350	NEEA
Commercial & Industrial Stand-Alone Fans Market Research	Commercial, Industrial	DNV	NEEA
Commercial and Industrial Pumps Standard Evaluation	Commercial, Industrial	TRC Companies	NEEA
Commercial Code Enhancement Market Progress Evaluation #1	Commercial	Energy& Resource Solutions	NEEA
Commercial Pre-Rinse Spray Valves Standard Evaluation	Commercial, Industrial	TRC Engineers	NEEA
Commercial Secondary Window Program Development Research	Commercial	Cadeo Group	NEEA
COVID-19's Impact on Energy Use: The Northwest End Use Load Research Project	Residential	NEEA	NEEA
Drive Power Initiative—2020 Long-Term Monitoring and Tracking Report	Commercial, Industrial	Cadmus	NEEA
Ductless Heat Pumps 2020 Long-Term Monitoring and Tracking Report	Residential	Johnson Consulting Group	NEEA
EXP07 Value Engineering Memo and PowerPoint	Residential	Underwriters Laboratory	NEEA
Extended Motor Products Pump and Circulator Baseline Assumptions Review	Commercial, Industrial	Apex Analytics	NEEA
Heat Pump Water Heater ACE Model Review	Residential	Ecotope, Larson Energy Research	NEEA
Heat Pump Water Heater Qualified Products List	Residential	NEEA	NEEA
Home Builders Market Research Report	Residential	Cadmus	NEEA
Investigation of Airtightness and Ventilation Interactions in New Multifamily Buildings—Phase II	Residential	Ecotope	NEEA

Report Title	Sector	Analysis Performed By	Study Manager
Investigation of Airtightness and Ventilation Interactions in New Multifamily Buildings—Phase III	Residential	Ecotope	NEEA
Laboratory Assessment of Rheem Generation 5 Series Heat Pump Water Heaters	Residential	Larson Energy Research	NEEA
Luminaire Level Lighting Controls—Market Progress Evaluation Report #1	Commercial, Industrial	Cadmus Group, Michael Mutmansky, TRC Companies	NEEA
Manufactured Homes Market Progress Evaluation #1	Residential	Apex Analytics	NEEA
Maximizing Mini-Split Performance Report	Residential	Sustainabilist, Resilient Edge, Bruce Harley Consulting, Ridgeline Energy Analytics	NEEA
NEEA 2022 Operations Plan	Residential, Commercial, Industrial	NEEA	NEEA
NEEA External Power Supply Standard Evaluation: Final Report	Commercial, Industrial	TRC Companies	NEEA
NEEA Q1 2021 Codes, Standards and New Construction Newsletter	Residential, Commercial	NEEA	NEEA
NEEA Q1 2021 Emerging Technology Newsletter	Residential, Commercial, Industrial	NEEA	NEEA
NEEA Q1 2021 Quarterly Report	Residential, Commercial, Industrial	NEEA	NEEA
NEEA Q2 2021 Codes, Standards and New Construction Newsletter	Residential, Commercial	NEEA	NEEA
NEEA Q2 2021 Emerging Technology Newsletter	Residential, Commercial, Industrial	NEEA	NEEA
NEEA Q2 2021 Quarterly Report	Residential, Commercial, Industrial	NEEA	NEEA
NEEA Q3 2021 Codes and Standards Newsletter	Residential, Commercial	NEEA	NEEA
NEEA Q3 2021 Quarterly Report	Residential, Commercial, Industrial	NEEA	NEEA
NEEA Q4 2020 Codes, Standards and New Construction Newsletter	Residential, Commercial	NEEA	NEEA
NEEA Q4 2020 Emerging Technology Newsletter	Residential, Commercial, Industrial	NEEA	NEEA
NEEA Q4 2020 Quarterly Report	Residential, Commercial, Industrial	NEEA	NEEA
Next Step Homes Pilot Phases 2 and 3 Summary	Residential	CLEAResult	NEEA
Non-Powered Damper Gas Storage Water Heater Lab Testing	Commercial, Industrial	GTI	NEEA
Northwest Smart Thermostat Research Study	Residential	Apex Analytics	NEEA
Oregon Residential Specialty Code: 2005 Baseline and Code Roadmap to Achieve the 2030 Goal	Residential	Ecotope	NEEA
Q1 2021 Market Research and Evaluation Newsletter	Residential, Commercial, Industrial	NEEA	NEEA

Report Title	Sector	Analysis Performed By	Study Manager
Q2 2021 Market Research and Evaluation Newsletter	Residential, Commercial, Industrial	NEEA	NEEA
Q3 2021 Emerging Technology Newsletter	Residential, Commercial, Industrial	NEEA	NEEA
Q3 2021 Market Research and Evaluation Newsletter	Residential, Commercial, Industrial	NEEA	NEEA
Q4 2021 Market Research and Evaluation Newsletter	Residential, Commercial, Industrial	NEEA	NEEA
RBSA 2022 Introductory Webinar Slides	Residential	NEEA	NEEA
RBSA 2022 Webinar #2 Slides	Residential	NEEA	NEEA
RBSA 2022 Webinar #3 Slides	Residential	Evergreen Economics	NEEA
Retail Product Portfolio Market Progress Evaluation Report #1	Residential	Cadeo Group	NEEA
Televisions Planning Assumptions Review	Residential	Cadeo Group	NEEA
The Northwest End-Use Load Research (EULR) Project	Residential	Association of Energy Engineers	NEEA
Variable Refrigerant Flow ASRAC Working Group Evaluation	Residential, Commercial, Industrial	TRC Engineers	NEEA
Variable Speed Heat Pump Smart Thermostat Findings	Residential	Energy 350	NEEA

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
2021 Task 1: Foundational Services Summary of Projects	Commercial	IDL	Idaho Power	Assistance and Education
2021 Task 2: Lunch and Learn Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	Training and Education
2021 Task 3: BSUG Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	Training and Education
2021 Task 4: New Construction Verifications Summary of Projects	Commercial	IDL	Idaho Power	Verifications
2021 Task 5: Energy Resource Library Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	Assistance and Education
2021 Task 6: Energy Impacts of IAQ Devices	Commercial	IDL	Idaho Power	Research

2020 Task 1: Foundational Services

Summary of Projects

Idaho Power Company External Year-End Report

December 31, 2021

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 2021_001-01

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Prepared by:
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Author:
Damon Woods

Prepared for:
Idaho Power Company

Contract Number:
IPC KIT # 5277

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

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ACRONYMS AND ABBREVIATIONS

AIA	American Institute of Architects
ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
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 2021 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 shown in Figure 1 outlines the three phases. 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.

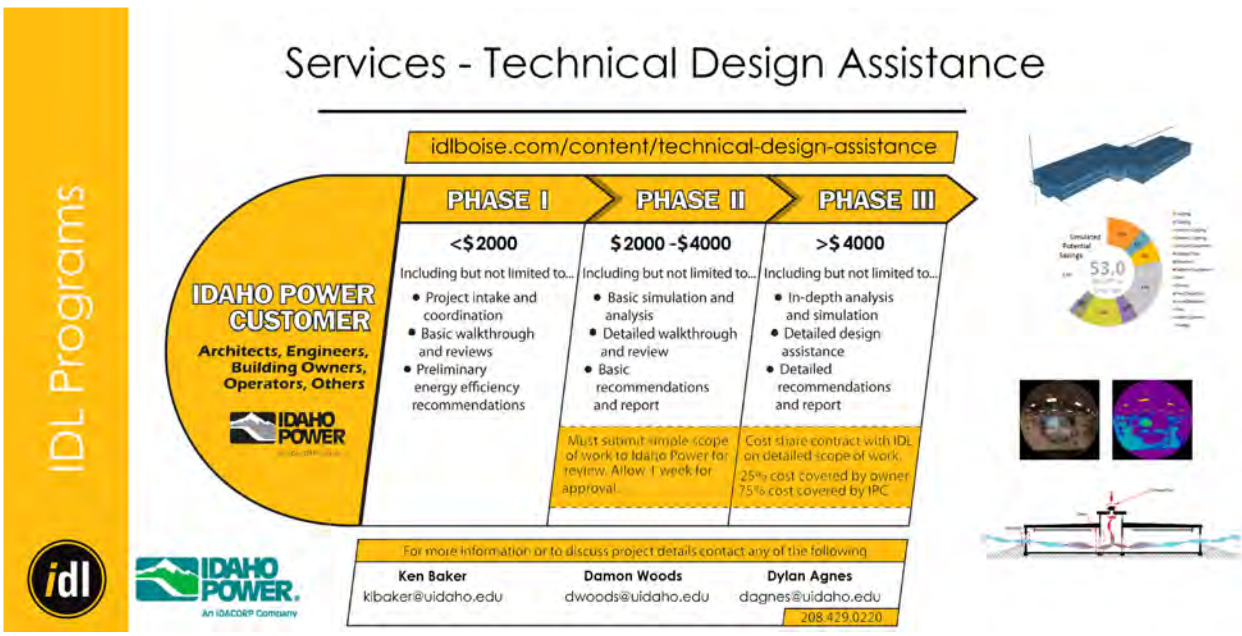

Figure 1: Foundational Services Flyer Outlining Phases

2. Project Summary

The IDL worked on at least 16 Foundational Service projects in 2021. These included some direct trainings with local firms on daylighting and energy modeling. Projects involved multiple community and non-profit centers throughout Idaho Power Service Territory. The technical assistance provided in 2021 was more involved and focused than in year's past.

Projects consisted of email responses, personal trainings, technical reports, and memos. In total, there were nine Phase I projects,three Phase II projects, and two Phase III projects. Two other projects are underway and have yet to be fully scoped. The full list of projects is shown in Table 1 below.

Table 1: Summary of Technical Assistance Projects for 2021

Type	Phase	Status	Notes	w	Ft^2	Locatio
Community	3	Complete	Energy modeling and efficiency assistance for new learning center	New	5,000	Blaine County
Community	TBD	Underway	Retrofit considerations for older building	Retro	TBD	Twin Falls County
Community	1	Underway	Envelope and operational savings investigation for pet adoption center	Retro	3,000	Gem County
Mix	1	Underway	Ventilation upgrades for COVID	Retro	TBD	Blaine County
Healthcare	1	Complete	QAQC on energy modeling of adding waterside economizer on central chiller plant	Retro	N/A	Ada County
Military	3	Underway	Training on energy audits and strategic energy management	Retro	30,000	Ada County
Agricultural	TBD	Not Started	Discussion of energy efficiency options prior to construction of large agrucultural research centers	New	40,000	Twin Falls County
ARCH - Training	2	Complete	Training on energy modeling tools and incorporation into current practice for firm Y	New	N/A	Ada County
Mixed-Use	2	Complete	Exploration of passive design strategies and envelope options for new development (focused on commercial side only)	New	10,000	Valley County
ARCH - Training	1	Complete	Discussion of daylighting training to incorporate into firm X's current practice	New	N/A	Ada County
Healthcare	1	Complete	Support of HVAC efficiency options for LTC facility personnel and owners	Retro	N/A	Statewide
Mixed-Use	1	Underway	Estimating savings of HPWH installation for central plant in Boise's climate	New	100,000	Ada County
Community	1	Complete	Determining whether to replace just bulbs or full ballasts for LED retrofit	Retro	7,000	Canyon County
Training	1	Complete	Sharing weather normalization strategies for design work	N/A	N/A	Ada County
Community	2	Complete	Exploring LED side-lighting options to avoid roof penetrations in restroom areas.	New	5,000	Ada County
Healthcare	1	Complete	Responding to questions on design considerations for VRFs and DOAS for new clinic design	New	TBD	Ada County

2021 Task 2: Lunch and Learn

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2021

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes

Report Number: 2021_002-01

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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
PoE	Power over Ethernet
TBD	To Be Determined
UI	University of Idaho
USGBC	U.S. Green Building Council

1. 2021 SUMMARY AND CUMULATIVE ANALYSIS

Table 1: 2021 Lunch and Learn Summary

	Date	Title	Presenter	Group / Location	Attendees
1	3/18	High Efficiency Heat Recovery	Damon Woods	Open Webinar	11
2	3/31	Indoor Air Quality (IAQ) & Energy Efficiency in Building	Ken Baker	Open Webinar	17
3	4/12	Daylight in Buildings: Getting the Details Right	Dylan Agnes	Open Webinar	12
4	4/21	Dedicated Outdoor Air Systems (DOAS) Integration	Damon Woods	Open Webinar	5
5	4/28	The Architect's Business Case for Energy Performance Modeling	Ken Baker	Open Webinar	7
6	5/6	The Architect's Business Case for Energy Performance Modeling	Ken Baker	Open Webinar	5
7	5/12	OpenStudio Parametric Analysis Tool	Dylan Agnes	Open Webinar	8
8	5/18	High Performance Classrooms	Damon Woods	Open Webinar	5
9	5/27	LEED V4.1 Daylighting Credits	Dylan Agnes	Open Webinar	6
10	6/15	ASHRAE 209 Energy Simulation Aided Design	Damon Woods	Open Webinar	1
11	6/24	ASHRAE 36 High Performance Sequences of Operations for HVAC Systems	Damon Woods	Open Webinar	15
12	9/21	High Efficiency Heat Recovery	Damon Woods	Open Webinar	9
13	10/26	The Architect's Business Case for Energy Performance Modeling	Dylan Agnes	Open Webinar	3
14	11/21	Luminaire Level Lighting Controls	Dylan Agnes	Open Webinar	0
15	-	-	-	-	-
16	-	-	-	-	-
17	-	-	-	-	-
18	-	-	-	-	-
19	-	-	-	-	-
20	-	-	-	-	-
				Total Attendees	104

Table 1 on the previous page summarizes all Lunch and Learn presentations given in 2021. The statistics in this section are cumulative for the 14 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:	29	Electrician:	0
Engineer:	28	Contractor:	0
Mech. Engineer:	10	Other:	37
Elec. Engineer:	0	None Specified:	0
Total (Online):	104		

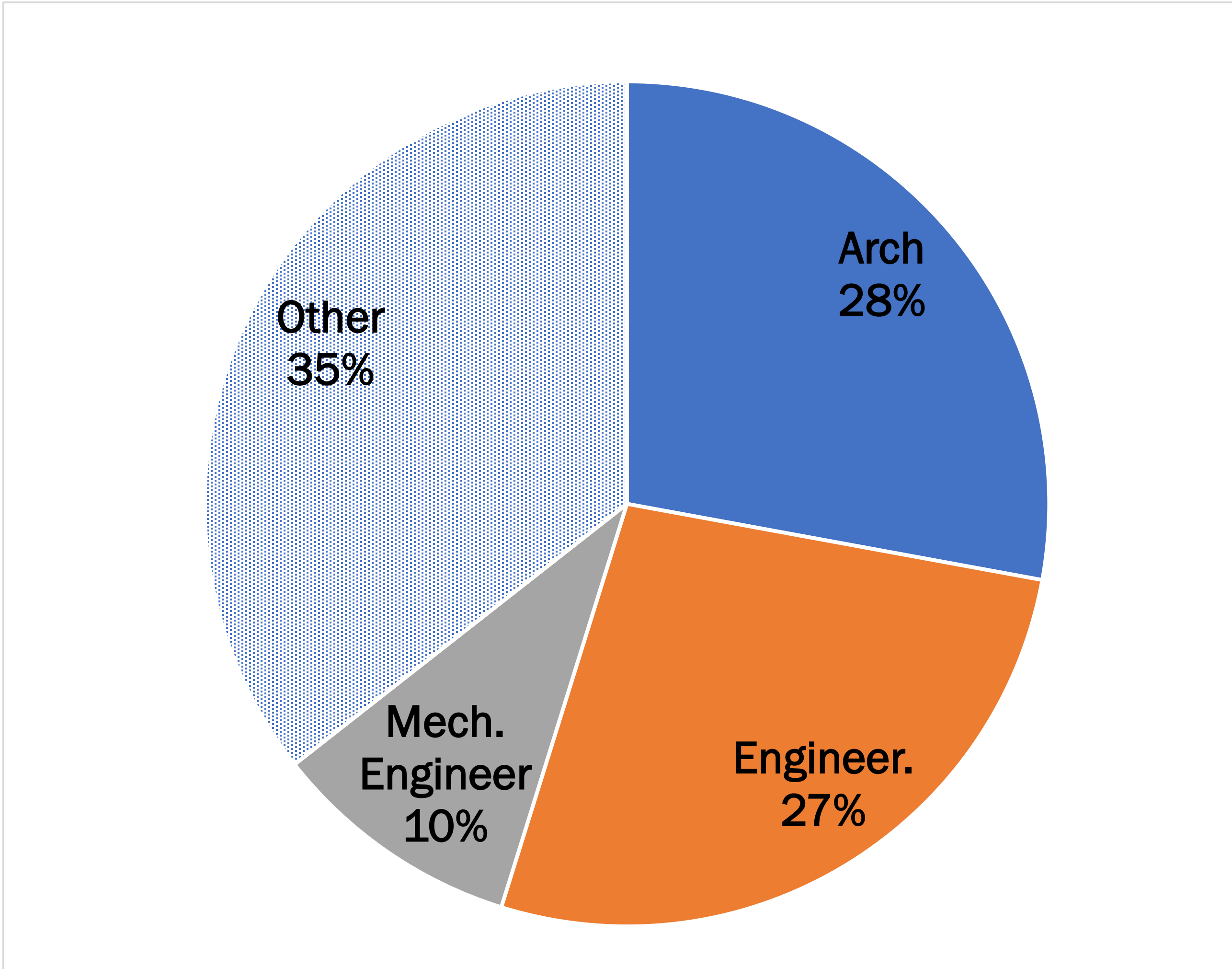


Figure 1: Attendee Profession

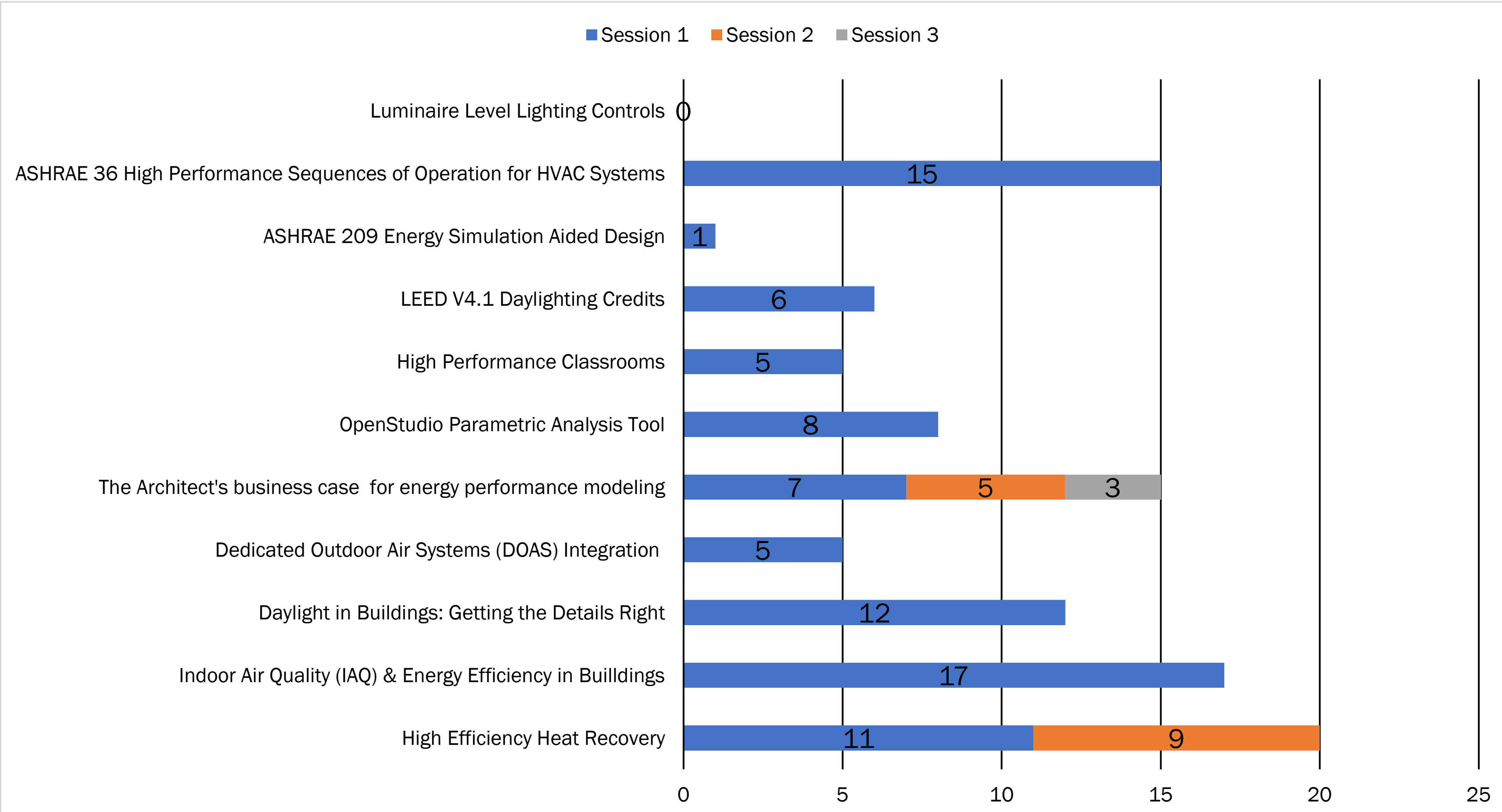


Figure 2: Attendee Count by Title and Number per Session

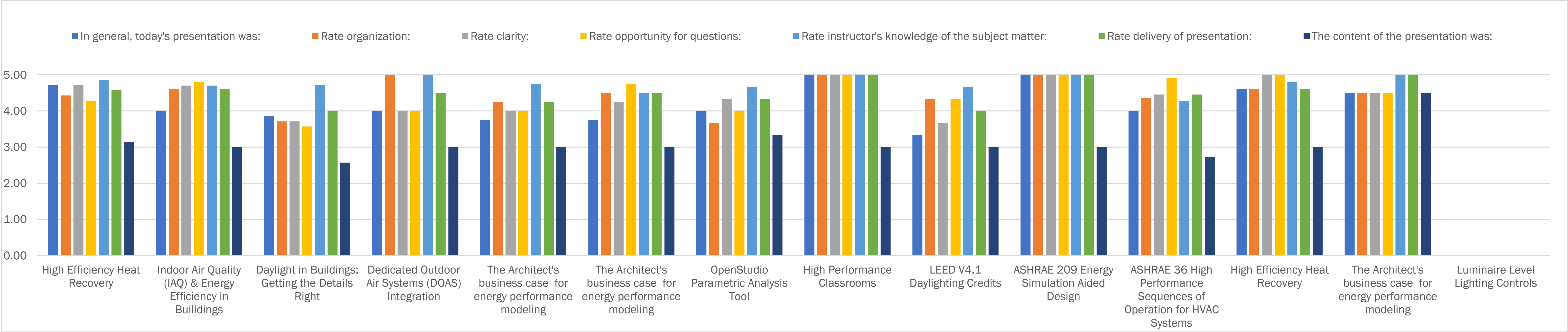
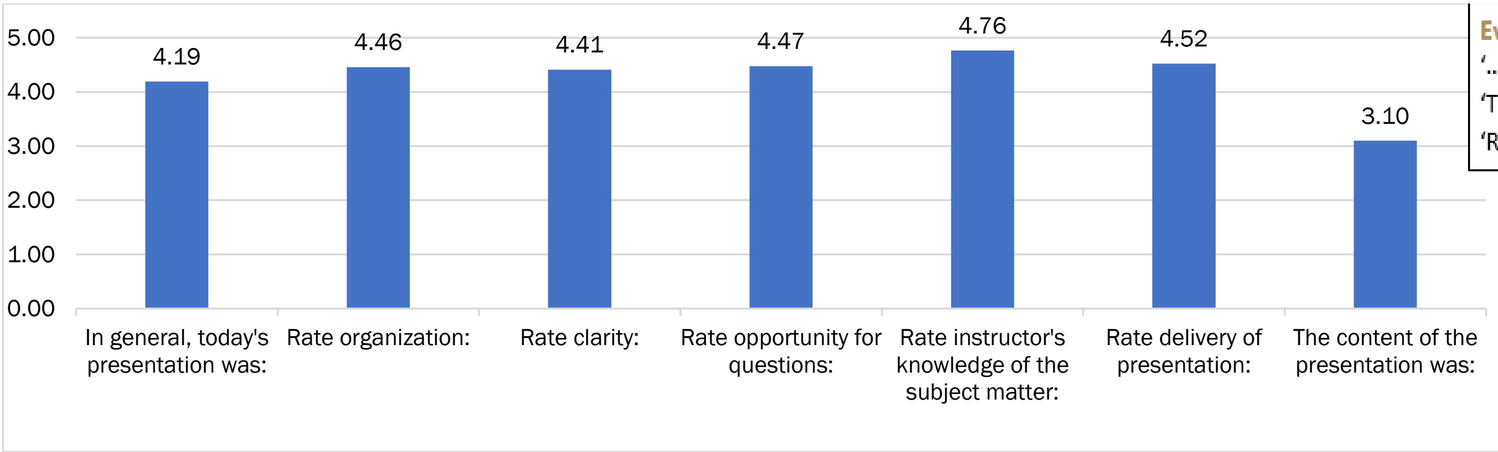


Figure 3: Average Evaluations by Session Title



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. 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: HIGH EFFICIENCY HEAT RECOVERY (03/18/2021)

Title: High Efficiency Heat Recovery

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

Presentation Info:

Date:	03/18/21
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		Other:	5
Elec. Engineer:		None Specified:	
Total (Online):	**11**		

2.2 SESSION 2: INDOOR AIR QUALITY (IAQ) & ENERGY EFFICIENCY IN BUILDINGS (03/31/2021)

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

Description: In an effort to make buildings operate 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:	03/31/21
Location:	Open Webinar – Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	6	Electrician:	
Engineer:	6	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	17		

2.3 SESSION 3: DAYLIGHT IN BUILDINGS – GETTING THE DETAILS RIGHT (04/12/2021)

Title: Daylight in Buildings – Getting the Details Right

Description: The second talk in a sequence intended to instruct on the process of creating high quality and comfortable day-lit spaces focuses on getting the details right. After the schematic design is formed to appropriately deliver daylight to the important surfaces within a space, there are several details that can make or break the overall success of the project. This presentation discussed several details, ranging from interior surface colors and reflectance, to interior space layouts, furniture design, window details (including glazing specifications), and shading strategies. The presentation introduces concepts of lighting control systems to ensure that energy is saved from the inclusion of daylight.

Presentation Info:

Date:	04/12/21
Location:	Open Webinar – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	4	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	12		

2.4 SESSION 4: DEDICATED OUTDOOR AIR SYSTEMS (DOAS) INTEGRATION (04/21/2021)

Title: Dedicated Outdoor Air Systems (DOAS) Integration

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:	04/21/21
Location:	Open Webinar – Boise, ID
Presenter:	Ken Baker

Attendance:

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

2.5 SESSION 5: THE ARCHITECT'S BUSINESS CASE FOR ENERGY MODELING (04/28/2021)

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:	04/28/21
Location:	Open Webinar – Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	2
Elec. Engineer:		None Specified:	
Total (Online):	**7**		

2.6 SESSION 6: THE ARCHITECT'S BUSINESS CASE FOR ENERGY MODELING (05/6/2021)

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:	05/6/21
Location:	Open Webinar - Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	2	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	5		

2.7 SESSION 7: OPENSTUDIO PARAMETRIC ANALYSIS TOOL (05/12/2021)

Title: OpenStudio Parametric Analysis Tool

Description: 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.

Presentation Info:

Date:	05/12/21
Location:	Open Webinar - Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	1	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other:	4
Elec. Engineer:		None Specified:	
Total (Online):	8		

2.8 SESSION 8: HIGH PERFORMANCE CLASSROOMS (05/18/2021)

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 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.

Presentation Info:

Date:	05/18/21
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other:	6
Elec. Engineer:		None Specified:	
Total (Online):	5		

2.9 SESSION 9: LEED V4.1 DAYLIGHTING CREDITS (05/27/2021)

Title: LEED V4.1 Daylighting Credits

Description: LEED Daylighting credits are one of the most difficult to achieve and requires an early investment for validation. However, investigating daylight opportunities for a project will assist in other aspects of energy efficiency, such as, estimating heating and cooling loads or integrating a building's control systems. As such, any time spent in the early design phase investigating if a project should invest in daylighting is applicable to facets of energy efficient design that is often required for LEED projects. In this lecture we will discuss the changes from LEED V4 to V4.1 Daylighting Credits, which options work best for project types, incorporating early energy/simulation modeling into the design process, and how to run a cost-benefit analysis to determine if you should invest in daylighting.

Presentation Info:

Date:	05/27/21
Location:	Open Webinar – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	2	Electrician:	

Engineer:	1	Contractor:	
Mech. Engineer:		Other:	3
Elec. Engineer:		None Specified:	
Total (Online):	6		

2.10 SESSION 10: ASHRAE 209 ENERGY SIMULATION AIDED DESIGN (06/15/2021)

Title: ASHRAE 209 Energy Simulation Aided Design

Description: Learn about ASHRAE's recommendations for energy simulation aided design. This lecture will cover methods of integrating modeling into the design process to meet aggressive energy savings targets. Learn how to implement load-reducing modeling cycles early in the design process. Quantify the energy impact of design decisions in real time. And, use post-occupancy modeling to enhance building performance. Whether trying to achieve LEED, tax credits, or efficiency incentives, energy modeling can help improve the bottom line for both designers and clients.

Presentation Info:

Date:	06/15/21
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

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

2.11 SESSION 11: ASHRAE 36 HIGH PERFORMANCE SEQUENCES OF OPERATION FOR HVAC SYSTEMS (06/24/2021)

Title: ASHRAE 36 High Performance Sequences of Operation for HVAC Systems

Description: The best equipment can still run terribly if it's not controlled well – like a sports car in the hands of a clueless driver. Don't let that happen to your design. Get the latest guidelines on sequences of operation for common HVAC sequences. Take advantage of Idaho Power's incentives on HVAC energy management controls. Get a refresher proper start-up and shut down sequences for air handling units including VAVs, rooftop units, and heat pumps. Ensure that controls are in compliance with indoor air quality standards for ASHRAE 62.1 compliance and COVID mitigation. Participants will learn functional tests they can perform that can confirm that proper sequences are in place.

Presentation Info:

Date:	06/24/21		
Location:	Open Webinar – Boise, ID		
Presenter:	Damon Woods		

Attendance:

Architect:	2	Electrician:	
Engineer:	9	Contractor:	
Mech. Engineer:		Other:	4
Elec. Engineer:		None Specified:	
Total (Online):	**15**		

2.12 SESSION 12: HIGH EFFICIENCY HEAT RECOVERY (09/21/2021)

Title: High Efficiency Heat Recovery

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

Presentation Info:

Date:	09/21/21		
Location:	Open Webinar – Boise, ID		
Presenter:	Damon Woods		

Attendance:

Architect:	1	Electrician:	
Engineer:	7	Contractor:	
Mech. Engineer:		Other*:	1
Elec. Engineer:		None Specified:	
Total (Online):	**9**		

2.13 SESSION 13: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (10/26/2021)

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

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

Presentation Info:

Date:	10/26/21
Location:	Open Webinar – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

2.14 SESSION 14: LUMINARIE LEVEL LIGHTING CONTROLS (11/21/2021)

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:	11/21/21
Location:	Open Webinar – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	0		

3. FUTURE WORK

Feedback was gathered from the 61 Lunch and Learn evaluations received throughout 2021. The comments from these were valuable but were limited in the type of response that could be given. We saw a significant increase in attendance of virtual Lunch and Learns in 2020, however, in 2021 we observed a significant decrease in attendance. For more details please refer to the summary and cumulative analysis table. This drop in attendance can be attributed virtual training fatigue. Most of our audience are not attending virtual lectures unless required to meet a specific licensing requirement. The open lectures in virtual format means that the same topic is delivered to all A&E firms at once, and with a limited number of topics, attendees quickly cycle through the topics they are interested in. Visiting individual firms in person encourages participant engagement and material can be tailored to a firm's specific interests.

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: HIGH EFFICIENCY HEAT RECOVERY (03/18/2021)

Title: High Efficiency Heat Recovery

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

Presentation Info:

Date:	03/18/21
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		Other:	5
Elec. Engineer:		None Specified:	
Total (Online):	**11**		

Evaluations:

		Scale
In general, today's presentation was:	**4.7**	1 Not Useful - 5 Very Useful
Rate organization:	**4.4**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.7**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.3**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.9**	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.

4.1.2 SESSION 2: INDOOR AIR QUALITY (IAQ) & ENERGY EFFICIENCY IN BUILDINGS (03/31/2021)

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

Description: In an effort to make buildings operate 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:	03/31/21
Location:	Open Webinar – Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	6	Electrician:	
Engineer:	6	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	**17**		

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

		Scale
In general, today's presentation was:	4.0	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:	4.8	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.7	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.6	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.

4.1.3 SESSION 3: DAYLIGHT IN BUILDINGS – GETTING THE DETAILS RIGHT (04/12/2021)

Title: Daylight in Buildings – Getting the Details Right

Description: The second talk in a sequence intended to instruct on the process of creating high quality and comfortable day-lit spaces focuses on getting the details right. After the schematic design is formed to appropriately deliver daylight to the important surfaces within a space, there are several details that can make or break the overall success of the project. This presentation discussed several details, ranging from interior surface colors and reflectance, to interior space layouts, furniture design, window details (including glazing specifications), and shading strategies. The presentation introduces concepts of lighting control systems to ensure that energy is saved from the inclusion of daylight

Presentation Info:

Date:	04/12/21
Location:	Open Webinar – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	4	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	**12**		

Evaluations: No evaluations were collected for this webinar.

		Scale
In general, today's presentation was:	**3.9**	1 Not Useful - 5 Very Useful
Rate organization:	**3.7**	1 Needs Improvement - 5 Excellent
Rate clarity:	**3.7**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**3.6**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.7**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.0**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**2.6**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.4 SESSION 4: DEDICATED OUTDOOR AIR SYSTEMS (DOAS) INTEGRATION (08/12/2021)

Title: Dedicated Outdoor Air Systems (DOAS) Integration

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:	04/21/21
Location:	Open Webinar – Boise, ID
Presenter:	Ken Baker

Attendance:

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

Evaluations:

		Scale
In general, today's presentation was:	4.0	1 Not Useful - 5 Very Useful
Rate organization:	5.0	1 Needs Improvement - 5 Excellent
Rate clarity:	4.0	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.0	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.5	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.

4.1.5 SESSION 5: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (04/28/2021)

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

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

Presentation Info:

Date:	04/28/21
Location:	Open Webinar – Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	2
Elec. Engineer:		None Specified:	
Total (Online):	7		

Evaluations:

		Scale
In general, today's presentation was:	**3.8**	1 Not Useful - 5 Very Useful
Rate organization:	**4.3**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.0**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.0**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.8**	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.

4.1.6 SESSION 6: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (05/6/2021)

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

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

Presentation Info:

Date:	05/6/21
Location:	Open Webinar - Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	2	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	5		

Evaluations:		**Scale**
In general, today's presentation was:	**3.8**	1 Not Useful - 5 Very Useful
Rate organization:	**4.5**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.3**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.8**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.5**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.5**	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.

4.1.7 SESSION 7: OPENSTUDIO PARAMETRIC ANALYSIS TOOL (05/12/2021)

Title: OpenStudio Parametric Analysis Tool

Description: 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.

Presentation Info:

Date:	05/12/21
Location:	Open Webinar - Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	1	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other:	4
Elec. Engineer:		None Specified:	
Total (Online):	**8**		

Evaluations:		**Scale**
In general, today's presentation was:	**4.0**	1 Not Useful - 5 Very Useful
Rate organization:	**3.7**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.3**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.0**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.7**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.3**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.3**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.8 SESSION 8: HIGH PERFORMANCE CLASSROOMS (05/18/2021)

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 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.

Presentation Info:

Date:	05/18/21
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	5		

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:	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:	3.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.9 SESSION 9: LEED V4.1 DAYLIGHTING CREDITS (05/27/2021)

Title: LEED V4.1 Daylighting Credits

Description: LEED Daylighting credits are one of the most difficult to achieve and requires an early investment for validation. However, investigating daylight opportunities for a project will assist in other aspects of energy efficiency, such as, estimating heating and cooling loads or integrating a building's control systems. As such, any time spent in the early design phase investigating if a project should invest in daylighting is applicable to facets of energy efficient design that is often required for LEED projects. In this lecture we will discuss the changes from LEED V4 to V4.1 Daylighting Credits, which options work best for project types, incorporating early energy/simulation modeling into the design process, and how to run a cost-benefit analysis to determine if you should invest in daylighting.

Presentation Info:

Date:	05/27/21
Location:	Open Webinar – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	2	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		Other:	31
Elec. Engineer:		None Specified:	
Total (Online):	6		

Evaluations:

		Scale
In general, today's presentation was:	3.1	1 Not Useful - 5 Very Useful
Rate organization:	4.3	1 Needs Improvement - 5 Excellent
Rate clarity:	3.7	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.3	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.7	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.0	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 evaluations collected.

4.1.10 SESSION 10: ASHRAE 209 ENERGY SIMULATION AIDED DESIGN (06/15/2021)

Title: ASHRAE 209 Energy Simulation Aided Design

Description: Learn about ASHRAE's recommendations for energy simulation aided design. This lecture will cover methods of integrating modeling into the design process to meet aggressive energy savings targets. Learn how to implement load-reducing modeling cycles early in the design process. Quantify the energy impact of design decisions in real time. And, use post-occupancy modeling to enhance building performance. Whether trying to achieve LEED, tax credits, or efficiency incentives, energy modeling can help improve the bottom line for both designers and clients.

Presentation Info:

Date:	06/15/21
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

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

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:	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:	3.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.11 SESSION 11: ASHRAE 36 HIGH PERFORMANCE SEQUENCES OF OPERATION FOR HVAC SYSTEMS (06/24/2021)

Title: ASHRAE 36 High Performance Sequences of Operation for HVAC Systems

Description: The best equipment can still run terribly if it's not controlled well – like a sports car in the hands of a clueless driver. Don't let that happen to your design. Get the latest guidelines on sequences of operation for common HVAC sequences. Take advantage of Idaho Power's incentives on HVAC energy management controls. Get a refresher proper start-up and shut down sequences for air handling units including VAVs, rooftop units, and heat pumps. Ensure that controls are in compliance with indoor air quality standards for ASHRAE 62.1 compliance and COVID mitigation. Participants will learn functional tests they can perform that can confirm that proper sequences are in place.

Presentation Info:

Date:	06/24/21
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:	9	Contractor:	
Mech. Engineer:		Other:	4
Elec. Engineer:		None Specified:	
Total (Online):	15		

Evaluations:		**Scale**
In general, today's presentation was:	4.0	1 Not Useful - 5 Very Useful
Rate organization:	4.4	1 Needs Improvement - 5 Excellent
Rate clarity:	4.5	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.9	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.3	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.5	1 Needs Improvement - 5 Excellent
The content of the presentation was:	2.7	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.12 SESSION 12: HIGH EFFICIENCY HEAT RECOVERY (09/21/2021)

Title: High Efficiency Heat Recovery

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

Presentation Info:

Date:	09/21/2021
Location:	Open Webinar – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	1	Electrician:	
Engineer:	7	Contractor:	
Mech. Engineer:		Other*:	1
Elec. Engineer:		None Specified:	
Total (Online):	**9**		

Evaluations: No evaluation were handed out

		Scale
In general, today's presentation was:	4.6	1 Not Useful - 5 Very Useful
Rate organization:	4.6	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:	4.8	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.6	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.

4.1.13 SESSION 13: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (10/26/2021)

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

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

Presentation Info:

Date:	10/26/21
Location:	Open Webinar – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

Evaluations: No evaluations were handed out

		Scale
In general, today's presentation was:	4.5	1 Not Useful - 5 Very Useful
Rate organization:	4.5	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:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	5.0	1 Needs Improvement - 5 Excellent
The content of the presentation was:	4.5	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.14 SESSION 14: LUMINAIRE LEVEL LIGHTING CONTROLS (11/21/2021)

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:	11/21/21

Location:	Architectural Organization 2 – Webinar
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	0		

Evaluations:		**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: No comments were made on the evaluations collected.

APPENDIX B: LUNCH AND LEARN 2021 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.

LEED V4.1 Daylighting Credits (Topic 2101)

LEED Daylighting credits are one of the most difficult to achieve and requires an early investment for validation. However, investigating daylight opportunities for a project will assist in other aspects of energy efficiency, such as, estimating heating and cooling loads or integrating a building's control systems. As such, any time spent in the early design phase investigating if a project should invest in daylighting is applicable to facets of energy efficient design that is often required for LEED projects. In this lecture we will discuss the changes from LEED V4 to V4.1 Daylighting Credits, which options work best for project types, incorporating early energy/simulation modeling into the design process, and how to run a cost-benefit analysis to determine if you should invest in daylighting.

ASHRAE Standard 209 – Energy Simulation-Aided Design (Topic 2102)

Learn about ASHRAE's recommendations for energy simulation aided design. This lecture will cover methods of integrating modeling into the design process to meet aggressive energy savings targets. Learn how to implement load-reducing modeling cycles early in the design process. Quantify the energy impact of design decisions in real time. And, use post-occupancy modeling to enhance building performance. Whether trying to achieve LEED, tax credits, or efficiency incentives, energy modeling can help improve the bottom line for both designers and clients.

ASHRAE Standard 36 – High Performance Sequences of Operation for HVAC Systems (Topic 2103)

The best equipment can still run terribly if it's not controlled well – like a sports car in the hands of a clueless driver. Don't let that happen to your design. Get the latest guidelines on sequences of operation for common HVAC sequences. Take advantage of Idaho Power's incentives on HVAC energy management controls. Get a refresher proper start-up and shut down sequences for air handling units including VAVs, rooftop units, and heat pumps. Ensure that controls are in compliance with indoor air quality standards for ASHRAE 62.1 compliance and COVID mitigation. Participants will learn functional tests they can perform that can confirm that proper sequences are in place.

2021 Task 3: BSUG
Summary of Effort and Outcomes
Idaho Power Company External Year-End Report

December 31, 2021

Prepared for:
Idaho Power Company

Author:
Dylan Agnes

Report Number: 2021_003-01

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IDL Director:
Damon Woods

Author:
Dylan Agnes

Prepared for:
Idaho Power Company

Contract Number:
IPC KIT #V2021224

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DISCLAIMER

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

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Table of Contents

1. Acronyms and Abbreviations

AIA	American Institute of Architects
App	Application
ARUP	London based multi-discipline firm
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
BCVTP	Building Controls Virtual Test-Bed
BEMP	Building Energy Modeling Professional
BESF	Building Energy Simulation Forum (Energy Trust of Oregon)
BIM	Building Information Modeling
BOMA	Building Owners and Managers Association
BSME	Bachelor of Science in Mechanical Engineering
BSUG	Building Simulation Users' Group
CBECS	Commercial Building Energy Consumption Survey
Comm	Commercial
Elec.	Electrical
HePESC	Heat Pump Energy Savings Calculator
HVAC	Heating, Ventilation, and Air Conditioning
IBPSA	International Building Performance Simulation Association
IDL	Integrated Design Lab
IPC	Idaho Power Company
LBNL	Lawrence Berkeley National Laboratory
LEED	Leadership in Energy & Environmental Design
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 2021 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 on the IDL website which can be found here: (http://www.idlboise.com/content/bsug-20).

3. 2021 Summary and Cumulative Analysis

In 2021, six sessions were coordinated and hosted. Sessions are summarized below with details in the following sections.

Table 1: Overall Summary of Sessions

Date	Title	Presenter	Presenter Company	RSVPs		Attendees	
				In-person	Online	In-person	Online
3/24	How high can you go – simulation study on high temperature cooling for radiant systems	Carlos Duarte	CBE	-	54	-	21
4/28	Building energy and systems analysis with Autodesk Revit and Insight	Ian Molloy	Autodesk	-	63	-	33
5/19	Weather normalization and climate design	Damon Woods	IDL	-	58	-	27
8/25	Automated 2D heat transfer using Grasshopper	Kyleen Rockwell	HKS	-	80	-	32
9/22	Designing for PoE lighting and automation	Joe Herbst	PoE Texas	-	24	-	13
10/27	Indoor air quality during lockdown – towards a new health integrated modeling framework	Elizabeth Cooper	UCL	-	57	-	28
				-	**336**	**-**	**154**
				336		**154**	

2021 Attendance

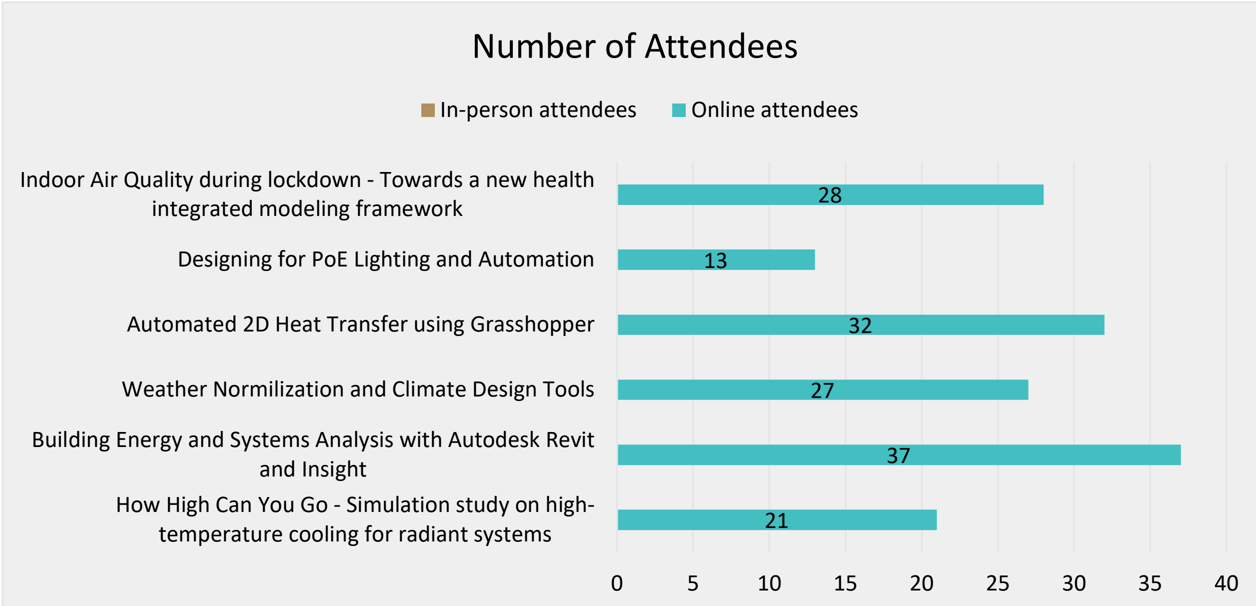


Figure 1: Attendee Count by Session and Type

Table 2: Overall Attendance Breakdown

Architect:	21	Electrician:	0
Engineer:	35	Contractor:	0
Mech. Engineer:	16	Other:	82
Elec. Engineer:	0	None Specified:	0
Total (In-Person):	**0**		
Total (Online):	**154**		
Total (Combined):	**154**		

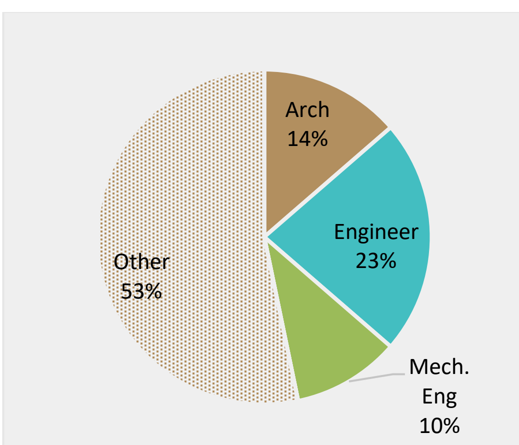


Figure 2: Attendee Profession Breakdown

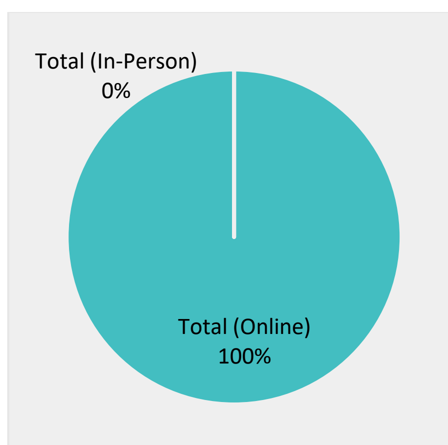


Figure 3: Attendee Type Breakdown

2021 Evaluations

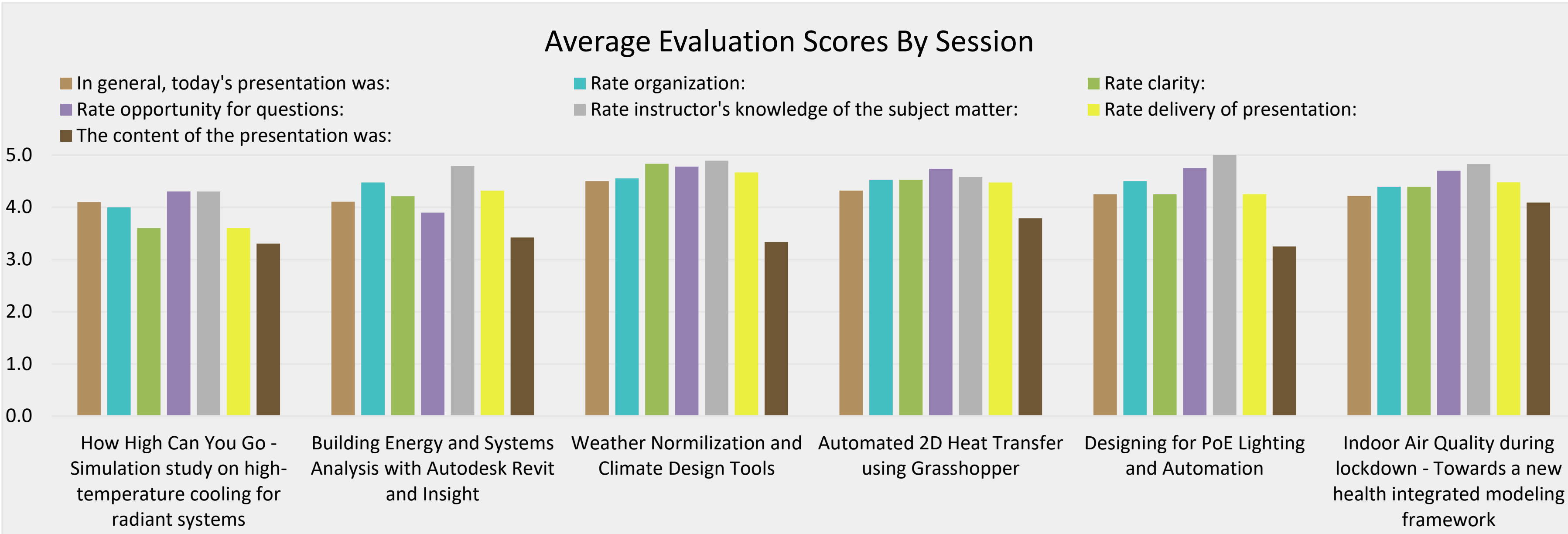
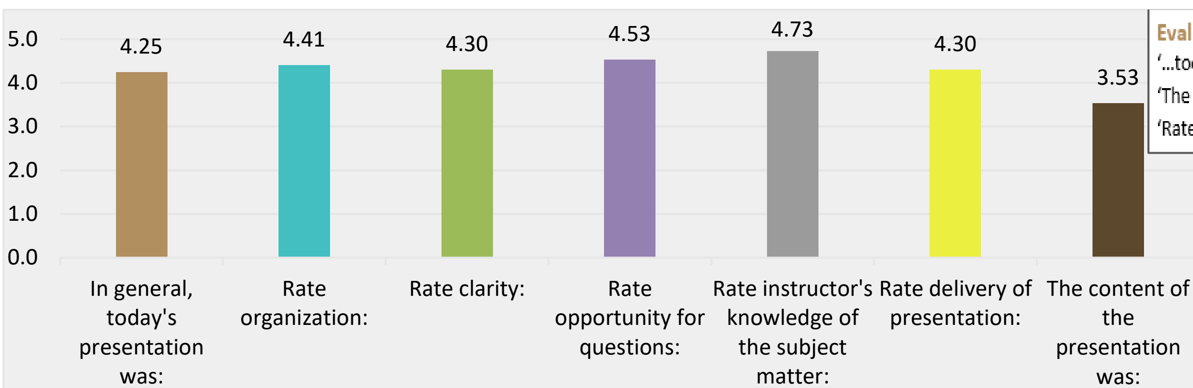


Figure 4: Average Evaluations by Session



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

Session 1: How high can you go – Simulation study on high temperature cooling for radiant systems (3/24/21)

Title: How high can you go – Simulation study on high temperature cooling for radiant systems

Date: 03/24/21

Description: The need for cooling is a major driver of energy consumption in buildings and is mostly handled using systems based on the refrigeration cycle, an energy- and cost-intensive process. In this presentation, we will go over a simulation study where we investigated the potential of eliminating the refrigeration cycle from the primary cooling system design in various US climates including all 16 California climate zones. We created single zone EnergyPlus models that use a high thermal mass radiant system (HTMR) as the primary cooling system and meet the climate zones' energy code requirements. We iteratively simulated each test case on its climate's cooling design day to determine the highest supply water temperature (SWT) to the HTMR that maintains comfortable conditions in the zone. The results show that HTMR can use SWT of 17.5, 20.8, 23 °C (63.5, 69.4, 73.4 °F) for the 25th, 50th, and 75th percentile, respectively, of test cases on the cooling design day, indicating a great potential of using HTMR coupled with low -energy and -cost cooling devices like evaporative cooling towers or fluid coolers.

Presenter: Carlos Duarte

Attendance:

Architect:	3	Electrician:	
Engineer:	6	Contractor:	
Mech. Engineer:	2	Other*:	10
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**21**		
*If 'Other' was noted:	Principal, Associate, PhD Candidate, Energy Analyst, President		

Session 2: Building energy and systems analysis with Autodesk Revit and Insight (04/28/21)

Title: Building energy and systems analysis with Autodesk Revit and Insight

Date: 04/28/21

Description: In this webinar, you'll get an overview of tools from Autodesk that provide architects and engineers with a solution for more integrated modeling, design and analysis. This will include:

- Revit and Automatic Energy Model Creation – Use architectural models at different levels of detail / completeness to automatically create accurate analytical spaces and surfaces for use in whole building energy simulation and systems analysis
- Concept/Schematic Stage Energy Analysis with Insight - Get quick, accurate guidance on whole building energy use and cost, see tradeoffs and set targets for key architectural and engineering factors from the earliest stages of design.
- HVAC Systems Selection and Sizing with Revit Systems Analysis - Determine HVAC equipment, systems and zone loads, energy and comfort in an open and extensible way using EnergyPlus and OpenStudio.
- Creating Custom Energy and Systems Analysis Workflows – Use OpenStudio measures to set custom properties and analysis outputs to suit individual and project specific requirements.

Presenter: Ian Molloy

Attendance:

Architect:	6	Contractor:	
Mech. Engineer:	9	Other*:	18
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**33**		
*If 'Other' was noted:	Project manager, product manager, VP, BIM Manager, Energy Analyst		

Session 3: Weather normalization and climate design tools (05/19/21)

Title: Weather normalization and climate design tools

Date: 05/19/21

Description: The Integrated Design Lab has developed a set of free tools that can help users to visualize building energy usage and normalize performance based on weather patterns. This makes it easy to spot anomalies like a sudden increase in electrical consumption during the winter. This presentation will cover the resources that IDL uses to find, filter, and format both typical and historical weather data for any location. We will cover a variety of free data repositories and technologies available to design professionals. These simple tools can help you track an existing building's performance or design a new building with an eye to minimizing thermal loads. To view the IDL's design tools please visit: http://idlboise.com/content/design-tools

Presenter: Damon Woods

Attendance:

Architect:	5	Electrician:	
Engineer:	9	Contractor:	
Mech. Engineer:	2	Other*:	11
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**27**		
*If 'Other' was noted:	Energy Manager, Energy Analyst, RA, Student, Building System Analyst		

Session 4: Automated 2D heat transfer using grasshopper (08/25/21)

Title: Automated 2D heat transfer using grasshopper

Date: 08/25/21

Description: The predominant tool for 2D heat transfer analysis is THERM which has a toilsome interface for drafting and post-processing façade details. The proposed interoperable algorithmic modeling (IAM) workflow utilizes the friendly drafting environment in Rhino as inputs to a Grasshopper (GH) file that utilizes open source Ladybug Tools to set up, simulate and post-process unique customizable heat transfer results. The GH file is interoperable with THERM and InDesign to generate and automate the generation of a consistent thermal analysis report. This workflow cuts down on production time, generates consistent outputs, and advocates interoperability in a user-friendly environment.

Presenter: Kyleen Rockwell

Attendance:

Architect:	4	Electrician:	
Engineer:	7	Contractor:	
Mech. Engineer:	2	Other*:	19
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**32**		
*If 'Other' was noted:	Professor, Energy Modeler, Associate, Designer, VP		

Session 5: Designing for PoE lighting and automation (09/22/21)

Title: Designing for PoE lighting and automation

Date: 09/22/21

Description: Power over Ethernet is transforming the world of building automation in a way that may not be obvious - but it will be how facilities and buildings are wired above the desktop in the future (we still need AC power - no one is refuting that) but IoT sensors, dashboards, lighting, access control, security are already supporting this open standard in a way to push interoperability across the supply chain and provide a seamless means toward the proverbial "single pane of glass" in a fraction of what it costs today.

Presenter: Joe Herbst

Attendance:

Architect:	1	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:	1	Other*:	9
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**13**		
*If 'Other' was noted:	Designer, President, Student, Lighting Designer, Interior Designer		

Session 6: Indoor Air Quality during lockdown – towards a new health integrated modeling framework (10/20/21)

Title: Indoor Air Quality during lockdown – towards a new health integrated modeling framework

Date: 10/20/21

Description: Throughout the world governments instituted a variety of measures to try to curb the spread of COVID-19 and improve public health. In the UK that took the shape of a nationwide lockdown as of the 23rd of March 2020. This mandate continued until the 13th of June. These restrictions led to atypical patterns of home occupancy, the implications of which are still unknown. The work shown in this presentation took advantage of an existing IAQ and window operation monitoring study taking place in east London, UK. One-year's worth of monitored data on indoor and outdoor environment parameters along with occupant use of windows was used to analyze the impact of lockdown on IAQ and infer probabilistic models of window operation behavior. Moreover, using on-site CO2 data, monitored occupancy and operation of windows, the team calibrated a thermal performance model of one of the spaces to investigate the implications of alternative ventilation strategies. The use of this type of model, one in which energy, thermal, and air quality performance is integrated has great potential to be used to better understand how changes in our built environment impact health, and at what cost. A conceptual framework for modelling health impact into the built environment will also be introduced.

Presenters: Elizabeth Cooper

Attendance:

Architect:	2	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:	3	Other*:	19
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**28**		
*If 'Other' was noted:	Project Manager, President, Designer, Student, Professor		

5. Website Maintenance and Statistics

The Google site “BSUG 2.0” was retired in 2020 and has been 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 are sent out to users subscribed to our mailing list. 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 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 2022. 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 as well as overall attendance from 2020. While we are happy that we have increased our attendance despite the webinar format it should be noted that attendance for the treasure valley is down significantly. Attendance this year was successful for the BSUG task with 6 sessions completed and 154 total attendees – 0 in-person and 154 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 93 responses with a response rate of 60% in 2021. 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 2022.

7. Appendices

Appendix A: BSUG 2021 Evaluations

Summaries of evaluations for each of the 6 sessions are recorded below. It should be noted that comments typically collected with evaluation are available due to restriction from the ZOOM platform.

Session 1 (03/24/21): How high can you go – Simulation study on high temperature cooling for radiant systems

Presentation Info:

Date:	03/24/21
Location:	IDL
Presenters:	Carlos Duarte – CBE

Attendance:

Architect:	3	Electrician:	
Engineer:	6	Contractor:	
Mech. Engineer:	2	Other*:	10
Elec. Engineer:		None Specified:	
Total (In-Person):			
Total (Online):	**21**		
*If 'Other' was noted:	Principal, Associate, PhD Candidate, Energy Analyst, President		

Evaluations:

		Scale
In general, today's presentation was:	**4.1**	1 Not Useful - 5 Very Useful
Rate organization:	**4.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**3.6**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.3**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.3**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**3.6**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.3**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on evaluations collected.

Session 2 (04/28/21): Building energy and systems analysis with Autodesk Revit and Insight

Presentation Info:

Date:	04/28/2021
Location:	IDL
Presenter:	Ian Molloy – Autodesk

Attendance:

Architect:	6	Electrician:	
Engineer:	7	Contractor:	
Mech. Engineer:	2	Other*:	20
Elec. Engineer:		None Specified:	
Total (In-Person):			
Total (Online):	**33**		
*If 'Other' was noted:	Project manager, product manager, VP, BIM Manager, Energy Analyst		

Evaluations:

		Scale
In general, today's presentation was:	**4.1**	1 Not Useful - 5 Very Useful
Rate organization:	**4.5**	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:	**4.8**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.3**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.4**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on evaluations collected.

Session 3 (05/19/21): Weather normalization and climate design tools

Presentation Info:

Date:	05/19/2021
Location:	Webinar
Presenter:	Damon Woods – IDL

Attendance:

Architect:	5	Electrician:	
Engineer:	9	Contractor:	
Mech. Engineer:	2	Other*:	11
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**27**		
*If 'Other' was noted:	Energy Manager, Energy Analyst, RA, Student, Building System Analyst		

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:	**4.8**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.8**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.9**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.7**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.3**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on evaluations collected.

Session 4 (08/25/21): Automated 2D heat transfer using Grasshopper

Presentation Info:

Date:	08/25/2021
Location:	IDL
Presenter:	Kyleen Rockwell – HKS

Attendance:

Architect:	4	Electrician:	
Engineer:	7	Contractor:	
Mech. Engineer:	2	Other*:	19
Elec. Engineer:		None Specified:	
Total (In-Person):			
Total (Online):	**32**		
*If 'Other' was noted:	Professor, Energy Modeler, Associate, Designer, VP		

Evaluations:

		Scale
In general, today's presentation was:	**4.3**	1 Not Useful - 5 Very Useful
Rate organization:	**4.5**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.5**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.7**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.6**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.5**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.8**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on evaluations collected.

Session 5 (09/22/21): Designing for PoE Lighting Automation

Presentation Info:

Date:	09/22/2021
Location:	IDL
Presenters:	Joe Herbst – PoE Texas

Attendance:

Architect:	1	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:	1	Other*:	9
Elec. Engineer:		None Specified:	
Total (In-Person):			
Total (Online):	**13**		
*If 'Other' was noted:	Designer, President, Student, Lighting Designer, Interior Designer		

Evaluations:

		Scale
In general, today's presentation was:	**4.3**	1 Not Useful - 5 Very Useful
Rate organization:	**4.5**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.3**	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:	**4.3**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.3**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on evaluations collected.

Session 6 (10/20/21): Indoor Air Quality during lockdown – towards a new health integrated modeling framework

Presentation Info:

Date:	10/20/2021
Location:	IDL
Presenters:	Elizabeth Cooper – UCL

Attendance:

Architect:	2	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:	3	Other*:	19
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**28**		
*If 'Other' was noted:	Project Manager, President, Designer, Student, Professor		

Evaluations:		Scale
In general, today's presentation was:	**4.2**	1 Not Useful - 5 Very Useful
Rate organization:	**4.4**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.4**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.7**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.8**	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 evaluations collected.

2021 TASK 4: NEW CONSTRUCTION VERIFICATIONS

SUMMARY OF PROJECTS

IDAHO POWER COMPANY EXTERNAL YEAR-END REPORT

December 31, 2021

Prepared for:
Idaho Power Company

Author:
Dylan Agnes

Report Number: 2021_004-01

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Prepared by:
University of Idaho Integrated Design Lab | Boise
322 E Front Street Suite #360 Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Damon Woods

Authors:
Dylan Agnes

Prepared for:
Idaho Power Company

Contract Number:
IPC KIT #

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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 2021. The primary role is to conduct on-site verification reports for approximately 10% of projects that participated in Idaho Power Company's (IPC) New Construction Program. The verified projects were randomly selected from the projects paid in 2021, and at least four projects were required to be outside the Boise/Meridian/Eagle/Kuna area. The purpose of the project reviews and on site verifications is to assist IPC in program quality assurance. The on site verification also looks to capture any inconsistences between the final application and what was installed on site. The secondary role is 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. The review and letter provides IPC the information needed to pay the L3 incentive and increase energy savings and quality of design through the inclusion of additional design and commissioning recommendations.

2. 2021 New Construction Verification Projects

The UI-IDL completed twelve New Construction Verification projects in 2021. 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 2021 were finalized and paid in 2021. One project resides under the 2016 program and the rest reside under the 2018 program format. The specific incentives for this program are outlined in Table 1 and 2.

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 summarizes the twelve projects and respective qualified incentive measures which were verified by UI-IDL. For the projects listed, more than 75% were located outside the capital service area.

Table 3: Project Summary

IPC Project #	Facility Description	Location	Incentive Measures	UI-IDL Site-Visit Date
16-144	Medical (Hospital)	Nampa, ID	L1, L4, L5	07/09/21
18-081	Manufacturing	Nampa, ID	L1, L2, L5	07/09/21
18-083	Retail (Non-Food)	Star, ID	L1, L2	10/13/21
18-106	Industrial – Mid	Ontario, OR	L1, L2	08/27/21
18-284	Warehouse	Jerome, ID	L1	10/27/21
18-302	Medical (Non-Hospital)	Jerome, ID	L1, L2, L5, A1	10/27/21
18-315	Other	Boise, ID	L1, L5	08/26/21
18-411	Industrial – Mid	Meridian, ID	CA1, CA2	10/01/21
18-431	Other	Nampa, ID	L1	08/13/21
18-503	Manufacturing (1 Shift)	Fruitland, ID	CA1, CA4	11/10/21
18-518	Manufacturing (1 Shift)	Eagle, ID	CA1	09/15/21
18-537	Industrial – Large	Blackfoot, ID	CA1	09/01/21

3. 2021 Photo Controls Review Projects

In 2021, the UI-IDL received two inquiries regarding the New Construction photo controls incentive review, however, only one qualified for an incentive. Documentation was received and final letters of support were submitted to IPC for photo controls incentive applications for the single project.

2021 TASK 5: ENERGY RESOURCE LIBRARY

SUMMARY OF EFFORT AND OUTCOMES

IDAHO POWER COMPANY EXTERNAL YEAR-END REPORT

December 31, 2021

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes

Report Number: 2021_005-05

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Prepared by:
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322 E Front St. Suite 360 Boise, ID 83702 USA
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IDL Director:
Damon Woods

Authors:
Dylan Agnes

Prepared for:
Idaho Power Company

Contract Number:
IPC KIT# 5277

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ACRONYMS AND ABBREVIATIONS

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

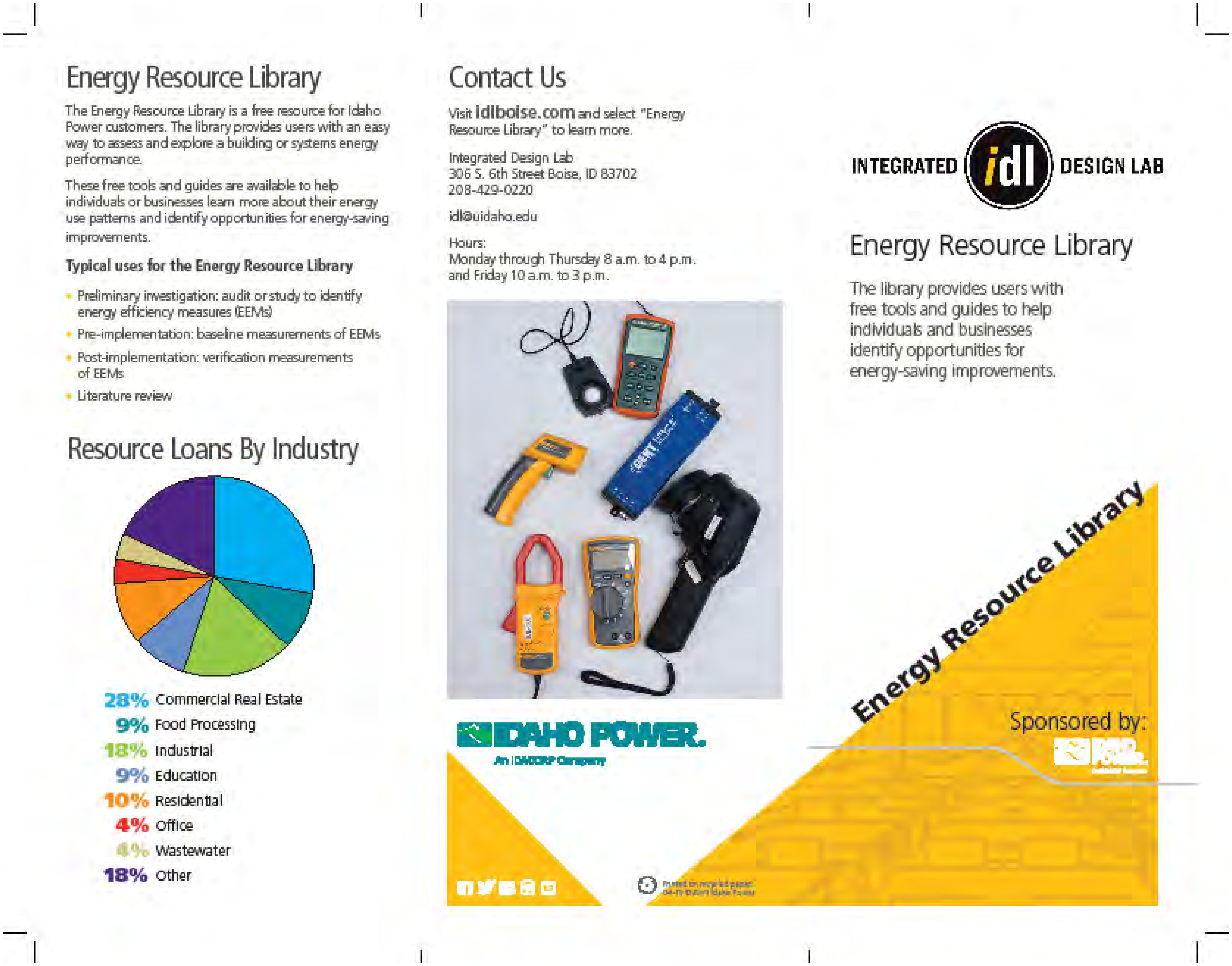
The loan process is started when a customer creates a user account. Then the user has access to submit a resource questionnaire and fill out a form describing their intent and project information. Customers can also add tools to their “cart” and complete a checkout process if they don’t require the IDL 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. 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 2021, as well as on the new idlboise.com website. The flyer layout was retired during 2019 and replaced with a brochure format. The 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-2021

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 2021, the ERL home page had 1,483 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 Brochure Back

3. New Tools & Tool Calibration Plan

In 2021, ten new tools were added to the ERL to replace old data logging models, to fill gaps in tool kits as well as accessories for kits and other various tools.

Equipment 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. The management of the ERL has be adapted to integrate the measurement and verification method of calibration. However, 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 or the Air-Data Multimeter which would have to be recalibrated by the manufacturer.

The IDL performs 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.

Furthermore, calibration tracking columns have been added to the inventory spreadsheet which allows 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.

4. 2021 Summary of Loans

In 2021, loan requests totaled 10 with 9 loans completed, 0 loans are on-going. The fourth quarter had the highest volume of loans at 3 total. Loans were made to 4 different locations and 3 unique users and 4 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 one loan that was not fulfilled because they did not meet the requirement of being an Idaho Power customer.

Due to Covid-19 and the restrictions associated with it we saw a decrease in loans over the past year and a half. Moving forward into 2022 we are devoting resources to market the ERL to potential users in order to return to normal frequency of use. For example, we will be presenting the ERL to municipalities in the treasure valley specifically addressing the benefits of the library to facilities managers and public works departments. More details about the ERL marketing strategy can be found in the 2022 scope of work.

Table 1 and the following figures outline the usage analysis for ERL in 2021.

TABLE 1: PROJECT AND LOAN SUMMARY

	Request Date	Location		Project	Type of Loan	# of Tools Loaned
1	02/06/21	Garden City	ID	OR35FL	Identify EEMs	2
2	02/16/21	Boise	ID	RFLO	Identify EEMs	1
3	04/01/21	Boise	ID	EAOFE	Identify EEMs	1
4	05/24/21	Idaho Falls	ID	DBF116	Audit	18
5	09/06/21	Boise	ID	BRCHK	Identify EEMs	2
6	09/10/21	Boise	ID	OR51SP	Identify EEMs	3
7	10/08/21	Boise	ID	BRCHK2	Identify EEMs	1
8	11/24/21	Emmett	ID	EEAPLDL	Audit	14
9	12/03/21	Boise	ID	OR58FLC2	Identify EEMs	1

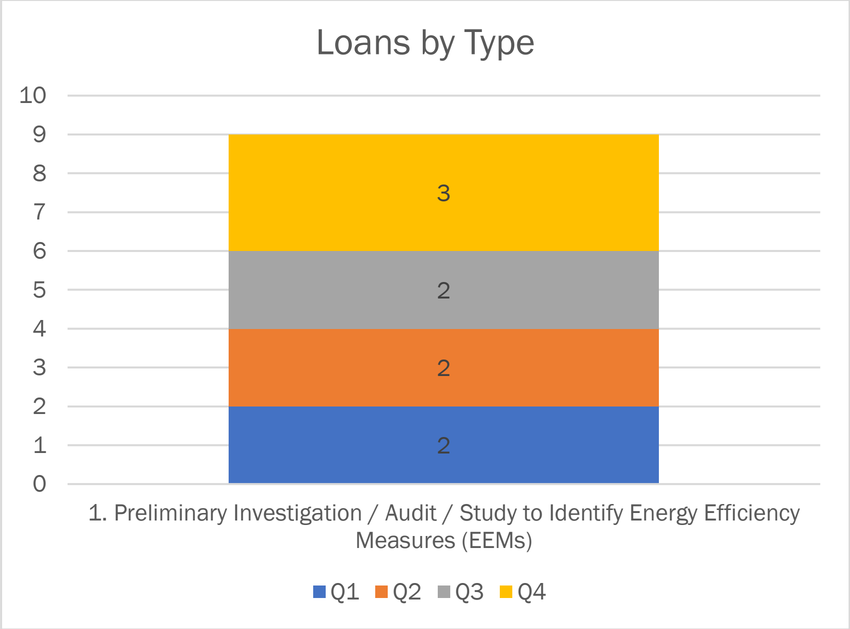


FIGURE 3: LOANS BY TYPE

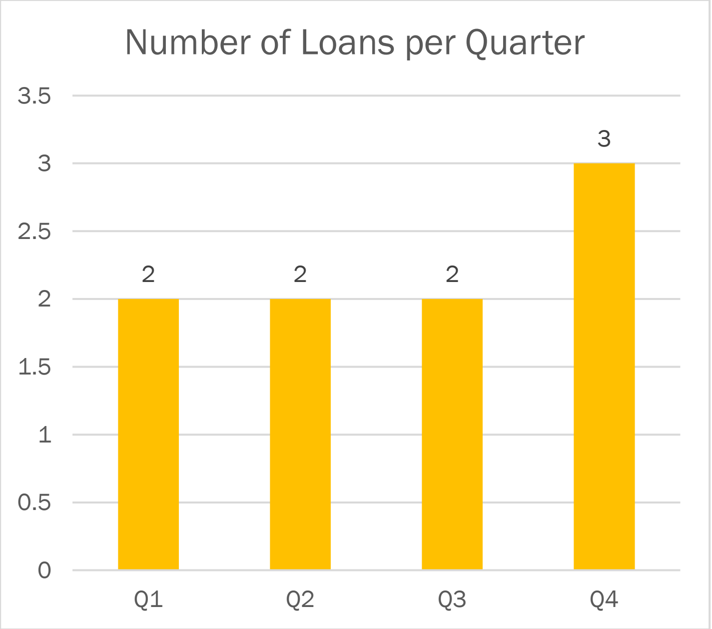


FIGURE 4: NUMBER OF LOANS PER QUARTER

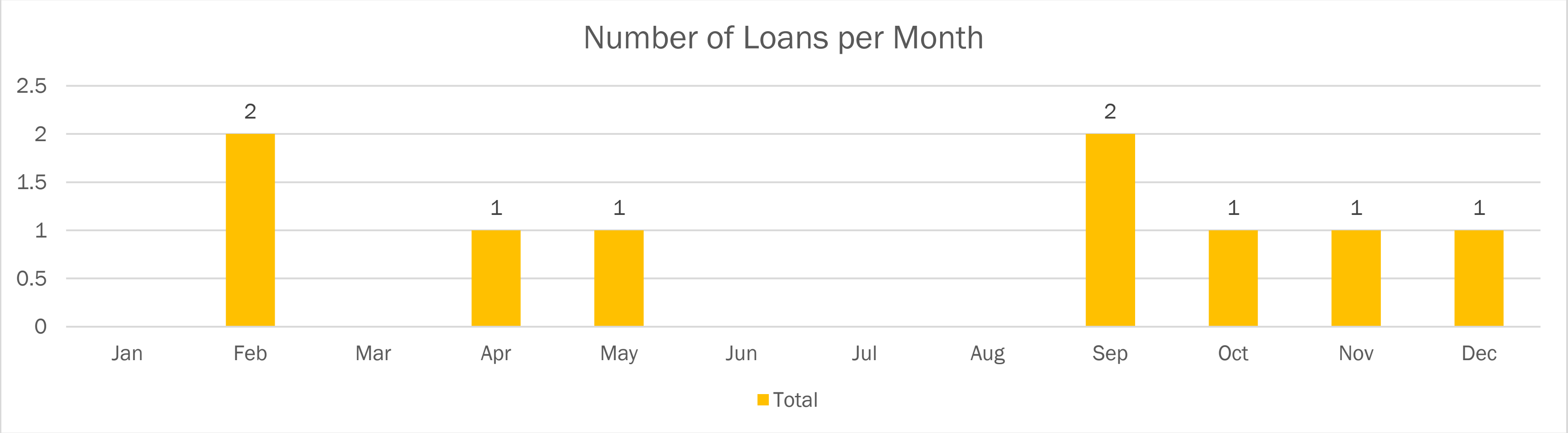


FIGURE 5: NUMBER OF LOANS PER MONTH

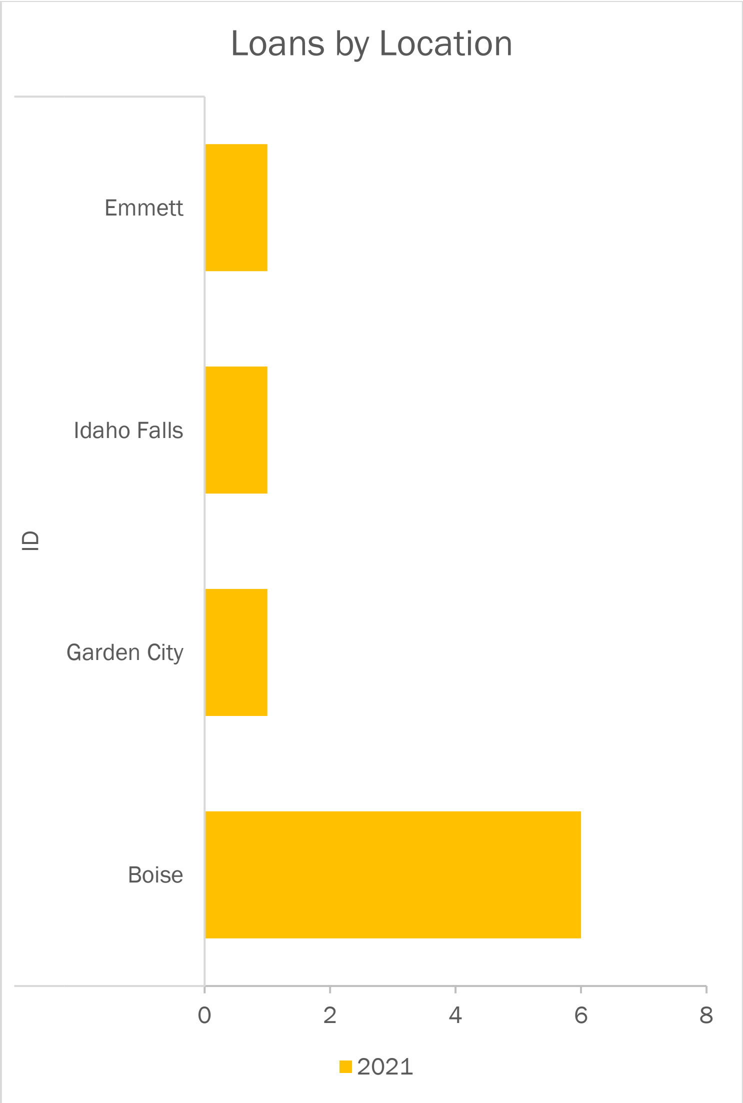


FIGURE 6: NUMBER OF LOANS BY LOCATION

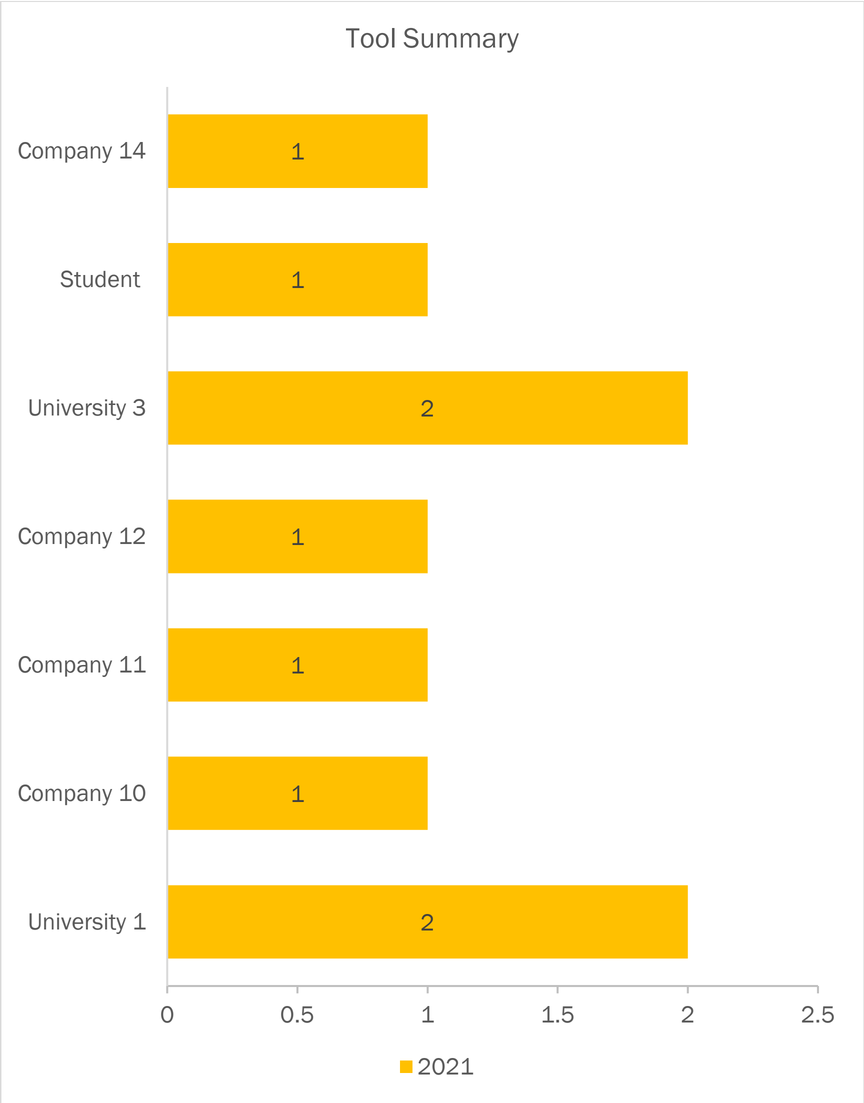


FIGURE 7: NUMBER OF LOANS BY USER

TOTAL TOOLS LOANED: **43**	Q1=3	Q2=19	Q3=5	Q4=16

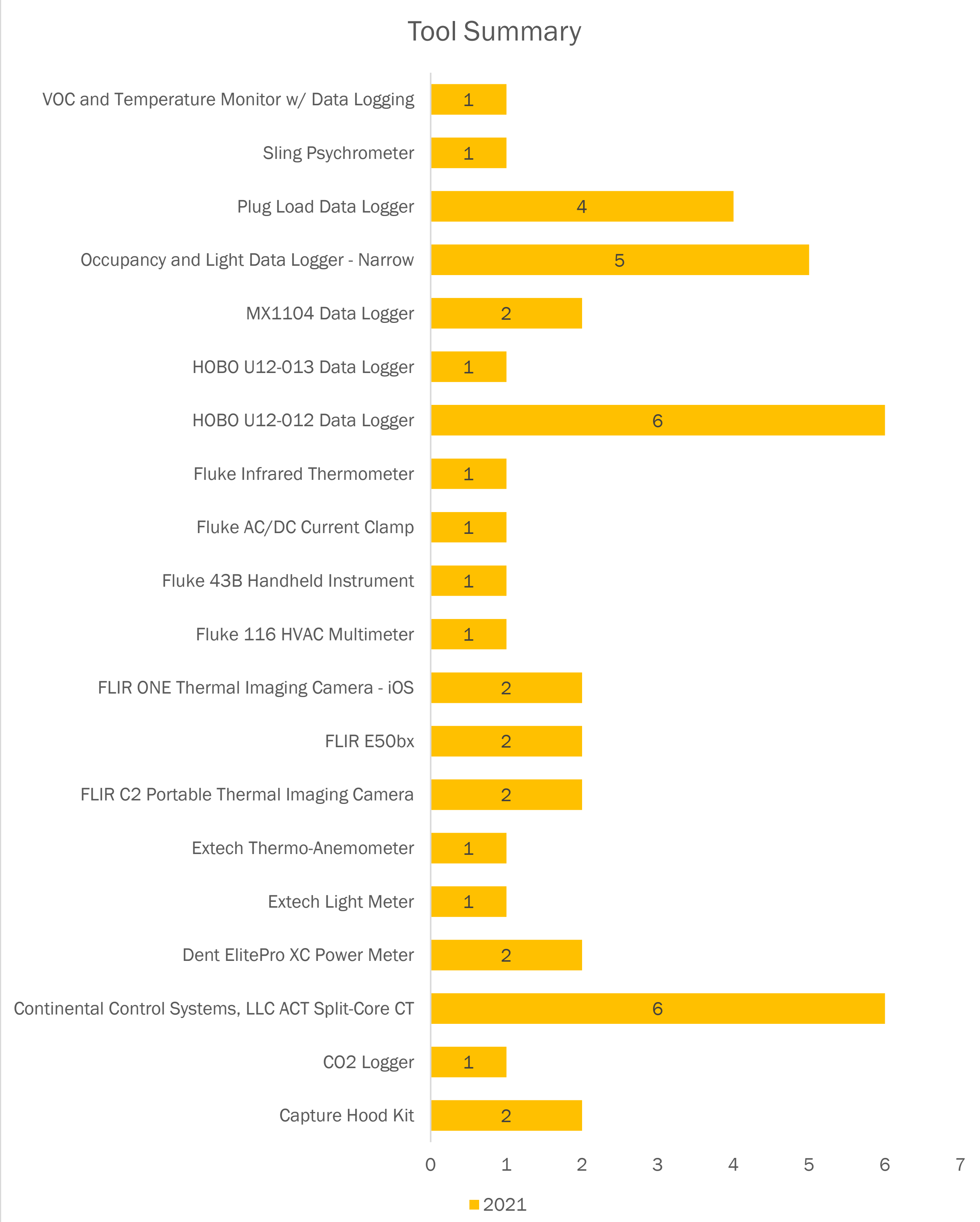


FIGURE 8: SUMMARY OF TOOLS LOANED

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-2021

APPENDIX C: Website Progress

The majority of work has shifted to maintenance for website development.

2020 TASK 6: ENERGY IMPACTS OF IAQ DEVICES

IDAHO POWER COMPANY YEAR-END REPORT

December 31, 2021

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 2021_001-06

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DISCLAIMER

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

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Table of Contents

Acronyms and Abbreviations

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]
HEPA	High Efficiency Particulate Air Filter
HVAC	Heating Ventilation and Air Conditioning
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
IDL	Integrated Design Lab
IPC	Idaho Power Company
MERV	Minimum Efficiency Reporting Value
NEEA	Northwest Energy Efficiency Alliance
NBPI	Needle Point Bi-Polar Ionization
PNNL	Pacific Northwest National Lab
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) examined the energy impacts of indoor air quality devices. The IDL used the energy modeling software, EnergyPlus to estimate the effects of adding higher-rated filters, in-room HEPA filters, Ultraviolet Irradiation, ionization devices, and increasing the percentage of outdoor air. The IDL selected eight of the sixteen prototype models from the Pacific Northwest National Lab to simulate these operational adjustments. The energy models were run for climate zone 5B with Idaho Power tariffs to estimate the change in annual operating costs of the facility from adopting each of these technologies. The IDL performed brief literature reviews on each of these technologies that can be integrated into current Heating Ventilating and Air Conditioning (HVAC) systems. These reviews were turned into 1-page reference documents outlining the major points and energy impacts of each Indoor Air Quality (IAQ) strategy for Idaho facility managers and owners.

2. Work Summary

2.1 Comparing the mitigation strategies

The IDL considered five mitigation strategies and an additional three subcategories that improve indoor air quality. These included:

1. Upgrading Minimum Efficiency Rating Value (MERV) of filters
2. Adding High Efficiency Particulate Air (HEPA) filters (both in-duct and portable in-room systems)
3. Using Ultraviolet Germicidal Irradiation (UVGI) lamps (both in-duct and stand-alone in-room systems)

4. Adding Needle-Point Bipolar Ionization (NBPI) to the supply air
5. Increasing Outdoor Air (OA) considered both a minimum of 3 Air Changes per Hour (ACH) of OA and also relying on 100% OA.

2.1.1 Upgrading MERV filter ratings

There is no minimum MERV rating required by Idaho's Energy Code. Idaho's Energy Code Circuit Rider, David Freelove, estimates that most small commercial buildings in Idaho Power territory use MERV 6 filters. ASHRAE recommends using MERV 13 or better filters. This mitigation strategy can help by filtering out virus particles from the return air stream in the HVAC system. While some filter switches can be simple, careful consideration must be given to ensure that the new filters will fit into the same space and that the existing fan can accommodate the additional pressure drop across the filter. Otherwise, more substantial upgrades must be made to the ventilation system to accommodate the new filter.

2.1.2 Adding HEPA filters

HEPA filters can be added to a building in two ways – either through the existing air supply duct or by setting up portable in-room units. In-duct HEPA filters are typically much larger than a MERV filter and can have much higher pressure drops across them. It can take considerable modifications to add a HEPA filter if the existing system was designed for a thinner low-value MERV filter. These filters also tend to be more expensive and so they have a significant maintenance cost as these filters must be regularly replaced.

Portable HEPA units provide a plug and play option that is more effective than MERV filters at removing sub-micron and nanoparticles. Units can be moved throughout a space to optimize their effectiveness. HEPA units do take up floor space and require an electrical outlet. They can be noisy at high speeds and additional maintenance is required to care for the units and change out filters when needed. Portable HEPA units are the simplest way to maximize filtration without modifying the existing building ventilation system. However, due to the high costs associated (both capital and operating), in-room HEPA filters are best suited for areas where contamination risk is higher or when outdoor air does not meet air quality standards (e.g., during inversions or wildfire smoke events).

2.1.3 Using Ultraviolet Germicidal Irradiation

In-duct UVGI prevents microbial growth on cooling coils, which can reduce fan energy and can result in net energy savings depending on the building type and airflow. Sizing and layout of the UV lamps greatly impacts performance. Proper installation is necessary to ensure effective air disinfection and cooling coil maintenance. An irradiance of at least 1,000 mW/cm^2 and an exposure time of 0.25 seconds or longer is needed to properly kill viruses in the airstream.

In-room UVGI units often include an additional HEPA filter to remove particulates as well as sanitize the air. This is a powerful method of disinfection, which requires significant capital and operational costs. In-room UVGI units are well-suited for healthcare facilities and spaces with higher sanitation requirements. In other settings, an in-room HEPA filter is often a more suitable alternative.

2.1.4 Adding Needlepoint Bipolar Ionization to air supply

NBPI is an exciting technology that shows great potential at being a low-energy air cleaner. While some studies have shown that NBPI destroys certain viral components, open questions remain on its effectiveness against Covid19. Low quality NBPI devices may produce Ozone, which is harmful at high concentrations and should be continuously monitored. NBPI's energy use is quite low compared to UVGI or even adding better filters.

2.1.5 Increasing Outdoor Air

Increasing the supply of fresh air is an excellent way to reduce indoor contaminants but relying on this year-round used more energy than most other mitigation strategies. However, for temporary mitigation, it may prove an effective strategy to flush out contaminants as long as the equipment is sized to handle the load and occupant comfort is not severely compromised. The results shown in the flyers (in the Appendix) are for requiring 3 ACH of outdoor air for occupied spaces. This was already the case for some building types, such as a restaurant, but was a significant increase for other facilities such as apartments and retail. Increasing outdoor air will increase maintenance costs for more filter changes and will increase wear and tear on the equipment. These impacts were challenging to quantify, but is noted in the flyer.

2.2 Developing the Energy Models

2.2.1 Selecting the building prototypes

The IDL worked with Idaho Power (IPC) to select the eight most relevant building types for IPC customers. These building types included:

- Warehouse
- Standalone Retail
- Secondary School
- Mid-Rise Apartments
- Medium Office
- Large Hotel
- Hospital
- Full-service Restaurant

Table 1: Building Prototype Information

Building Type	Square Footage	Number of Stories	Heating	Cooling	Air Distribution	Systems
Medium Office	53600	3	Furnace	PACU	MZ	3
Stand-Alone Retail	24695	1	Furnace	PACU	ZN PSZ-AC	4
Secondary School	210900	2	Boiler	Air Cooled Chiller	MZ VAV	5 CAV, 4 VAV
Hospital	241410	5	Boiler	Water Cooled Chiller	CAV + VAV	2 VAV
Large Hotel	122132	6	Boiler	Air Colled Chiller	DOAS + VAV	2
Warehouse	49495	1	Furnace	PACU	ZN HVAC	2
Full-Service Restaurant	5502	1	Furnace	PACU	ZN PSZ-AC	2
Mid-Rise Apartment	33700	4	Furnace	Split System DX (1 per apt)	SAC	24

2.2.2 Modeling the IAQ Devices

Each of the prototype models were adjusted to account for adding an IAQ device and this was different for each technology. The specific steps are outlined below:

- Upgrading MERV Filters – increased pressure drop across fan by 0.4” H_2O
- HEPA Filters
    - In-duct HEPA filters – increased pressure drop across the fan by 1.25” H_2O
    - Portable in-room HEPA filters – added 3.14 Watts/person in plug loads
- NPBI – added plug load of 1Watt/5,300 CFM
- UVGI
    - In Room UVGI – added plug load of 1Watt/50 CFM
    - In Duct UVGI – added plug load and decreased pressure drop: 1Watt/50 CFM and 20% pressure reduction across cooling coil.
- Outdoor Air – increasing percentage of outdoor air from ASHRAE 62.1 minimum
    - Increased OA to at least 3ACH in occupied zones for IOA runs
    - Increased OA to be100% of the airflow for 100% OA runs

2.3 Running the Energy Simulations

Each of the models was set according to the 90.1-2010 baseline and run using Boise’s climate data and local utility rates. A complete list of the outputs is available in the appendix. In general, devices that increased the pressure drop or served as plug loads within the space increased electricity prices but decreased gas bills. This is because the heat generated from fan work reduced the heating requirements.

2.4 Results

Capital and maintenance costs were acquired through contacting local vendors and using RSMeans. Operating costs were determined using energy models and 2021 standard commercial tariffs for Idaho Power and Intermountain Gas.

Table 2: Technology costs for each mitigation strategy

Technology	Capital Costs (Equipment + Installation)	Annual Operating Costs	Annual Maintenance Cost (including filter replacement)
	[$/1000cfm]	[$/1000cfm]	[$/1000cfm]
Baseline	$0.00	$0.00	$0.00
MERV 13	$24.56	$17.19	$7.35
HEPA (portable)	$1,400.00	$18.28	$141.91
HEPA (in duct)	$300.00	$69.50	$300.00
UVGI (in room)	$9,394.81	$151.17	$150.00
UVGI (in duct)	$83.82	$74.25	$100.00
NBPI	$1,104.31	$47.77	$98.57
IOA	$0.00	$259.65	$0.00

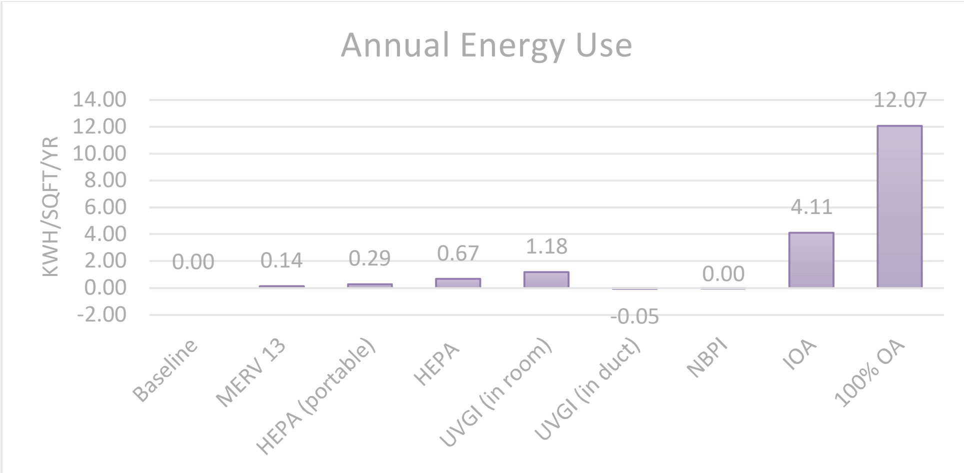

Figure 1: Energy use increase for each of the technologies averaged for the eight building types studied

Of the technologies surveyed, increasing outdoor airflow for non-Dedicated Outdoor Air Systems (non-DOAS) proved to have the highest energy impact. Adding UVGI in-duct lowered energy use on average by reducing the fan energy across the cooling coil as it prevents microbial growth. NBPI had a very low energy impact, but questions remain on its effectiveness. Increasing to MERV 13 filters proves the next-lowest energy impact as long as the existing system is capable of handling the new filters.

3. Appendix – Flyers and Simulation Results

Appendix A: Bibliography by topic:

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Appendix B: Simulation Results

Table 3: Simulation results for each of the mitigation strategies considered

		Total Site EUI (kBtu/ft^2)	Annual Electricity ($)	Annual Natural Gas ($)	Total Energy Costs ($)
Warehouse	Baseline	17.4	$10,613	$1,899	$12,512
(49,495 sqft)	MERV 13	17.5	$10,717	$1,871	$12,588
	HEPA (portable)	17.4	$10,618	$1,899	$12,516
	HEPA	17.5	$10,938	$1,817	$12,755
	UVGI (in room)	17.6	$10,824	$1,892	$12,716
	UVGI (in duct)	17.4	$10,523	$1,930	$12,453
	NBPI	17.4	$10,613	$1,899	$12,512
	IOA (3ach)	20.4	$10,702	$2,798	$13,500
	100% OA	24.7	$10,701	$4,088	$14,789
		Total Site EUI (kBtu/ft^2)	**Annual Electricity ($)**	**Annual Natural Gas ($)**	**Total Energy Costs ($)**
Stand Alone Retail	Baseline	51.0	$16,858	$1,978	$18,836
(24,695 sqft)	MERV	51.9	$17,406	$1,919	$19,325
	HEPA (portable)	51.5	$17,181	$1,948	$19,129
	HEPA	53.8	$18,575	$1,787	$20,362
	UVGI (in room)	53.1	$18,018	$1,922	$19,940
	UVGI (in duct)	50.2	$16,220	$2,060	$18,281
	NBPI	51.0	$16,859	$1,978	$18,837
	IOA (3ach)	101.0	$17,787	$8,917	$26,703
	100% OA	117.9	$17,817	$11,283	$29,100
		Total Site EUI (kBtu/ft^2)	**Annual Electricity ($)**	**Annual Natural Gas ($)**	**Total Energy Costs ($)**
Secondary School	Baseline	56.4	$118,089	$31,161	$149,250
(210,900 sqft)	MERV	56.6	$119,063	$31,065	$150,128
	HEPA (Portable)	57.8	$125,005	$30,320	$155,325
	HEPA	56.9	$121,185	$30,856	$152,041
	UVGI (in room)	56.5	$117,228	$31,314	$148,542
	UVGI (in duct)	59.7	$130,906	$30,491	$161,397
	NBPI	56.4	$118,105	$31,160	$149,265
	IOA (3ach)	61.5	$199,336	$36,786	$236,122
	100% OA	70.1	$121,648	$45,951	$167,599

		Total Site EUI (kBtu/ft^2)	**Annual Electricity ($)**	**Annual Natural Gas ($)**	**Total Energy Costs ($)**
Mid-Rise Apartments	Baseline	49.0	$24,288	$1,619	$25,908
(33,700 sqft)	MERV	49.2	$24,861	$1,519	$26,380
	HEPA (Portable)	51.1	$26,229	$1,293	$27,522
	HEPA	50.9	$26,085	$1,316	$27,401
	UVGI (In room)	57.3	$30,373	$926	$31,300
	UVGI (in duct)	49.1	$24,438	$1,593	$26,030
	NBPI	49.0	$24,290	$1,619	$25,909
	IOA (3ach)	89.2	$25,675	$8,959	$34,634
	100% OA	105.8	$24,002	$12,755	$36,757
		Total Site EUI (kBtu/ft^2)	**Annual Electricity ($)**	**Annual Natural Gas ($)**	**Total Energy Costs ($)**
Medium Office	Baseline	33.7	$30,238	$1,540	$31,778
(53,600 sqft)	MERV	33.8	$30,419	$1,532	$31,951
	HEPA (Portable)	33.9	$30,533	$1,528	$32,061
	HEPA	34.0	$30,761	$1,519	$32,280
	UVGI (in room)	36.1	$32,826	$1,400	$34,225
	UVGI (in duct)	34.8	$30,955	$1,529	$32,484
	NBPI	33.7	$30,241	$1,540	$31,780
	IOA (3ach)	45.1	$32,216	$4,739	$36,955
	100% OA	46.7	$32,480	$5,196	$37,676
		Total Site EUI (kBtu/ft^2)	**Annual Electricity ($)**	**Annual Natural Gas ($)**	**Total Energy Costs ($)**
	Baseline	105.1	$79,978	$46,602	$126,580
Large Hotel	MERV	105.5	$80,960	$46,574	$127,534
(122,132 sqft)	HEPA (Portable)	106.1	$81,939	$40,341	$122,280
	HEPA	106.4	$82,857	$40,286	$123,143
	UVGI (in room)	113.4	$94,844	$46,909	$141,753
	UVGI (in duct)	104.3	$78,657	$46,602	$125,259
	NBPI	105.1	$79,985	$46,578	$126,562
	IOA* (3ach)	105.1	$79,978	$46,602	$126,580
	100% OA	115.2	$79,850	$53,385	$133,235

		Total Site EUI (kBtu/ft^2)	Annual Electricity ($)	Annual Natural Gas ($)	Total Energy Costs ($)
	Baseline	99.5	$260,531	$40,459	$300,990
Hospital	MERV	99.6	$261,219	$40,447	$301,666
(241,410 sqft)	HEPA (Portable)	99.7	$262,035	$40,210	$302,245
	HEPA	102.3	$271,866	$40,330	$312,196
	UVGI (in room)	104.4	$280,339	$46,162	$326,500
	UVGI (in duct)	97.8	$253,945	$46,739	$300,684
	NBPI	99.5	$260,545	$46,685	$307,230
	IOA* (3ach)	102.0	$266,845	$47,615	$314,460
	100% OA	125.9	$281,310	$73,070	$354,381
		Total Site EUI (kBtu/ft^2)	**Annual Electricity ($)**	**Annual Natural Gas ($)**	**Total Energy Costs ($)**
Full Service Restaurant	Baseline	462.9	$14,885	$8,191	$23,076
(5,502 sqft)	MERV	464.6	$15,221	$8,133	$23,354
	HEPA (Portable)	465.3	$15,284	$8,132	$23,416
	HEPA	471.4	$16,437	$9,447	$25,884
	UVGI (in room)	468.7	$15,861	$8,048	$23,909
	UVGI(in duct)	460.5	$14,395	$9,844	$24,239
	NBPI	462.9	$14,885	$9,742	$24,627
	IOA* (3ach)	462.9	$14,885	$8,191	$23,076
	100% OA	598.2	$15,194	$13,905	$29,099

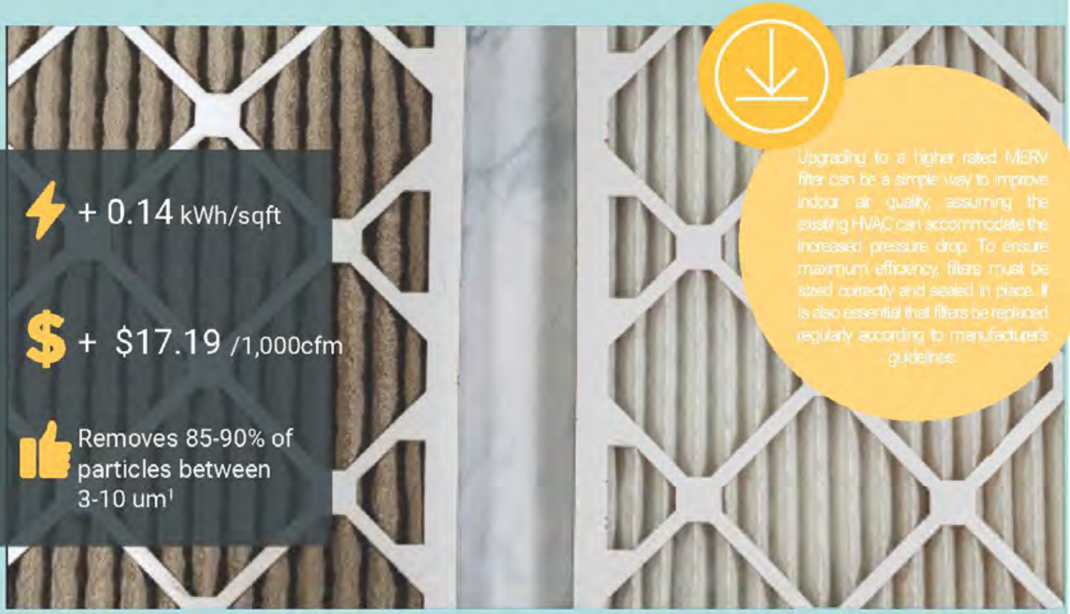
Appendix C: Flyers

INTEGRATED idl DESIGN LAB

IDAHO POWER.

MERV FILTER

Minimum Efficiency Reporting Value



+ 0.14 kWh/sqft

+ $17.19 /1,000cfm

Removes 85-90% of particles between 3-10 um[1]

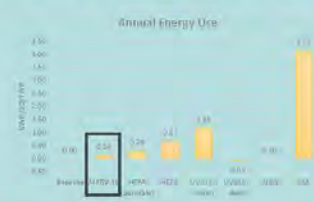
Upgrading to a higher rated MERV filter can be a simple way to improve indoor air quality, assuming the existing HVAC can accommodate the increased pressure drop. To ensure maximum efficiency, filters must be sized correctly and sealed in place. It is also essential that filters be replaced regularly according to manufacturer's guidelines.

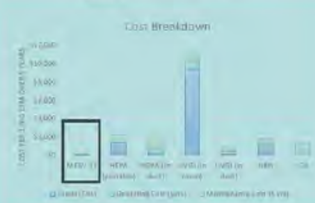
DESIGN GUIDELINES

- ASHRAE recommends MERV-13 or higher for commercial buildings[2].
- When upgrading to a higher MERV rating, look for a filter with a similar pressure drop to your current filter, or makes sure your HVAC system can accommodate the upgrade.
- To ensure filter efficiency, be sure your filter fits precisely in your system or is sealed in place to prevent leakage.
- Replace your filter regularly according to the manufacturer's recommendations.
- In practice, viruses are almost always embedded in particles that are much bigger than the virus itself. ASHRAE reports the virus mostly occurring in particles between 1 um to 5 um[3].
- Particle filters don't remove VOC's or ozone

	EFFICIENCY	PRESSURE DROP (IN. H_2O)
MERV 5	32%	0.17
MERV 12	78%	0.15
MERV 13	89%	0.18
MERV 14	97%	0.24

	EFFICIENCY	PRESSURE DROP (IN. H_2O)
HEPA	99.9%	0.5





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2. Alavy, Masih, and Jeffrey A. Siegel. "IAQ and Energy Implications of High Efficiency Filters in Residential Buildings: A Review (RP-1649)." Science and Technology for the Built Environment, vol. 25, no. 3, 2019, pp. 261–271.
3. Owen, Kathleen, and Carolyn G. Kerr. "Debunking Myths About MERV Air Filtration." ASHRAE, 8 Dec. 2020.
4. ASHRAE Handbook-HVAC Systems and Equipment. 2016, pp. 29.2–29.3.
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6. ASHRAE. "Filtration and Air Cleaning Summary." ASHRAE, 25 May 2021, COVID-19@ashrae.org. Accessed 10 Sept. 2021.

INTEGRATED idl DESIGN LAB

IDAHO POWER.

IN-DUCT HEPA FILTER

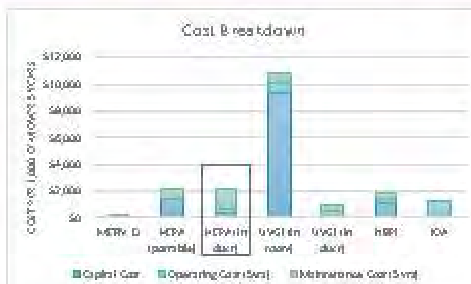
High efficiency particulate air filters, or HEPA filters, intercept and diffuse particulates through an expanded surface configuration of deep pleats fold of sub-micrometer glass fiber paper.

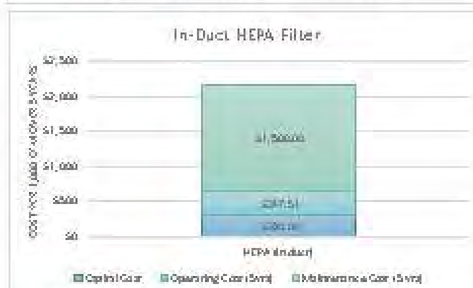
Bottom Line

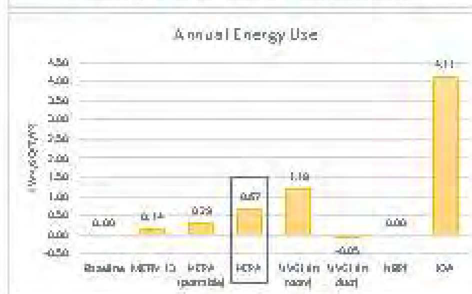
+ 0.67 kWh/sqft

+ $69.50 /1,000cfm

A well-sealed HEPA filter is more than 99.9% efficient for all sizes of particles!

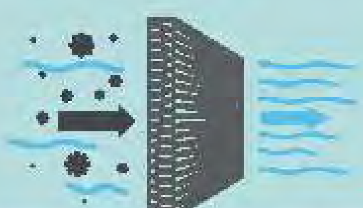






DESIGN GUIDELINES

- Must be sealed properly in filter racks.
- HVAC systems should be designed for HEPA filters. Retrofits are not recommended.
- Duct velocity of 250 to 500 fpm[4].
- Best when used with a pre-filter to not overload the HEPA filter.
- Replace filters regularly according to manufacturer's recommendation.



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IDAHO POWER.

PORTABLE HEPA FILTER

+ 0.29 kWh/sqft

+ $18.28 /1000cfm

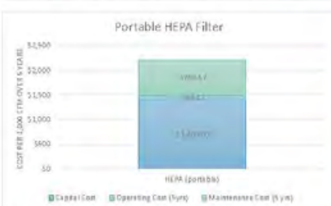
99.7% effective

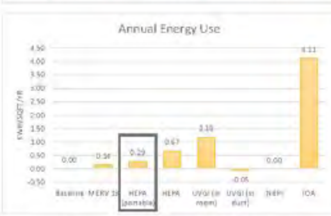
Bottom Line

Portable HEPA filters are the simplest way to maximize filtration without modifying the existing building ventilation system. However due to the high costs associated (both capital and operating costs), in-room filters are best suited for areas where contamination risk is higher or when outdoor air does not meet air quality standards (i.e. wildfire smoke)

DESIGN GUIDELINES

- Change filter regularly according to manufacturer's guidelines.
- Best placed in high traffic areas
- Choose a portable air cleaner with an adequate CADR (clean air delivery rate) for the space size.
- CADR only refers to particles. Some systems come with an activated carbon filter, which can be effective at removing gases and VOC's, although there is no widely used performance rating systems.





PORTABLE

HEPA

PROS

- Portable, "plug and play" option
- More effective at filtering sub-micron and nanoparticles
- Units can be moved throughout a space in order to optimize effectiveness

CONS

- Takes up floor space and outlets
- Noisy at high speeds
- Additional maintenance to care for units and change out filters when needed

IN DUCT

MERV

PROS

- Single-point intervention. No extra space needed
- Minimal change to maintenance requirements
- Easy to install into existing HVAC systems

CONS

- Less effective at filtering sub-micron and nanoparticles.
- Effectiveness is limited by air flow since particles and aerosols still travel within the space before being pulled into the return air vent

1. ASHRAE. "Filtration and Air Cleaning Summary." ASHRAE, 25 May 2021, COVID-19@ashrae.org. Accessed 10 Sept. 2021.
2. ASHRAE. "ASHRAE Epidemic Task Force" Core Recommendations for Reducing Airborne Infectious Aerosol Exposure , 2021, Accessed 2021.
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4. Fisk, W. J., et al. "Performance and Costs of Particle Air Filtration Technologies." Indoor Air, vol. 12, no. 4, 2002, pp. 223–234, https://doi.org/10.1034/j.1600-0668.2002.01136.x.

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IDAHO POWER.

UVGI IN-DUCT DISINFECTION

- 0.05 kWh/sqft

\+ $74.25 /1,000cfm

85% effective with typical single pass

In-duct UVGI prevents microbial growth on cooling coils which can reduce fan energy and result in net savings. Proper installation is necessary to ensure effective air disinfection and cooling coil maintenance.

DESIGN GUIDELINES

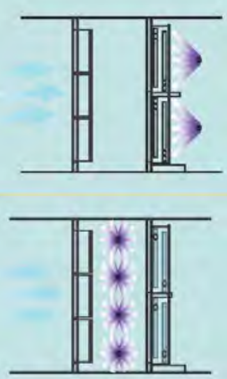
AIRSTREAM

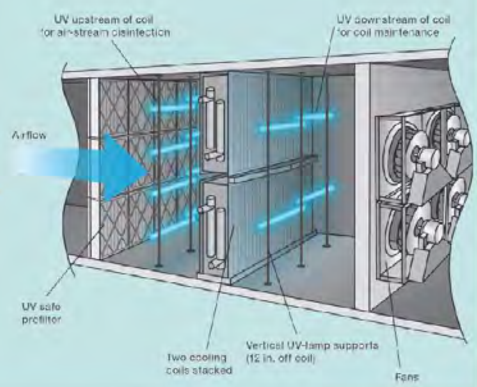
- Irradiance: 1,000 - 10,000 μW/cm²
- Exposure: > 0.25 sec (air speed <500 fpm)
- Upstream or downstream of cooling coils

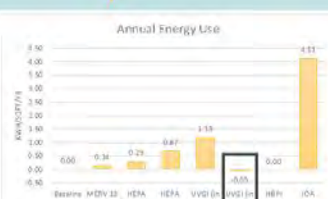
VS

SURFACE

- Irradiance: 50 - 100 μW/cm²
- Exposure: 24/7
- Downstream of cooling coils (most common)







1. ASHRAE. "ASHRAE Epidemic Task Force" Core Recommendations for Reducing Airborne Infectious Aerosol Exposure. 2021. Accessed 2021.
2. ASHRAE. "Filtration and Air Cleaning Summary." ASHRAE, 25 May 2021. COVID-19 ... Accessed 10 Sept 2021.
3. Coolon, Wade H., et al. "Virus Mitigation in K12 Schools." ASHRAE. 2021.
4. "Fundamentals of UVGI." ASHRAE. 12 May 2021 (Online Webinar). Accessed 2021.
6. Firrantello, Joseph, and William Bahnfleth. "Simulation and Monetization of Collateral Airborne Infection Risk Improvements from Ultraviolet Germicidal Irradiation for Coil Maintenance." Science and Technology for the Built Environment, vol. 24, no. 2, 2018, pp. 125–140.
6. "Ultraviolet Air and Surface Treatment." 2019 Ashrae Handbook: Heating, Ventilating, and Air Conditioning Applications. ASHRAE. Atlanta, GA, 2019, pp. 62.1–62.17. Accessed 2021.
7. Kowalski, Wladyslaw. Immune Building Systems Technology. The McGraw-Hill Companies, Inc., 2003.

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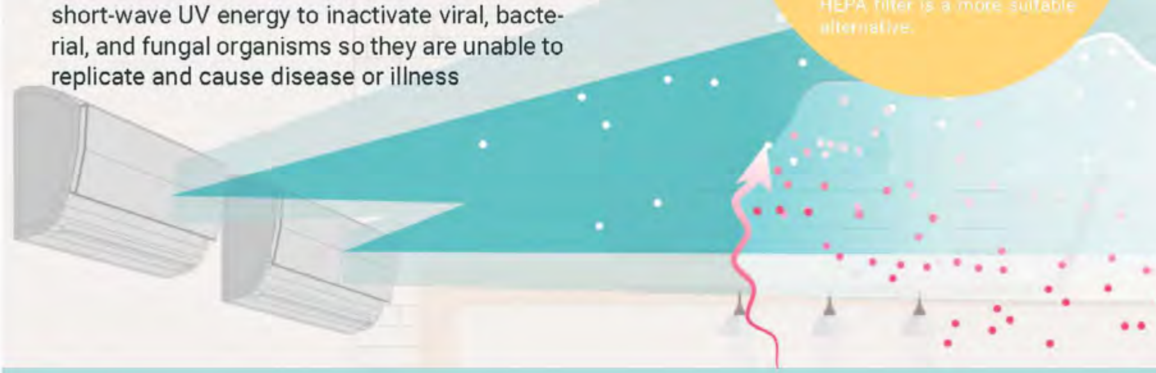
IDAHO POWER.

UPPER ROOM DISINFECTION UVGI

In-room UVGI is a powerful method of disinfection that requires significant capital and operational costs. These systems are well suited for health care facilities and spaces with higher disinfection requirements. In other settings, an in-room HEPA filter is a more suitable alternative.

Ultraviolet germicidal irradiation, or UVGI, uses short-wave UV energy to inactivate viral, bacterial, and fungal organisms so they are unable to replicate and cause disease or illness



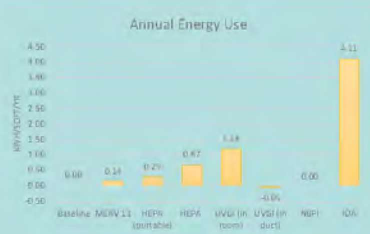
+ 1.18 kWh/sqft

+ $151.17 /1,000cfm

Properly Installed and operated lamps are 99% effective.

DESIGN GUIDELINES

- Approximately one 17W lamp per every 200 ft²
- Ideal UV-C intensity for disinfection is >10 uW/cm²
- Mount fixtures no less than 7 ft from the floor in a room with a minimum ceiling height of 8 ft
- Replace lamps every 1-2 years, or according to manufacturers recommendations.
- Well-mixed spaces increase the amount of air that comes into contact with the UV beam.
- Effectiveness of UVGI depends highly proper installation and operation.



1. ASHRAE. "ASHRAE Epidemic Task Force" Core Recommendations for Reducing Airborne Infectious Aerosol Exposure, 2021, Accessed 2021.
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3. "Fundamentals of UVGI" ASHRAE, 17 May 2021, Online Webinar
4. Coolan, Wade H, et al. "Virus Mitigation in K-12 Schools." ASHRAE, 2021.
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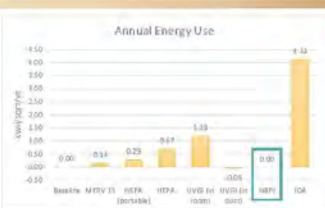
IDAHO POWER.

Needlepoint Bipolar Ionization

High voltage electrodes create reactive ions in air that react with airborne contaminants, including viruses. The design of the systems can be modified to create mixtures of reactive oxygen species (ROS), ozone, hydroxyl radicals and super-oxide anions .

Bottom Line

NBPI shows great potential at being a low energy air cleaner. While some studies have shown NBPI destroys certain viral components, open questions remain on its effectiveness against Sars-Covid2. Low quality equipment may produce ozone, which is harmful at high concentrations and should be monitored.



DESIGN GUIDELINES

- NBPI is an emerging technology and while the technology itself is sound, its efficacy in cleaning/disinfecting large and fast volumes of air within HVAC systems is not yet well documented. For this reason, NBPI is well suited for use with HEPA filtration systems.
- Ozone generation is a concern with NBPI. Ensure that your equipment meets **UL 2998** standard certification (Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners)
- Installation in Rooftop Units is often cheaper and easier than with other HVAC systems due to ease of accessibility.

1. ASHRAE. "ASHRAE Epidemic Task Force." Core Recommendations for Reducing Airborne Infectious Aerosol Exposure, 2021, Accessed 2021.
2. ASHRAE. "Filtration and Air Cleaning Summary". ASHRAE, 25 May 2021, COVID-19@ashrae.org Accessed 10 Sept. 2021.
3. Zeng, Yicheng, et al. "Evaluating a Commercially Available in-Duct Bipolar Ionization Device for Pollutant Removal and Potential Byproduct Formation." Building and Environment, vol. 195, 2021, p. 107750, https://doi.org/10.1016/j.buildenv.2021.107750.
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IDAHO POWER.

INCREASED OUTDOOR AIR

+ 4.11 kWh/sqft

+ $259.65 /1,000cfm

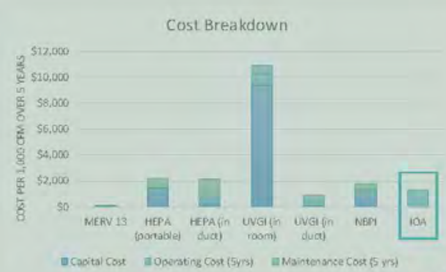
3 ach= 95% effective

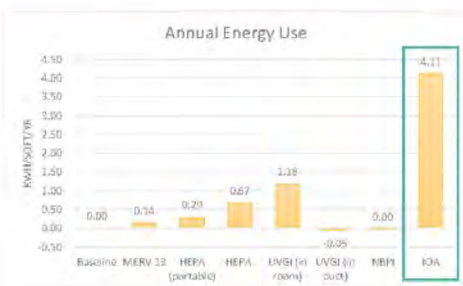
Bottom Line

Increasing outdoor air in your building requires no additional equipment or significant changes to your existing HVAC system, making it a great mitigation strategy for when indoor air quality needs change temporarily or unexpectedly. However, this strategy is expensive and may lead to unacceptable indoor air temperatures.

DESIGN GUIDELINES

- Maintain a clean cooling coil to increase the capability for heat transfer, and therefore increase the systems ability to maintain comfortable space conditions with increased outdoor air [2].
- Flush spaces for a duration sufficient to reduce concentration of airborne infectious particles by 95%. For a well mixed space, this would require 3 air changes of space volume using outdoor air [1].
- Maintain the space's humidity between 40-60% to decrease the bio-burden of infectious particles [3].
- Monitor pressurization of rooms when increasing outdoor air to ensure exhaust and relief air systems run as designed.





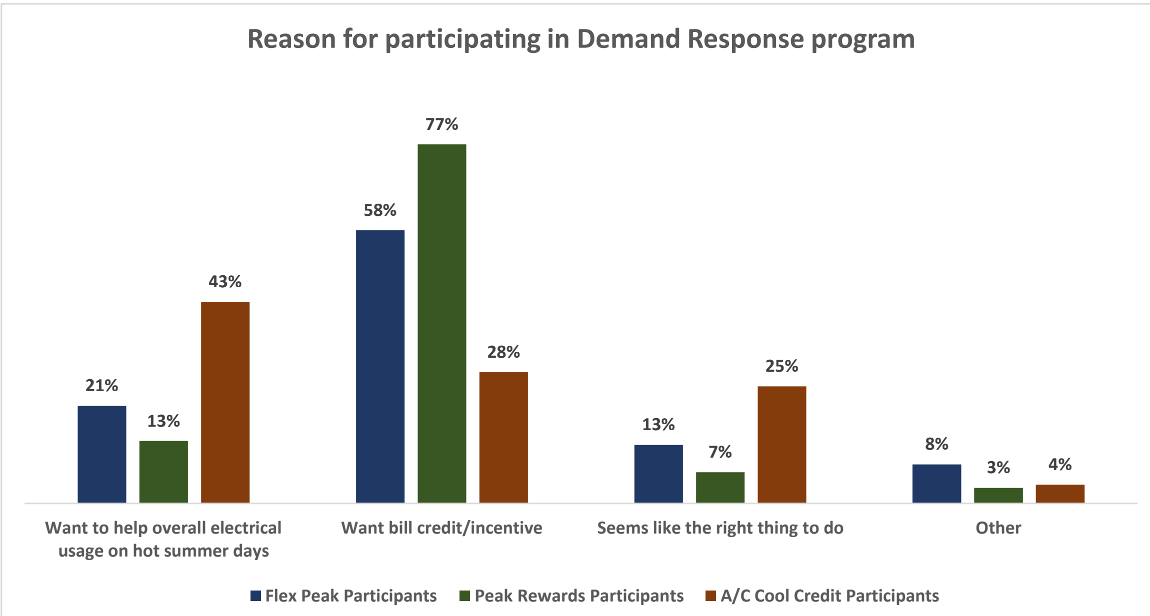
Increasing outdoor air in a non-DOAS setting causes wear and tear on the fan and coils; filters will need to be changed more frequently. These additional maintenance costs vary and were not quantified in this study.

1. ASHRAE "ASHRAE Epidemic Task Force" "Core Recommendations for Reducing Airborne Infectious Aerosol Exposure", 2021, Accessed 2021
2. ASHRAE "Filtration and Air Cleaning Summary", ASHRAE, 25 May 2021 COVID-19 Guidance, Accessed 10 Sept. 2021
3. Wade H. et al "Virus Mitigation in K-12 Schools" ASHRAE 2021 Online Webinar
4. ASHRAE Handbook HVAC Systems and Equipment 2016 pp. 24.2-24.12

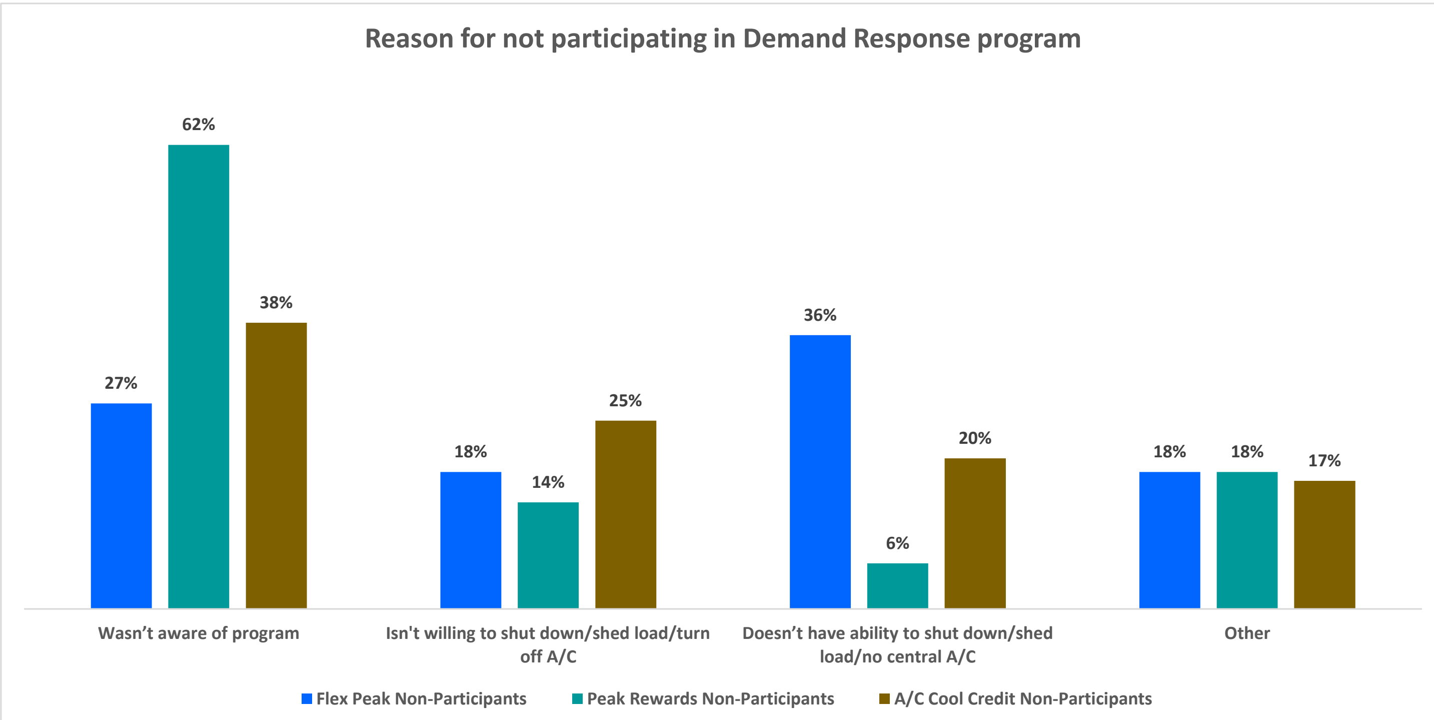
RESEARCH/SURVEYS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2021 Demand Response Programs Overall/Combined Survey Results	Residential, Commercial, Industrial, Irrigation	Idaho Power	Idaho Power	Survey
2021 Idaho Power Home Energy Report Customer Survey	Residential	Idaho Power	Idaho Power	Survey
2021 Idaho Power Weatherization Assistance for Qualified Customers Program Survey	Residential	Idaho Power	Idaho Power	Survey
2021 Retrofits Program Survey	Commercial/Industrial	Idaho Power	Idaho Power	Survey
2021 SBDI Program Customer Satisfaction Survey Reponses	Commercial/Industrial	DNV	DNV	Survey
2021 Shade Tree Program Survey	Residential	Idaho Power	Idaho Power	Survey

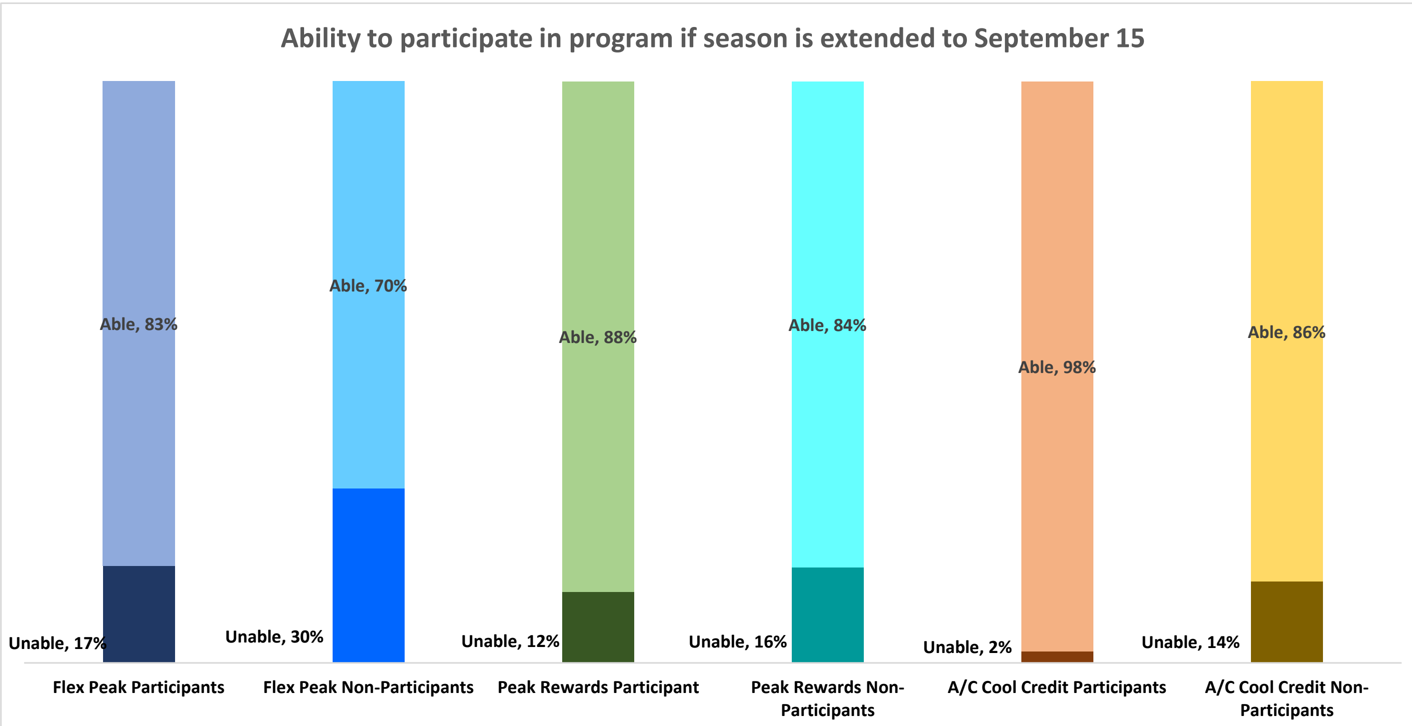
Reason for participating in Demand Response program	Flex Peak Participants	Peak Rewards Participants	A/C Cool Credit Participants
Want to help overall electrical usage on hot summer days	21%	13%	43%
Want bill credit/incentive	58%	77%	28%
Seems like the right thing to do	13%	7%	25%
Other	8%	3%	4%



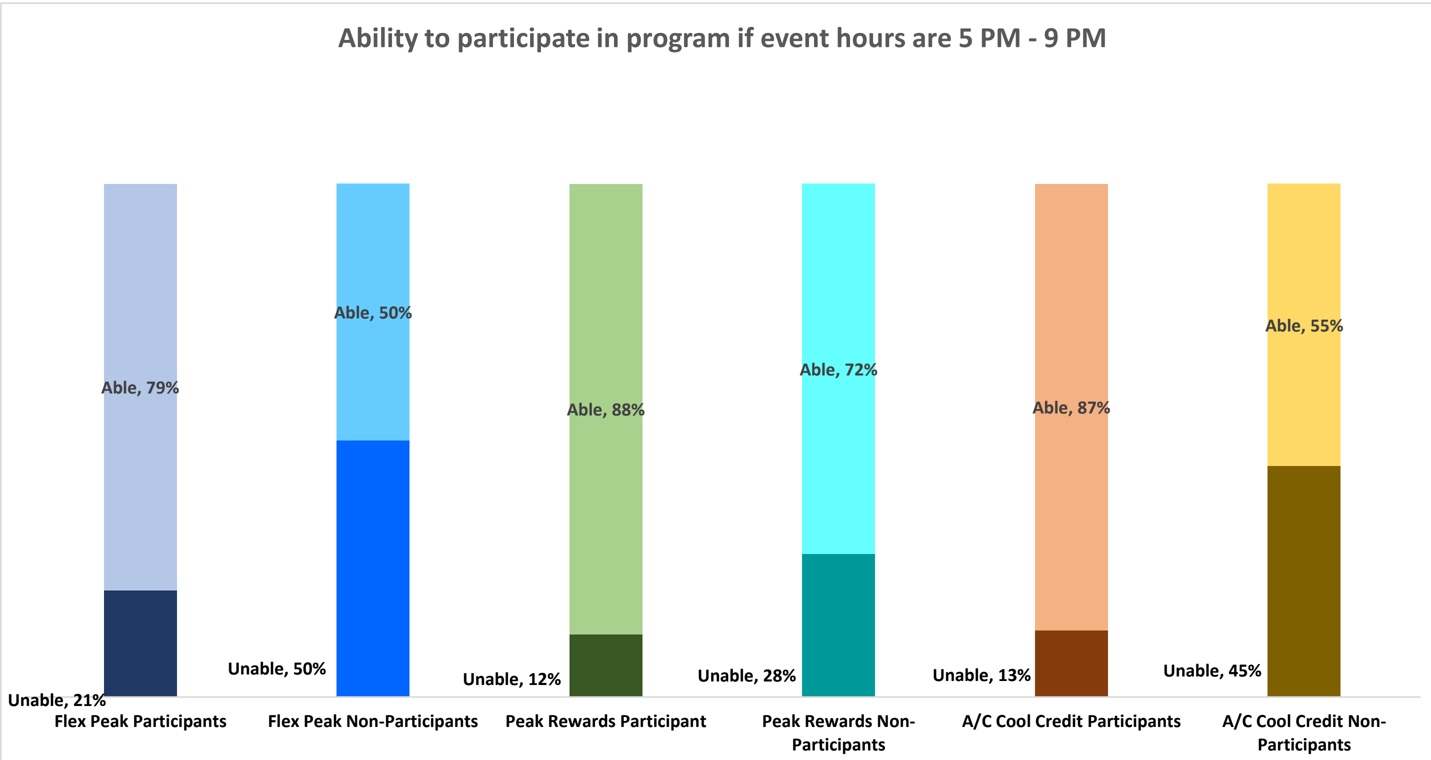
Reason for not participating in Demand Response program	Flex Peak Non-Participants	Peak Rewards Non-Participants	A/C Cool Credit Non-Participants
Wasn’t aware of program	27%	62%	38%
Isn't willing to shut down/shed load/turn off A/C	18%	14%	25%
Doesn’t have ability to shut down/shed load/no central A/C	36%	6%	20%
Other	18%	18%	17%



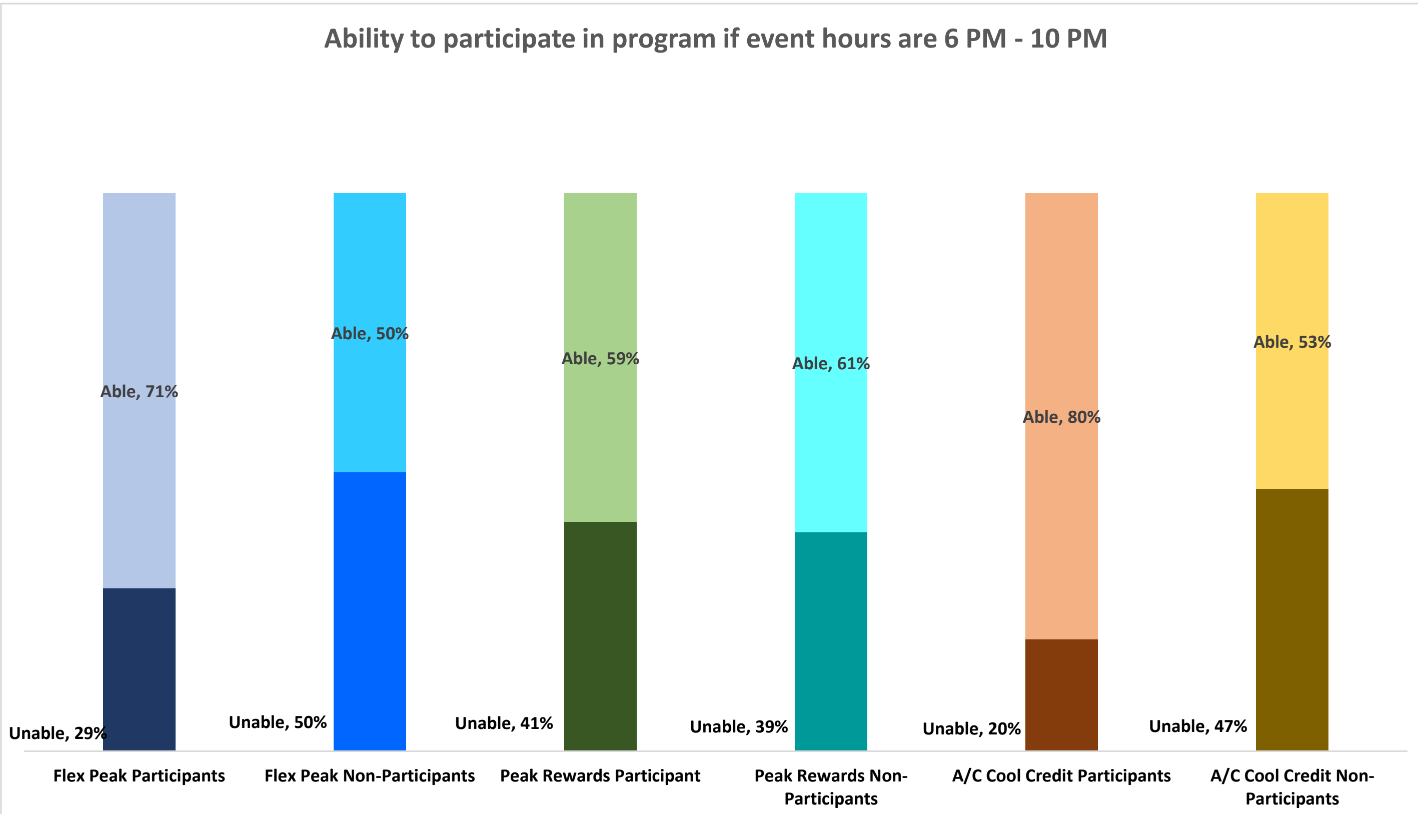
Ability to participate in program if season is extended to September 15	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	17%	30%	12%	16%	2%	14%
Able	83%	70%	88%	84%	98%	86%



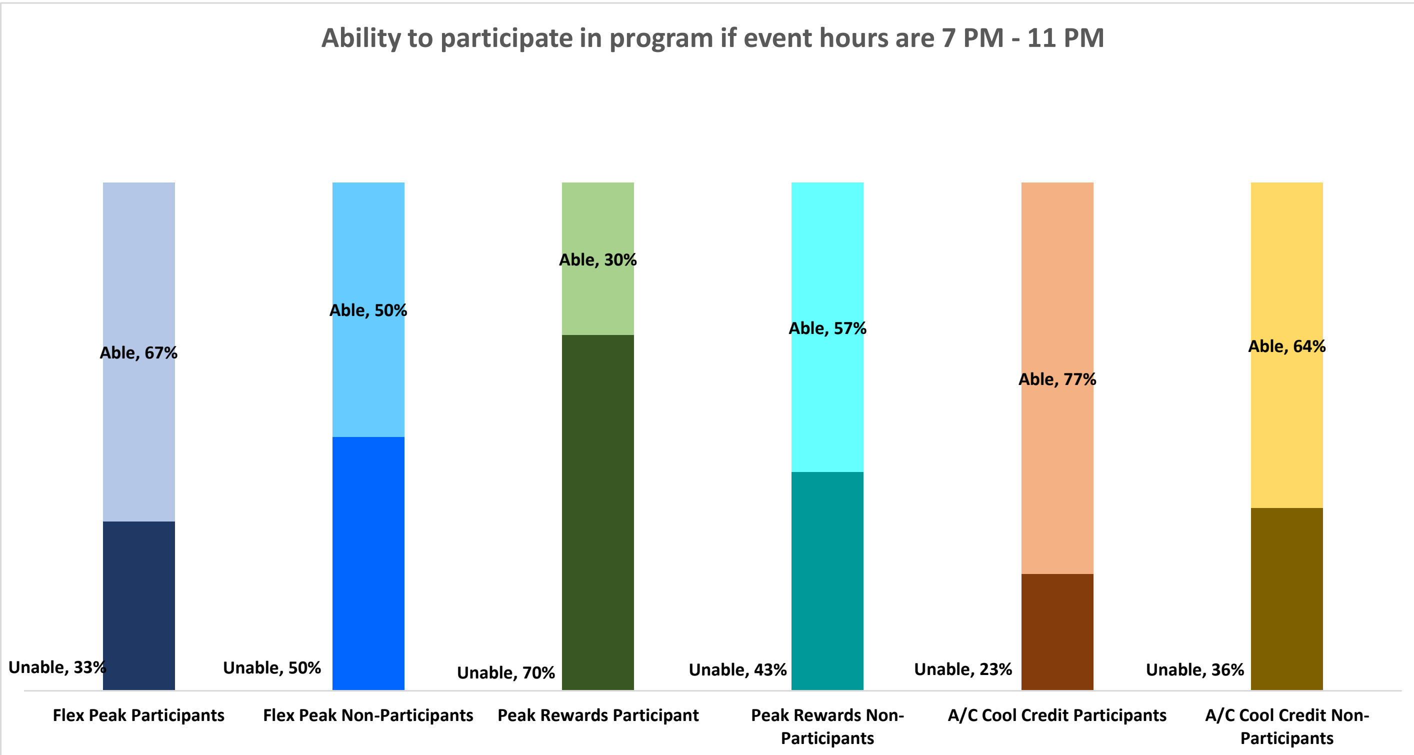
Ability to participate in program if event hours are 5 PM - 9 PM.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	21%	50%	12%	28%	13%	45%
Able	79%	50%	88%	72%	87%	55%



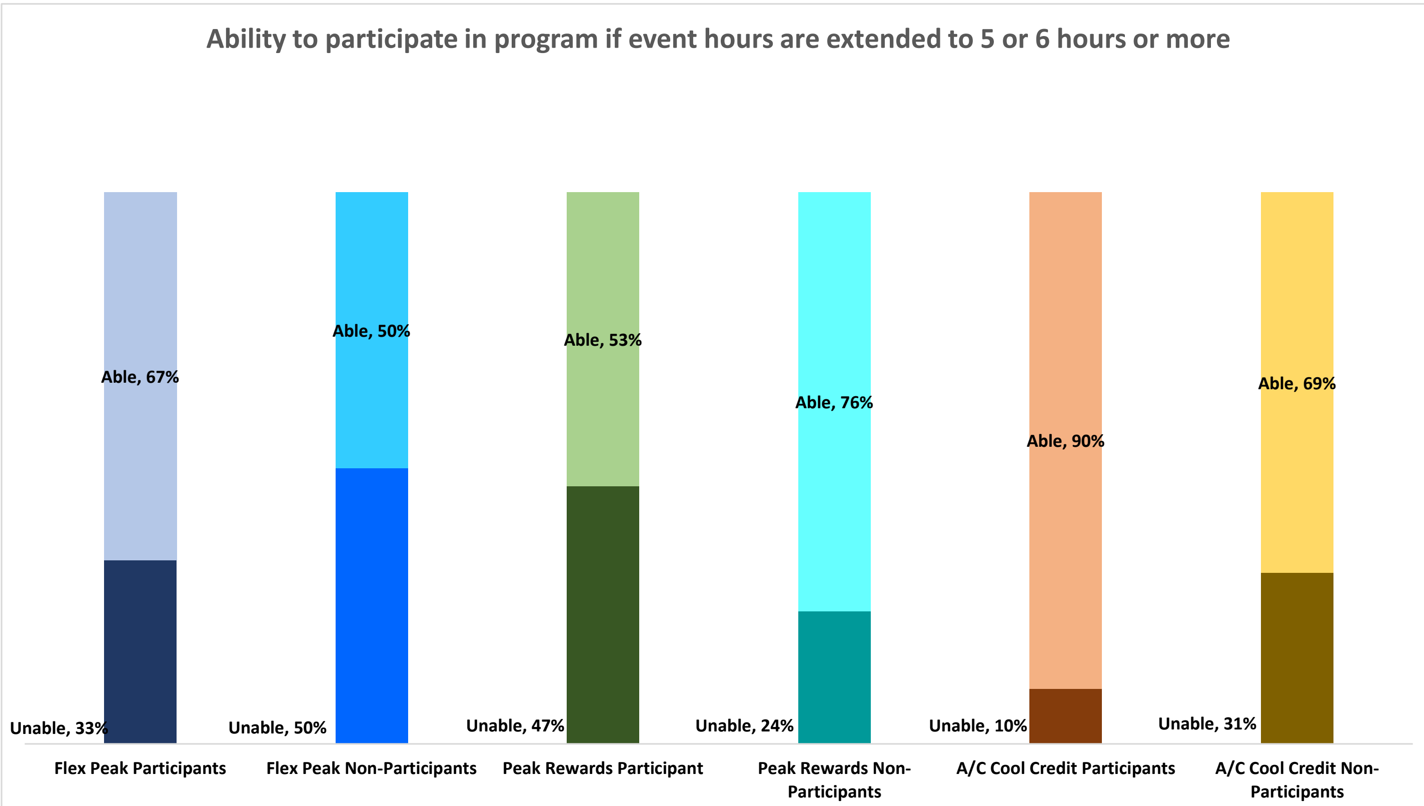
Ability to participate in program if event hours are 6 PM - 10 PM.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	29%	50%	41%	39%	20%	47%
Able	71%	50%	59%	61%	80%	53%



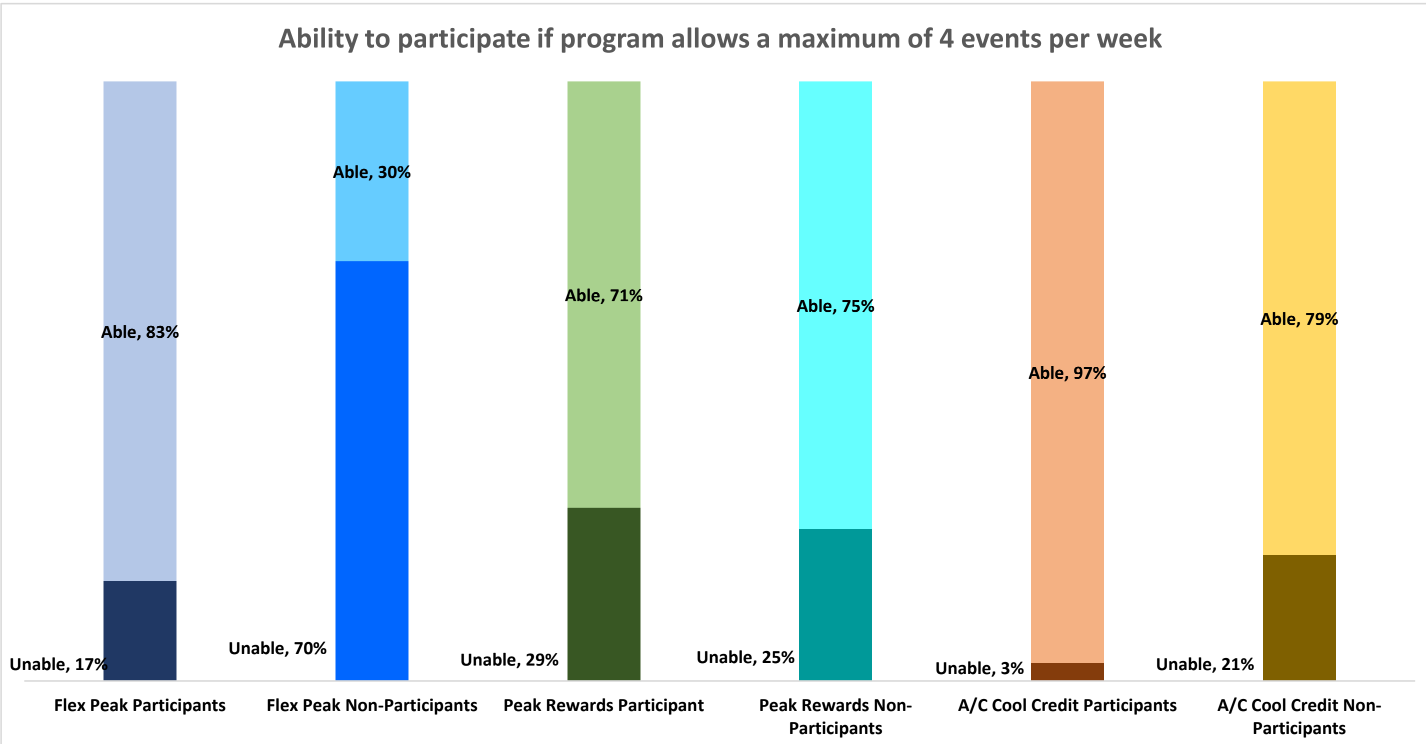
Ability to participate in program if event hours are 7 PM - 11 PM.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	33%	50%	70%	43%	23%	36%
Able	67%	50%	30%	57%	77%	64%



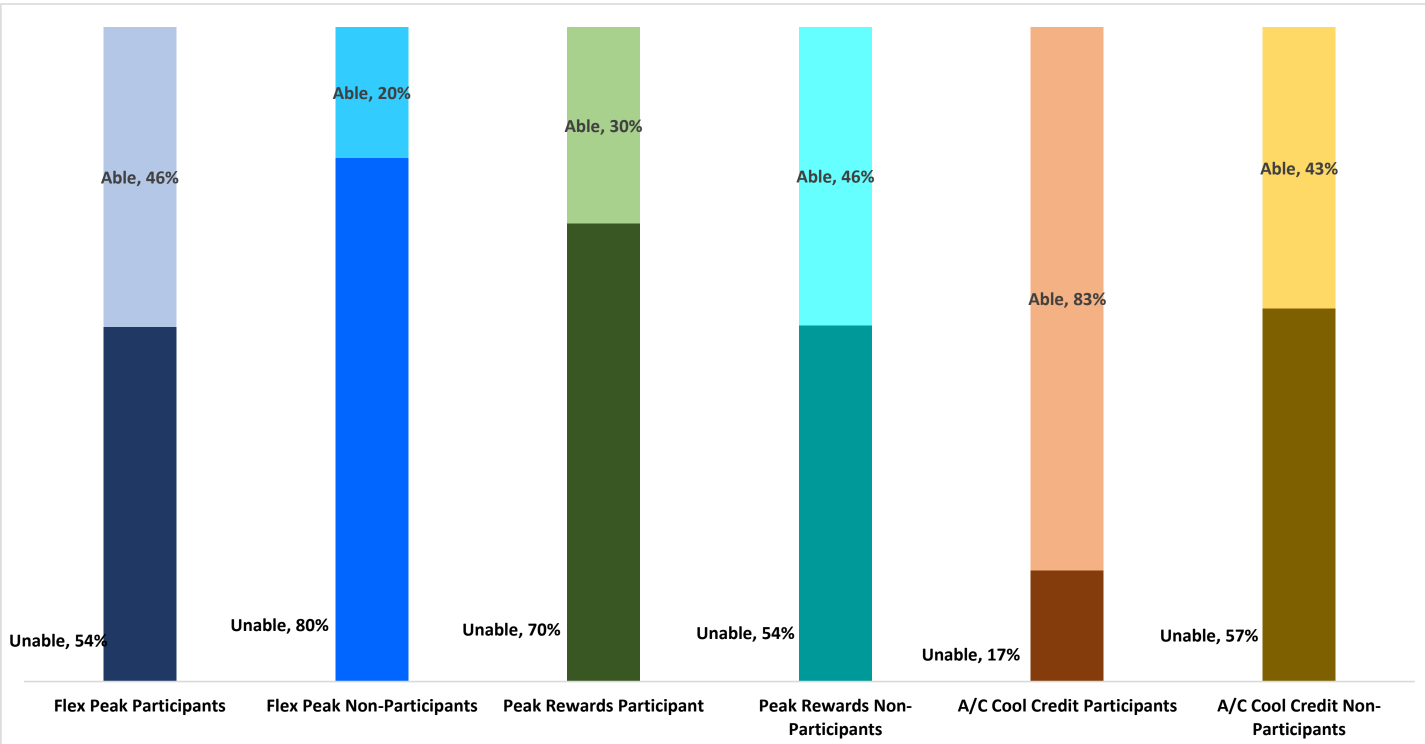
Ability to participate in program if event hours are extended to 5 or 6 hours or more.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	33%	50%	47%	24%	10%	31%
Able	67%	50%	53%	76%	90%	69%



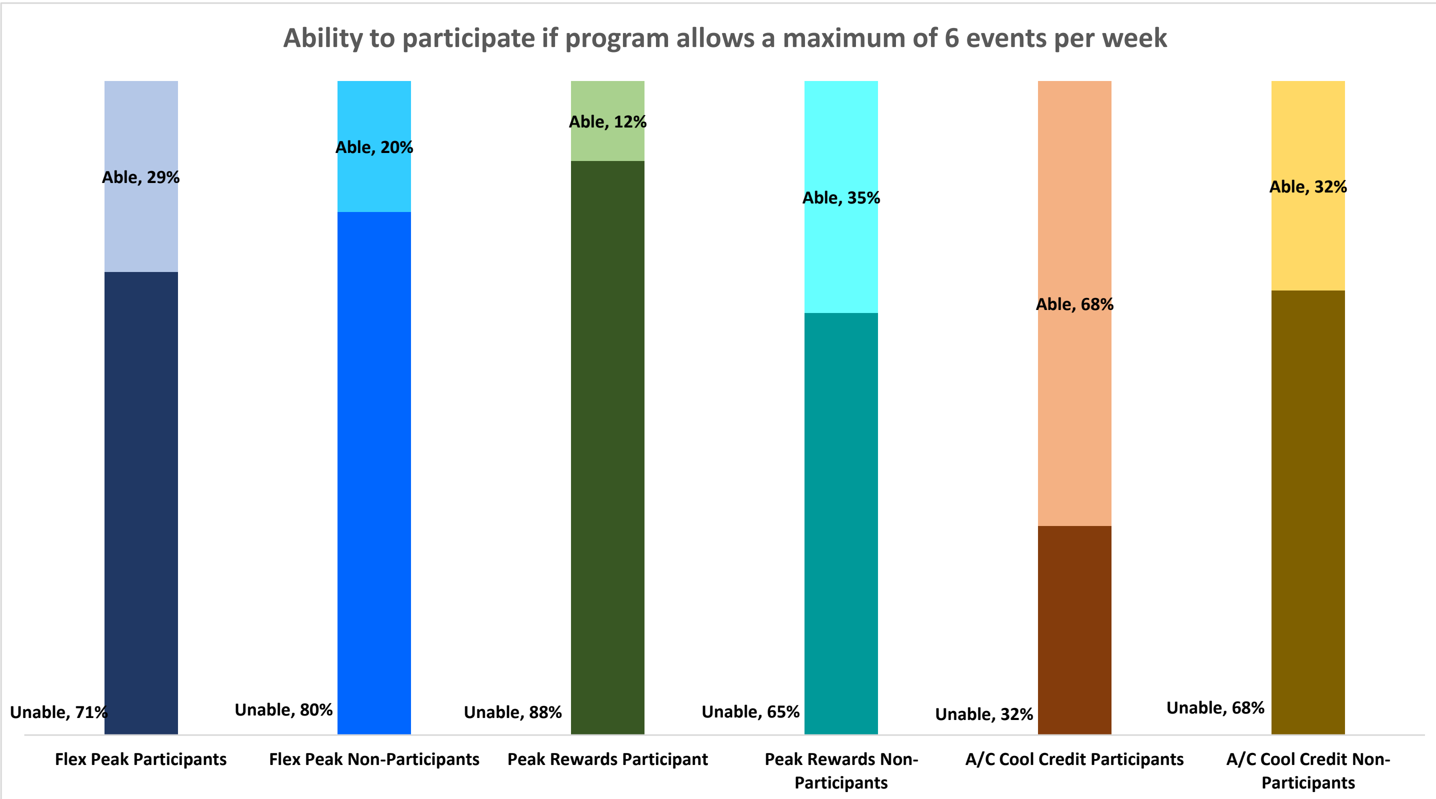
Ability to participate in program allows a maximum of 4 events per week.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	17%	70%	29%	25%	3%	21%
Able	83%	30%	71%	75%	97%	79%



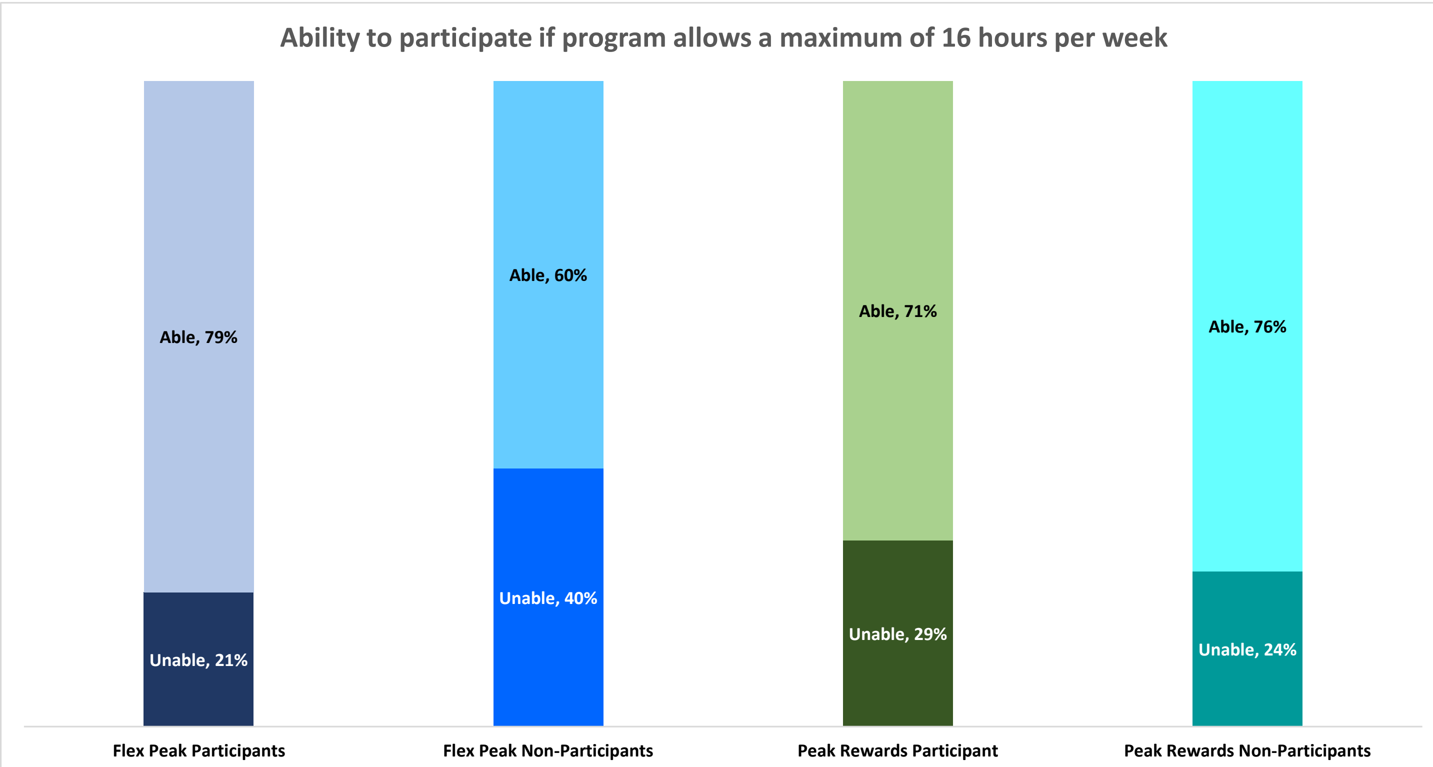
Ability to participate in program allows a maximum of 5 events per week.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	54%	80%	70%	54%	17%	57%
Able	46%	20%	30%	46%	83%	43%



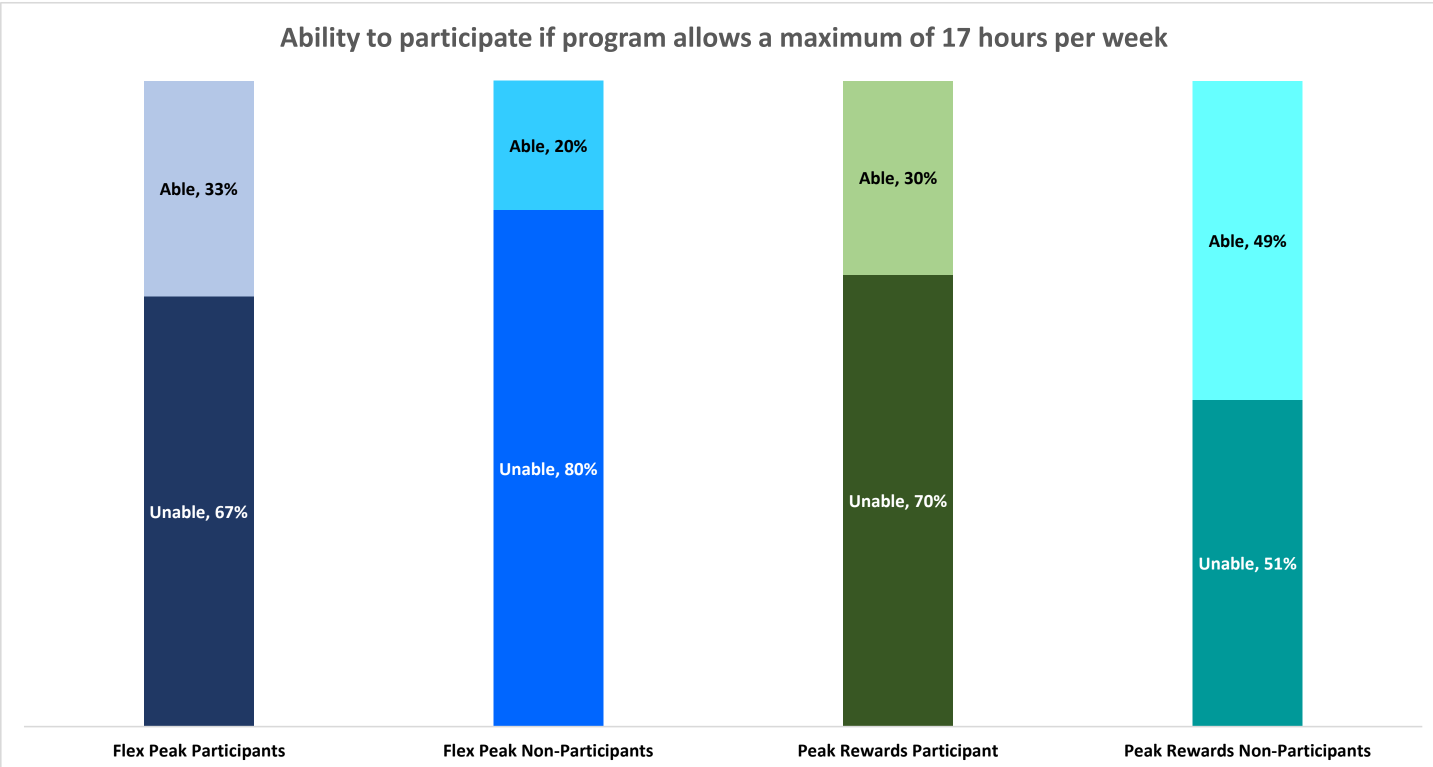
Ability to participate in program allows a maximum of 6 events per week.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	71%	80%	88%	65%	32%	68%
Able	29%	20%	12%	35%	68%	32%



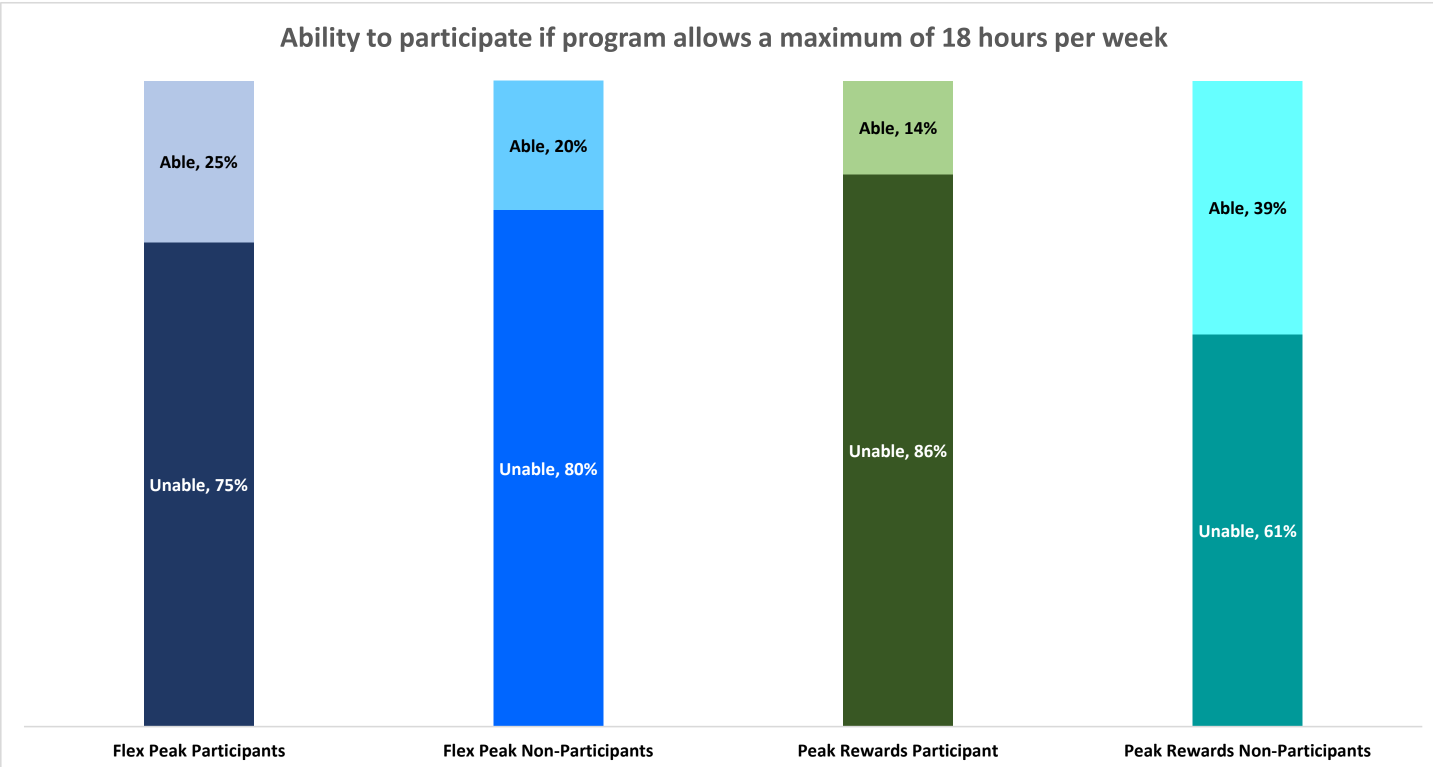
Ability to participate in program allows a maximum of 16 hours per week.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	21%	40%	29%	24%	N/A	N/A
Able	79%	60%	71%	76%	N/A	N/A



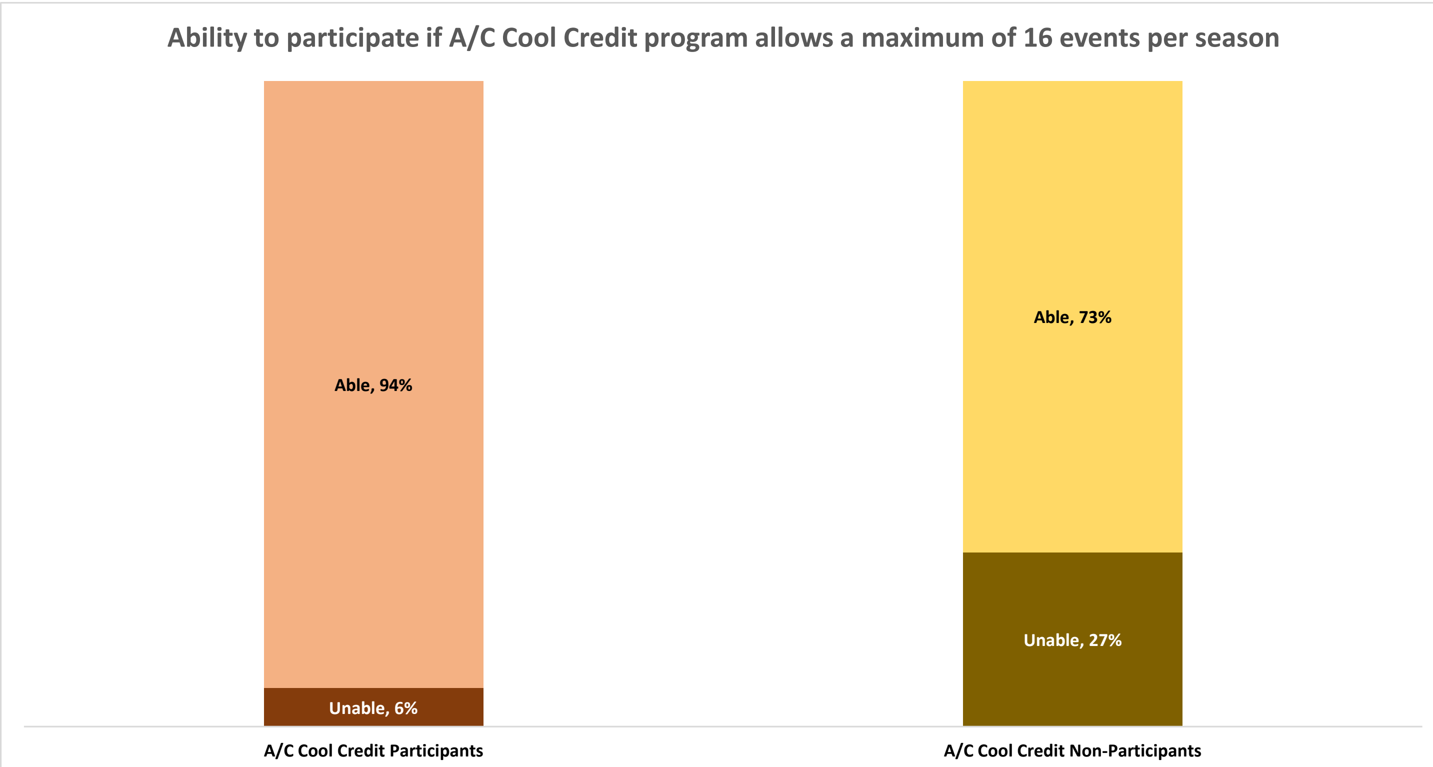
Ability to participate in program allows a maximum of 17 hours per week.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	67%	80%	70%	51%	N/A	N/A
Able	33%	20%	30%	49%	N/A	N/A



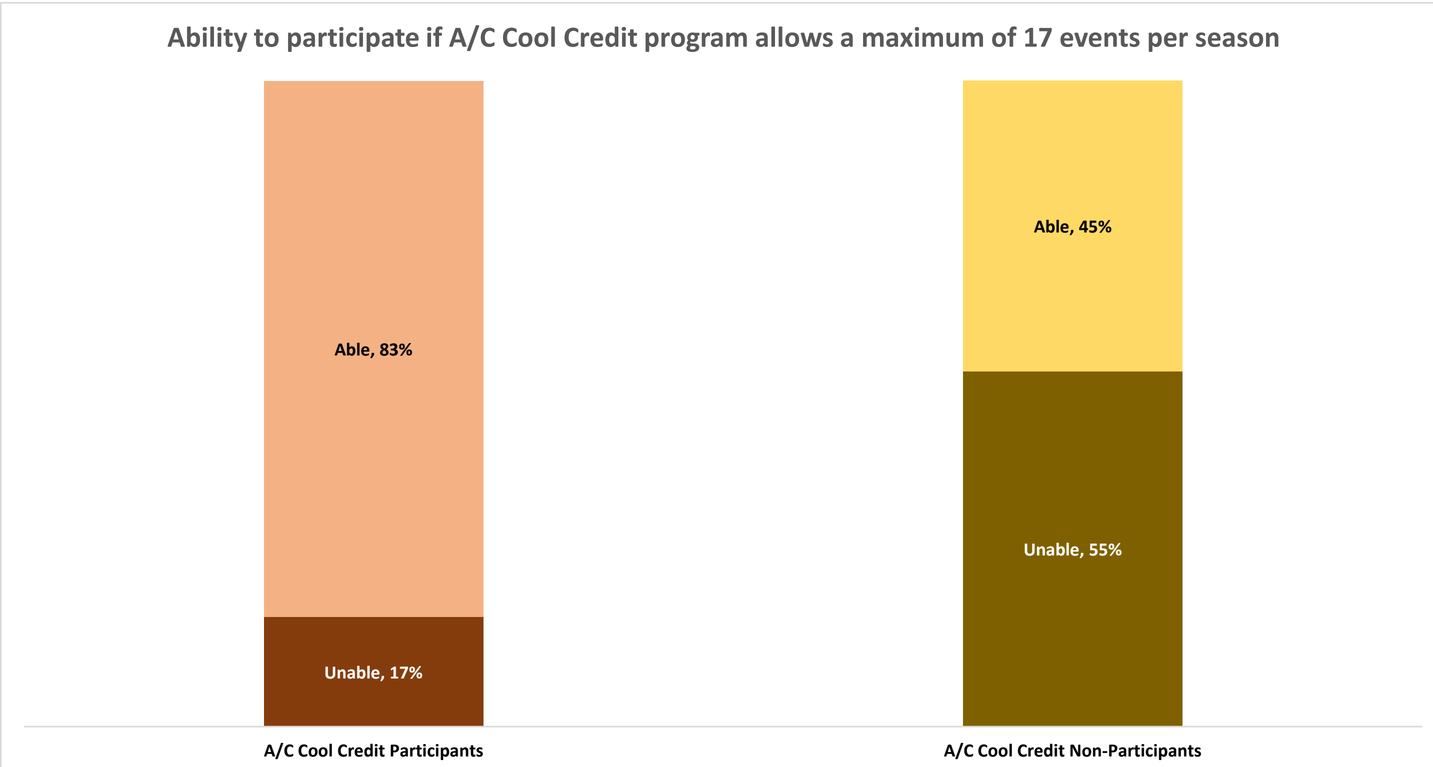
Ability to participate in program allows a maximum of 18 hours per week.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	75%	80%	86%	61%	N/A	N/A
Able	25%	20%	14%	39%	N/A	N/A



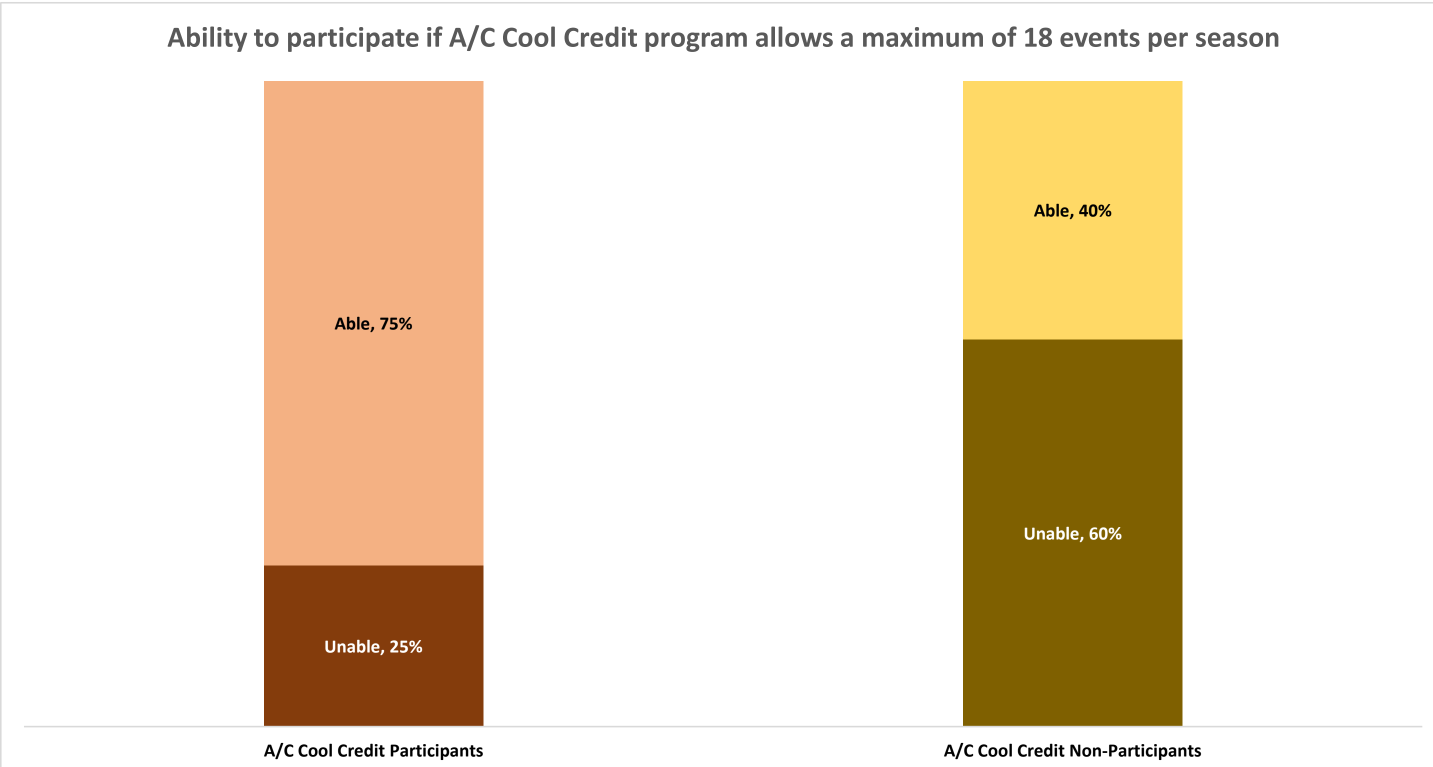
Ability to participate in program allows a maximum of 16 events per season.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	N/A	N/A	N/A	N/A	6%	27%
Able	N/A	N/A	N/A	N/A	94%	73%



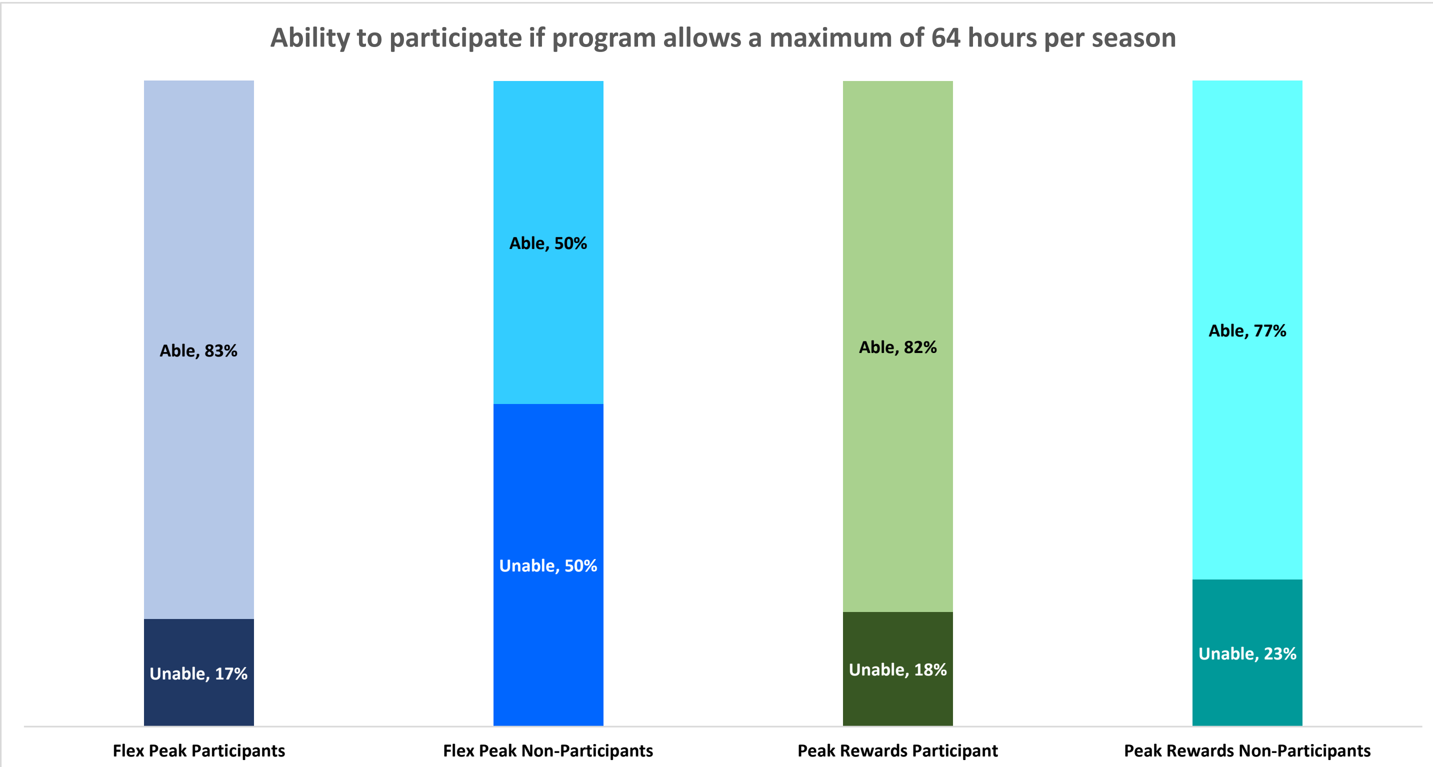
Ability to participate in program allows a maximum of 17 events per season.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	N/A	N/A	N/A	N/A	17%	55%
Able	N/A	N/A	N/A	N/A	83%	45%



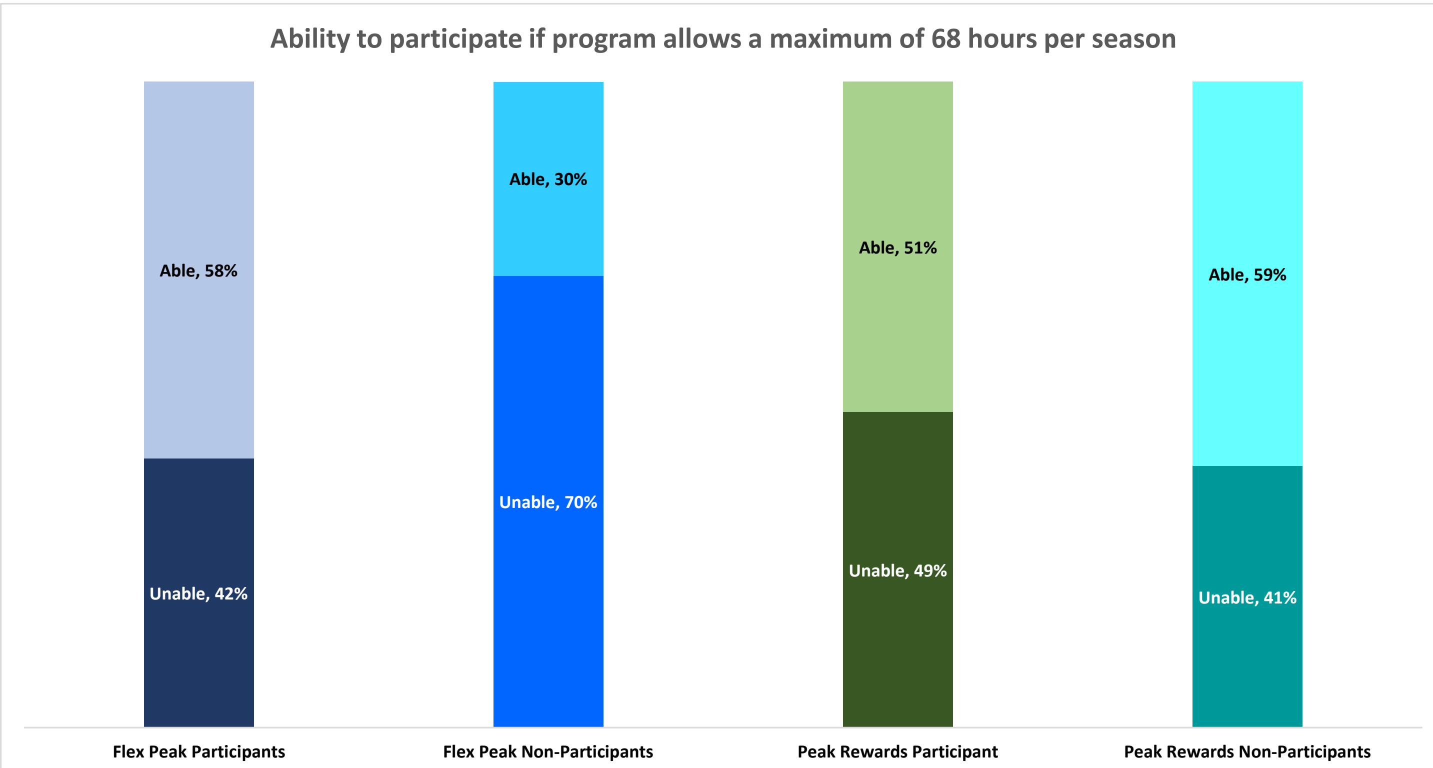
Ability to participate in program allows a maximum of 18 events per season.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	N/A	N/A	N/A	N/A	25%	60%
Able	N/A	N/A	N/A	N/A	75%	40%



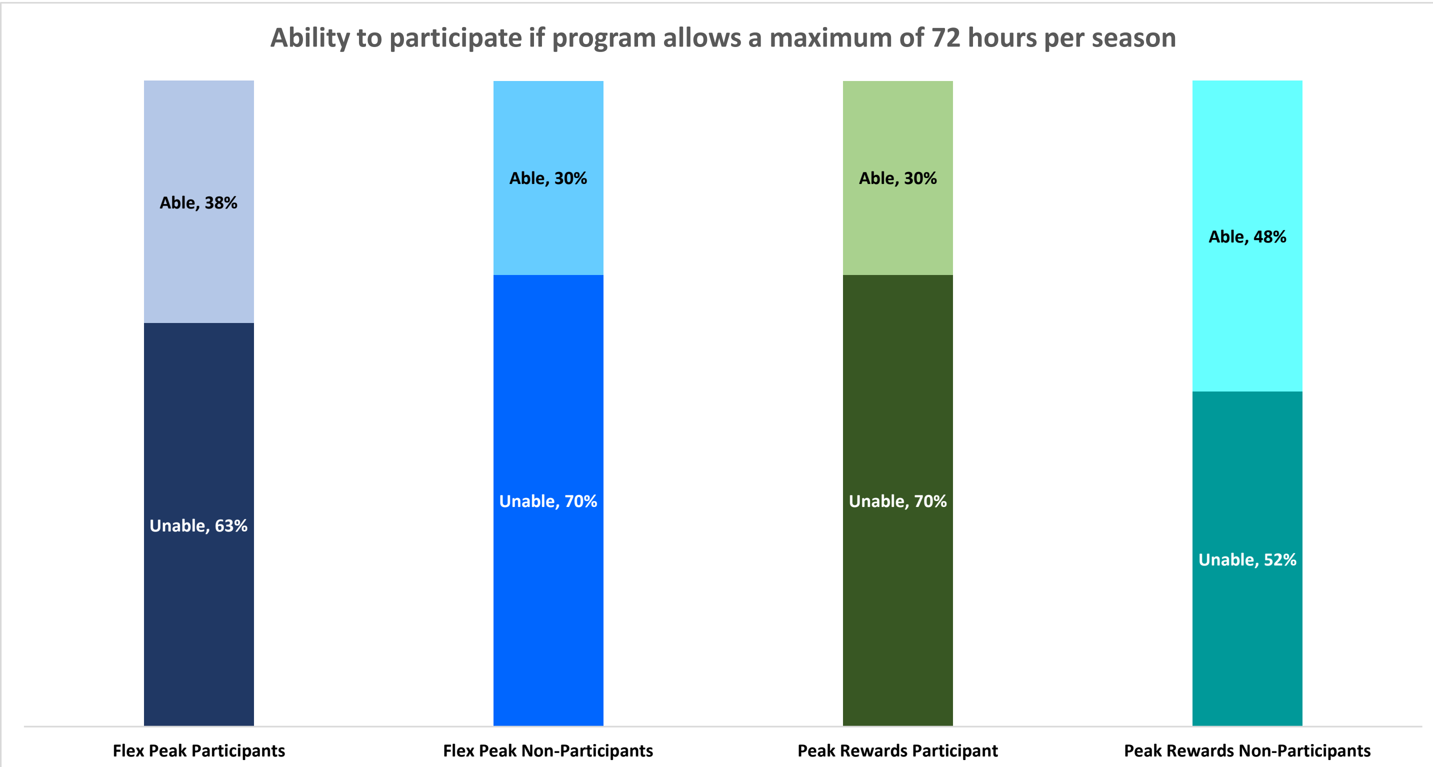
Ability to participate in program allows a maximum of 64 hours per season.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	17%	50%	18%	23%	N/A	N/A
Able	83%	50%	82%	77%	N/A	N/A



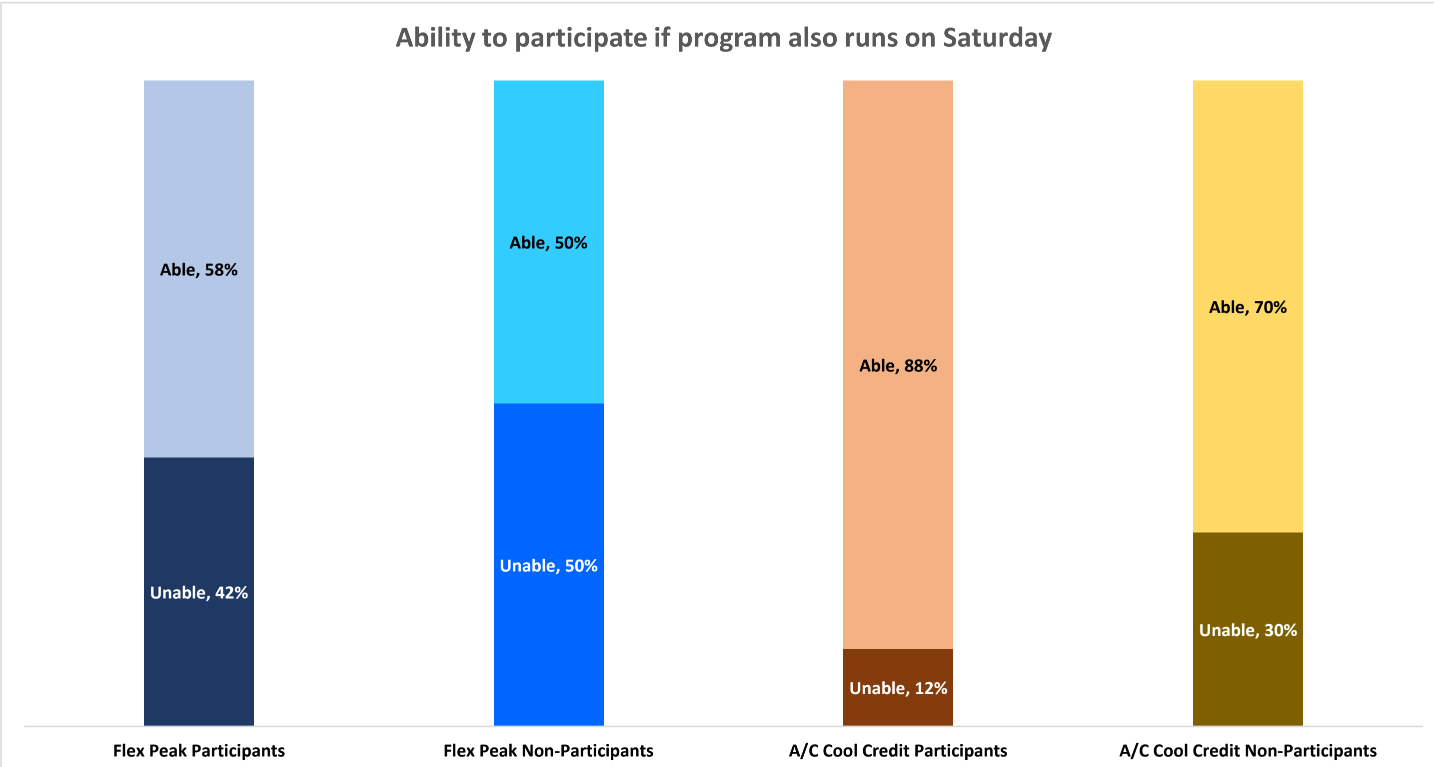
Ability to participate in program allows a maximum of 68 hours per season.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	42%	70%	49%	41%	N/A	N/A
Able	58%	30%	51%	59%	N/A	N/A



Ability to participate in program allows a maximum of 72 hours per season.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	63%	70%	70%	52%	N/A	N/A
Able	38%	30%	30%	48%	N/A	N/A



Ability to participate in program also runs on Saturday.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Unable	42%	50%	N/A	N/A	12%	30%
Able	58%	50%	N/A	N/A	88%	70%



Reason unable to participate in program.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Duration of events would be too long	17%	10%	18%	13%	29%	36%
Maximum number of events per season would be too many	7%	15%	14%	14%	23%	19%
Length of season would be too long	2%	5%	6%	4%	7%	6%
Maximum number of events per week would be too many	17%	10%	23%	23%	33%	35%
Not willing to take on the risk of shutting down/reducing operations	22%	10%	24%	11%		
Unable to shut off/reduce operations due to labor/staffing issues	13%	15%	11%	9%		
Customers/clients may be negatively impacted	20%	20%				
Concerned overall temperature in house would become too uncomfotable					76%	71%
Home during that time, don't want system interrupted					28%	40%
Other	2%	15%	4%	24%	14%	24%

Top 3 impacts to ability to participate in program. Total number of times ranked 1, 2 or 3.	Flex Peak Participants	Flex Peak Non-Participants	Peak Rewards Participant	Peak Rewards Non-Participants	A/C Cool Credit Participants	A/C Cool Credit Non-Participants
Maximum number of events allowed per week	18	6	76	58	122	180
Maximum number of events allowed per season	9	1	39	28	93	136
Days of the week the program runs	13	5	25	33	93	121
Length of season	6	3	9	20	93	109
Event times	13	7	59	43	154	195
Incentive amount	10	5	57	44	188	215
Comfort					209	227
Other	3	3	5	11	58	74

2021 Idaho Power Home Energy Report Customer Surveys

What is your overall satisfaction with Idaho Power?

Answer	Control Group	Treatment Goup	Total Percent	Responses
Very satisfied	64%	61%	62%	977
Somewhat satisfied	21%	24%	23%	360
Neither satisfied nor dissatisfied	11%	11%	11%	179
Somewhat dissatisfied	3%	2%	3%	40
Very dissatisfied	1%	1%	1%	16
Total				**1572**

How motivated are you to reduce the amount of electricity you use in your home?

Answer	Control Group	Treatment Goup	Total Percent	Responses
Very motivated	38%	33%	35%	543
Somewhat motivated	48%	52%	50%	792
Neither motivated nor unmotivated	12%	13%	12%	196
Somewhat unmotivated	2%	2%	2%	27
Very unmotivated	1%	1%	1%	13
Total				**1571**

Have you made efforts in your home to reduce your electricity use?

Answer	Control Group	Treatment Goup	Total Percent	Responses
Yes	90%	91%	91%	1426
No	7%	7%	7%	106
Don't know	4%	2%	2%	38
Total				**1570**

Please select the reasons you took action to reduce your electricity use. (Check all that apply)

Answer	Control Group	Treatment Goup	Total Percent	Responses
Save money	38%	37%	37%	1276
Reduce waste	20%	19%	19%	670
More comfortable home	12%	113%	13%	437
Preserve the environment	19%	20%	19%	668
Reduce fossil fuels usage	11%	11%	11%	380
Other	1%	1%	1%	30
Total				**3461**

How much would you agree with the following statement?
Idaho Power provides excellent customer service

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	43%	41%	41%	651
Somewhat agree	27%	29%	28%	445
Neither agree nor disagree	24%	27%	26%	416
Somewhat disagree	3%	2%	2%	39
Strongly disagree	2%	1%	1%	19
Total				**1570**

How much would you agree with the following statement?
Idaho Power provides service at a reasonable cost

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	30%	29%	29%	462
Somewhat agree	40%	38%	39%	609
Neither agree nor disagree	17%	21%	20%	314
Somewhat disagree	9%	8%	8%	131
Strongly disagree	5%	3%	4%	56
Total				**1572**

How much would you agree with the following statement?
Idaho Power cares about its customers

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	35%	33%	34%	532
Somewhat agree	33%	33%	33%	515
Neither agree nor disagree	25%	29%	27%	429
Somewhat disagree	4%	4%	4%	63
Strongly disagree	3%	2%	2%	32
Total				**1571**

How much would you agree with the following statement?
Idaho Power helps you understand how you're using energy

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	25%	36%	32%	507
Somewhat agree	40%	39%	39%	620
Neither agree nor disagree	29%	18%	21%	335
Somewhat disagree	5%	6%	6%	87
Strongly disagree	1%	2%	1%	22
Total				**1571**

How much would you agree with the following statement?
Idaho Power provides helpful tools to help you save money

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	22%	25%	24%	379
Somewhat agree	40%	41%	41%	641
Neither agree nor disagree	30%	26%	27%	431
Somewhat disagree	6%	6%	6%	92
Strongly disagree	2%	2%	2%	28
Total				**1571**

How much would you agree with the following statement?
Idaho Power is a trusted resource for information on how to save energy

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	33%	36%	35%	552
Somewhat agree	40%	38%	39%	612
Neither agree nor disagree	24%	22%	22%	350
Somewhat disagree	2%	3%	3%	41
Strongly disagree	1%	1%	1%	17
Total				**1572**

How much would you agree with the following statement?
Idaho Power helps manage energy usage

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	19%	22%	21%	328
Somewhat agree	34%	38%	37%	581
Neither agree nor disagree	38%	31%	33%	522
Somewhat disagree	6%	6%	6%	100
Strongly disagree	2%	3%	3%	40
Total				**1571**

How much would you agree with the following statement?
Idaho Power helps save with energy-saving recommendations

Answer	Control Group	Treatment Goup	Percent	Responses
Strongly agree	28%	29%	29%	456
Somewhat agree	41%	41%	41%	646
Neither agree nor disagree	24%	23%	24%	373
Somewhat disagree	4%	5%	4%	70
Strongly disagree	2%	2%	2%	26
Total				**1571**

How much would you agree with the following statement?
Viewing hourly/daily intervals of usage on Idaho Power's website is useful

Answer	Control Group	Treatment Goup	Total Percent	Responses
Strongly agree	42%	39%	40%	625
Somewhat agree	31%	33%	32%	510
Neither agree nor disagree	24%	25%	25%	389
Somewhat disagree	2%	2%	2%	28
Strongly disagree	1%	1%	1%	18
Total				**1570**

Have used any of the following energy-savings actions at residence in the last 12 months. (Check all that apply)

Answer	Recipients	Control Group	Treatment Goup	Total Percent	Responses
Added insulation to your home	15%	2%	2%	2%	234
Avoided heating unused rooms	48%	7%	7%	7%	753
Changed appliances	28%	4%	4%	4%	448
Changed windows or doors	18%	3%	2%	2%	276
Checked air ducts for leaks	21%	3%	3%	3%	329
Installed a high efficiency showerhead	27%	4%	4%	4%	428
Purchased LEDs to install in your home	82%	12%	11%	11%	1288
Reduced shower time	33%	4%	5%	5%	517
Set your thermostat to a lower or higher temperature	77%	11%	11%	11%	1208
Turned off lights	93%	13%	13%	13%	1458
Unplugged electrical devices	42%	6%	6%	6%	660
Used a clothesline to dry clothing	20%	3%	3%	3%	315
Washed clothes in cold water	63%	9%	9%	9%	989
Washed only full loads of dishes	75%	11%	11%	11%	1188
Washed only full loads of laundry	72%	10%	10%	10%	1129
Total					**11220**

Do you recall receiving a Home Energy Report?

Answer	Total Percent	Responses
Yes	82%	877
No	11%	122
Don't know	7%	70
Total		**1069**

How thoroughly did you, or someone in your home, read the Reports you received?

Answer	Total Percent	Responses
All or most of them	76%	664
Some of them	21%	185
Little to none of them	3%	26
Don't know	0%	2
Total		**877**

How much do you agree with the following statement?
The information presented in your Home Energy Report was easy to understand

Answer	Total Percent	Responses
Strongly agree	53%	454
Somewhat agree	39%	329
Neither agree nor disagree	5%	44
Somewhat disagree	2%	17
Strongly disagree	1%	5
Total		**849**

Total Per Category	
Agree	92%
Neither Agree/Disagree	5%
Disagree	3%

How much do you agree with the following statement?
The information presented in your Home Energy Report seemed accurate

Answer	Percent	Responses
Strongly agree	33%	278
Somewhat agree	40%	342
Neither agree nor disagree	13%	113
Somewhat disagree	8%	72
Strongly disagree	5%	43
Total		**848**

Per Category	
Agree	73%
Neither Agree/Disagree	13%
Disagree	14%

How much do you agree with the following statement?
The recommendations and tips on how to conserve were helpful

Answer	Percent	Responses
Strongly agree	31%	266
Somewhat agree	40%	335
Neither agree nor disagree	21%	177
Somewhat disagree	6%	48
Strongly disagree	3%	22
Total		**848**

Per Category	
Agree	71%
Neither Agree/Disagree	21%
Disagree	8%

Do you recall seeing each of the following features of the Home Energy Report?
The comparison of your electricity use in relationship to homes of similar type and size in your area

Answer	Percent	Responses
Yes	94%	797
No	6%	51
Total		**848**

Do you recall seeing each of the following features of the Home Energy Report?
The breakdown of your electricity use providing insights into how much your electricity use goes towards the different major appliance

Answer	Percent	Responses
Yes	89%	756
No	11%	93
Total		**849**

Do you recall seeing each of the following features of the Home Energy Report?
Saving tips including personalized savings tips just for you

Answer	Percent	Responses
Yes	69%	587
No	31%	258
Total		**845**

Did you find the following useful?
The comparison of your electricity use in relationship to homes of similar type and size in your area

Answer	Percent	Responses
Yes	71%	563
No	29%	233
Total		**796**

Did you find the following useful?
The breakdown of your electricity use providing insights into how much your electricity use goes towards the different major appliance categories in your home

Answer	Percent	Responses
Yes	83%	**630**
No	17%	**125**
Total		**755**

Did you find the following useful?
Saving tips including personalized savings tips just for you

Answer	Percent	Responses
Yes	78%	459
No	22%	126
Total		**585**

Have you acted on any of the information and suggestions that were included in the report to save money and electricity?

Answer	Percent	Responses
Yes	58%	492
No	42%	351
Total		**843**

How much would you agree that Idaho Power's Home Energy Reports helped you understand your energy usage during the COVID-19

Answer	Percent	Responses
Strongly agree	28%	239
Somewhat agree	34%	290
Neither agree nor disagree	31%	262
Somewhat disagree	3%	27
Strongly disagree	4%	31
Total		**849**

How frequently do you recall receiving your Home Energy Report?

Answer	Percent	Responses
Monthly	23%	194
Bi-monthly	15%	127
Quarterly	43%	361
Twice a year	14%	121
Other (please specify)	4%	36
Total		**839**

How, if at all, has your opinion of Idaho Power changed since receiving the Home Energy Reports? Would you say it is...

Answer	Percent	Responses
Much better	8%	65
Somewhat better	29%	245
Stayed the same	60%	509
Somewhat worse	3%	24
Much worse	0%	2
Total		**845**

How would you prefer to receive the report?

Answer	Percent	Responses
By paper	47%	394
By email	47%	399
Prefer not to receive the report	6%	51
Total		**844**

Are you aware that you can opt-out of the Home Energy Reports?

Answer	Percent	Responses
Yes	22%	11
No	78%	40
		51

Which of the following best describes your age?

Answer	Percent	Responses
18-24	0%	1
25-34	6%	97
35-44	17%	267
45-54	16%	255
55-64	23%	365
65-74	25%	391
75 or older	9%	146
Prefer not to answer	3%	47
Total		**1569**

What is the highest level of education you have completed?

Answer	Percent	Responses
Some high school or less	0%	5
Graduated high school or GED	8%	122
Some college or technical school	24%	377
Associate Degree	11%	179
Bachelor's Degree (4 year)	26%	408
Some graduate school	6%	91
Graduate Degree	19%	302
Prefer not to answer	5%	82
Total		**1566**

Which of the following would best describe the general area where your primary residence as an Idaho Power customer is located:

Answer	Percent	Responses
Canyon West region (including Nampa, Caldwell, Payette, McCall, Emmett, Ontario, and other surrounding towns)	25%	394
Capital region (including Boise, Meridian, Eagle, Star, Kuna, Mountain Home, Glenns Ferry and other surrounding towns)	54%	846
Southeast region (including Twin Falls, Jerome, Filer, Rupert, Ketchum, Pocatello, American Falls, Blackfoot and other surrounding towns)	21%	325
Total		**1565**

2021 Idaho Power Weatherization Assistance for Qualified Customers Program Survey

Job Number.
Answered: 124

Agency/Contractor Name:

Answer	Percentage	Responses
Metro Community Services	4%	5
Eastern Idaho Community Action Partnership	0%	0
El Ada Community Action Partnership	69%	85
South Central Community Action Partnership	9%	11
Southeastern Idaho Community Action Agency	18%	22
Community Connection of Northeast Oregon	0%	0
Community in Action	1%	1
	Answered	**124**

How did you learn about the weatherization program?

Answer	Percent	Responses
Agency/Contractor flyer	18%	21
Idaho Power employee	7%	8
Idaho Power web site	16%	18
Friend or relative	37%	43
Letter in mail	3%	4
Other (Please specify)	18%	21
	Answered	**115**

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

Answer	Percent	Responses
Reduce utility bills	46%	89
Improve comfort of home	21%	41
Furnace concerns	20%	39
Water heater concerns	3%	6
Improve insulation	8%	16
Other (please specify)	1%	2
	Answered	**193**

If you received any energy efficiency equipment upgrade as part of the weatherization, how well was the equipment's operation explained to you?

Answer	Percent	Responses
Completely	96%	110
Somewhat	3%	3
Not at all	1%	1
	Answered	**114**

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

Answer	Percent	Responses
How air leaks affect energy usage	22%	72
How insulation affects energy usage	18%	60
How to program the new thermostat	12%	41
How to reduce the amount of hot water used	9%	31
How to use energy wisely	21%	70
How to understand what uses the most energy in my home	16%	54
Other (Please specify)	1%	2
	Answered	**330**

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	Percent	Responses
Very likely	90%	104
Somewhat likely	10%	11
Not very likely	0%	0
Not likely at all	0%	0
	Answered	**115**

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

Answer	Percent	Responses
All of it	85%	89
Some of it	15%	16
None of it	0%	0
	Answered	**105**

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	Percent	Responses
Very likely	75%	76
Somewhat likely	23%	23
Somewhat unlikely	2%	2
Very unlikely	1%	1
	Answered	**102**

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

Answer	Percent	Responses
Washing full loads of clothes	17%	66
Washing full loads of dishes	12%	45
Turning off lights when not in use	20%	77
Unplugging electrical equipment when not in use	13%	50
Turning the thermostat up in the summer	17%	65
Turning the thermostat down in the winter	18%	69
Other (please specify)	2%	6
	Answered	**378**

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

Answer	Percent	Responses
Significantly	94%	108
Somewhat	6%	7
Very little	0%	0
Not at all	0%	0
	Answered	**115**

Rate the Agency/Contractor on the following based on your interactions with them: Courteousness

Answer	Percent	Responses
Excellent	99%	114
Good	1%	1
Fair	0%	0
Poor	0%	0
	Answered	**115**

Professionalism

Answer	Percent	Responses
Excellent	98%	114
Good	2%	2
Fair	0%	0
Poor	0%	0
	Answered	**116**

Explanation of work to be performed on your home

Answer	Percent	Responses
Excellent	96%	110
Good	4%	5
Fair	0%	0
Poor	0%	0
	Answered	**115**

Overall experience with Agency/Contractor

Answer	Percent	Responses
Excellent	97%	111
Good	3%	4
Fair	0%	0
Poor	0%	0
	Answered	**115**

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

Answer	Percent	Responses
Yes	84%	96
No	16%	18
	Answered	**114**

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

Answer	Percent	Responses
Very satisfied	98%	114
Somewhat satisfied	1%	1
Somewhat dissatisfied	0%	0
Very dissatisfied	1%	1
	Answered	**116**

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

Answer	Percent	Responses
Improved	94%	109
Stayed the same	6%	7
Decreased	0%	0
	Answered	**116**

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

Answer	Percent	Responses
0	26%	31
1	30%	35
2	21%	25
3	11%	13
4	5%	6
5	4%	5
6 or more	3%	3
	Answered	**118**

How long have you been an Idaho Power customer?

Answer	Percent	Responses
Less than 1 year	0%	0
1-10 years	28%	32
11-25 years	38%	44
26 years or more	34%	39
	Answered	**115**

Please select the category below that best describes your age:

Answer	Percent	Responses
Under 25	3%	3
25-34	11%	13
35-44	21%	25
45-54	18%	21
55-64	21%	25
65-74	15%	18
75 or older	11%	13
	Answered	**118**

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

Answer	Percent	Responses
Less than High School	11%	13
High School graduate or GED	52%	61
Some College or Technical School	25%	30
Associate Degree	4%	5
College Degree (including any graduate school or graduate degrees)	8%	9
	Answered	**118**

2021 Retrofits Survey Results

How did you learn about the Retrofits program?

Answer	Percent	Responses
Idaho Power employee	12.00%	15
Contractor	53.60%	67
Equipment supplier	14.40%	18
Other business owner	7.20%	9
Other (please specify)	12.80%	5
Total		**125**

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

Answer	Percent	Responses
Very satisfied	88.00%	110
Somewhat satisfied	11.20%	14
Neither satisfied nor dissatisfied	0.80%	1
Somewhat dissatisfied	0.00%	0
Very dissatisfied	0.00%	0
Total		**125**

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

Answer	Percent	Responses
Very satisfied	92.00%	115
Somewhat satisfied	6.40%	8
Neither satisfied nor dissatisfied	0.80%	1
Somewhat dissatisfied	0.80%	1
Very dissatisfied	0.00%	0
Total		**125**

How satisfied are you with the equipment that was installed?

Answer	Percent	Responses
Very satisfied	92.74%	115
Somewhat satisfied	5.65%	7
Neither satisfied nor dissatisfied	0.81%	1
Somewhat dissatisfied	0.81%	1
Very dissatisfied	0.00%	0
Total		**124**

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

Answer	Percent	Responses
Very likely	90.32%	112
Somewhat Likely	8.06%	10
Neither likely nor unlikely	0.81%	1
Somewhat unlikely	0.81%	1
Very unlikely	0.00%	0
Total		**124**

How likely are you to recommend Idaho Powers Retrofits program to other business owners?

Answer	Percent	Responses
Very likely	96.67%	116
Somewhat Likely	3.33%	4
Neither likely nor unlikely	0.00%	0
Somewhat unlikely	0.00%	0
Very unlikely	0.00%	0
Total		**120**

2021 SBDI Program Customer Satisfaction Survey Responses

Overall, how satisfied are you with the program?

	Response percent	Response total
Very satisfied	96.4%	134
Somewhat satisfied	2.88%	4
Somewhat dissatisfied	0%	0
Very dissatisfied	0.72%	1
If somewhat or very dissatisfied, why?		0

Export Graph

Statistics based on **139** respondents;

How easy was it to participate in the program?

	Response percent	Response total
Very easy	97.84%	136
Somewhat easy	2.16%	3
Somewhat difficult	0%	0
Very difficult	0%	0
If somewhat or very difficult, why?		0

Export Graph

Statistics based on **139** respondents;

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

	Response percent	Response total
Very likely	97.83%	135
Somewhat likely	2.17%	3
Not very likely	0%	0
Not likely at all	0%	0
If not very likely or not likely at all, why?		0

Export Graph

Statistics based on **138** respondents;

How satisfied are you with the equipment that was installed?

		Response percent	Response total
Very satisfied		95.68%	133
Somewhat satisfied		3.6%	5
Somewhat dissatisfied		0.72%	1
Very dissatisfied		0%	0
If somewhat or very dissatisfied, why?			1

Export Graph

Statistics based on **139** respondents;

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

		Response percent	Response total
Very satisfied		94.2%	130
Somewhat satisfied		5.8%	8
Somewhat dissatisfied		0%	0
Very dissatisfied		0%	0
If somewhat or very dissatisfied, why?			0

Export Graph

Statistics based on **138** respondents;

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

	Response percent	Response total
Idaho Power Energy Advisor	52.56%	72
Idaho Power Customer Service	8.03%	11
Email from Idaho Power	2.19%	3
Postal Mailing from Idaho Power	21.9%	30
Vendor or Contractor	10.22%	14
Idaho Power Website	2.19%	3
Other Business Owner or Employee	2.92%	4

Export Graph

Statistics based on **137** respondents;

Why did you choose to participate in this program?

		Response total
		112

Statistics based on **112** respondents;

Q7 Response Breakout	
Response	**Number of Responses**
Lighting Upgrade	37
Program was free	35
No response	21
Bill savings	15
Energy Savings	15
Good opportunity for my business (No further reasoning provided)	7
Relationship with EA	6
Building landlord mentioned program to me	1

Do you have any suggestions on how Idaho Power can make this program better?

			Response total
			42

Statistics based on **42** respondents;

Q8 Response Breakout	
Response	**Number of Responses**
Offer program to larger customers	9
No improvement suggestions	7
Offer equipment options that extend past lighting	1
Make program available to residential customers	1
Calling is a better option for outreach than mailer	1
Allow vacant spaces to participate	1
You should allow contractors to do light construction work to install lighting that live in ceiling panels	1
Provide more clarity about scheduling process as thought Idaho Power would call me directly	1

Is there other equipment you would have liked to see included in the program?

			Response total
			29

Statistics based on **29** respondents;

Q9 Response Breakout	
Response	**Number of Responses**
Outdoor sign lighting	3
More exterior lighting options	3
Customized outdoor sensors	1
Potato cellar lighting	1
Weather stripping	1
Install type B or C tubes only and do not replace ballasts	1
Increase eligibility criteria	1
Heating	1
Heating and cooling equipment	1

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	58.39%	80
No change in opinion of Idaho Power	41.61%	57
Less favorable opinion of Idaho Power	0%	0

Export Graph

Statistics based on **137** respondents;

What is it about participating in this program that has caused you to have a less favorable opinion of Idaho Power?

	Response total
	2

Statistics based on **2** respondents;

Which of the following best describes your business?

	Response percent	Response total
Agriculture, Forestry and Fishing	4.38%	6
Finance, Insurance and Real Estate	4.38%	6
Manufacturing	2.92%	4
Mining	0%	0
Public Administration	0%	0
Retail Trade	14.6%	20
Services	48.91%	67
Transportation, Communications, Electric, Gas and Sanitary Services	2.19%	3
Wholesale Trade	0.73%	1
Other (please specify)	21.9%	30

Export Graph

Statistics based on **137** respondents;

2021 Idaho Power Shade Tree Project Survey

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

Answer		Responses	Percent
Email from Idaho Power		314	54.04%
Friend or relative		122	21.00%
Neighbor		35	6.02%
Utility employee		13	2.24%
Other (please specify)		97	16.70%
	Answered	**581**	

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

Answer		Responses	Percent
Tree was free		60	10.54%
Home too warm in the summer		95	16.70%
Reduce energy bill		119	20.91%
Improve landscape/property value		67	11.78%
Wanted a tree		122	21.44%
Help the environment		94	16.52%
Other (please specify)		12	2.11%
	Answered	**569**	

What kept you from planting a tree prior to the Shade Tree Project?(Mark one)

Answer		Responses	Percent
Lack of knowledge		100	17.57%
Cost		267	46.92%
Time		71	12.48%
Other (please specify)		131	23.02%
	Answered	**569**	

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

Answer		Responses	Percent
Garden section of a do-it-yourself/home improvement store		185	32.51%
Nursery/garden store		360	63.27%
Other (please specify)		24	4.22%
	Answered	**569**	

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

Answer		Responses	Percent
10 minutes or less		320	57.76%
11-20 minutes		176	31.77%
21-30 minutes		44	7.94%
31 minutes or more		14	2.53%
	Answered	**554**	

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

Answer		Responses	Percent
Very easy		383	68.39%
Somewhat easy		167	29.82%
Somewhat difficult		9	1.61%
Very difficult		1	0.18%
	Answered	**560**	

How many trees did you receive from the Shade Tree Project?

Answer		Responses	Percent
One		84	14.76%
Two		485	85.24%
	Answered	**569**	

Received One Tree

When did you plant your shade tree?

Answer		Responses	Percent
Same day as the tree arrival		12	14.29%
1-3 days after the tree arrival		37	44.05%
4-7 days after the tree arrival		13	15.48%
More than 1 week after the tree arrival		10	11.90%
Did not plant the tree		12	14.29%
	Answered	**84**	

On which side of your home did you plant your shade tree?

Answer		Responses	Percent
North		5	6.94%
South		10	13.89%
Northeast		5	6.94%
Southwest		12	16.67%
East		7	9.72%
West		21	29.17%
Southeast		7	9.72%
Northwest		5	6.94%
	Answered	**72**	

How far from the home did you plant your shade tree?

Answer		Responses	Percent
20 feet or less		31	43.06%
21-40 feet		33	45.83%
41-60 feet		7	9.72%
More than 60 feet		1	1.39%
	Answered	**72**	

Receieved Two Trees

How many shade trees did you plant?

Answer		Responses	Percent
One		15	3.09%
Two		383	78.97%
Did not plant the trees		87	17.94%
	Answered	**485**	

When did you plant your shade tree?

Answer		Responses	Percent
Same day as the tree arrival		2	13.33%
1-3 days after the tree arrival		9	60.00%
4-7 days after the tree arrival		0	0.00%
More than 1 week after the tree arrival		4	26.67%
	Answered	**15**	

Receieved Two Trees, Planted One

On which side of your home did you plant your shade tree?

Answer		Responses	Percent
North		1	6.67%
South		1	6.67%
Northeast		0	0.00%
Southwest		2	13.33%
East		1	6.67%
West		7	46.67%
Southeast		2	13.33%
Northwest		1	6.67%
	Answered	**15**	

How far from the home did you plant your shade tree?

Answer		Responses	Percent
20 feet or less		6	40.00%
21-40 feet		8	53.33%
41-60 feet		1	6.67%
More than 60 feet		0	0.00%
	Answered	**15**	

Receieved Two Trees, planted Two Trees

When did you plant your shade tree?

First Tree

Answer		Responses	Percent
Same day as the tree arrival		49	12.79%
1-3 days after the tree arrival		222	57.96%
4-7 days after the tree arrival		67	17.49%
More than 1 week after the tree arrival		45	11.75%
	Answered	**383**	

Second Tree

Answer		Responses	Percent
Same day as the tree arrival		47	12.27%
1-3 days after the tree arrival		220	57.44%
4-7 days after the tree arrival		69	18.02%
More than 1 week after the tree arrival		47	12.27%
	Answered	**383**	

On which side of your home did you plant your shade tree?

First Tree

Answer		Responses	Percent
North		38	9.92%
South		61	15.93%
Northeast		21	5.48%
Southwest		52	13.58%
East		42	10.97%
West		131	34.20%
Southeast		15	3.92%
Northwest		23	6.01%
	Answered	**383**	

Second Tree

Answer		Responses	Percent
North		27	7.05%
South		49	12.79%
Northeast		19	4.96%
Southwest		57	14.88%
East		52	13.58%
West		123	32.11%
Southeast		23	6.01%
Northwest		33	8.62%
	Answered	**383**	

How far from the home did you plant your shade tree?

First Tree

Answer		Responses	Percent
20 feet or less		122	31.85%
21-40 feet		190	49.61%
41-60 feet		53	13.84%
More than 60 feet		18	4.70%
	Answered	**383**	

Second Tree

Answer		Responses	Percent
20 feet or less		118	30.81%
21-40 feet		185	48.30%
41-60 feet		57	14.88%
More than 60 feet		23	6.01%
	Answered	**383**	

Received One or Two Trees - Did Not Plant

Why did you not plant your tree(s)? (Check all that apply)

Answer		Responses	Percent
Changed my mind		1	0.85%
Did not like the tree		6	5.08%
Did not have time		10	8.47%
Other (please specify)		101	85.59%
	Answered	**118**	

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

Answer		Responses	Percent
Very satisfied		406	71.35%
Somewhat satisfied		129	22.67%
Somewhat dissatisfied		19	3.34%
Very dissatisfied		15	2.64%
	Answered	**569**	

What information did you find most valuable?

Answer		Responses	Percent
Planting depth		259	46.17%
Circling roots		76	13.55%
Staking		39	6.95%
Watering		146	26.02%
Other (please specify)		41	7.31%
	Answered	**561**	

How much do you agree with the following statements:

I am satisfied with Shade Tree Project delivery method

Answer		Responses	Percent
Strongly agree		365	64.37%
Somewhat agree		127	22.40%
Somewhat disagree		32	5.64%
Strongly disagree		43	7.58%
	Answered	**567**	

I am satisfied with the tree(s) I received from the Shade Tree Project

Answer		Responses	Percent
Strongly agree		305	54.27%
Somewhat agree		139	24.73%
Somewhat disagree		61	10.85%
Strongly disagree		57	10.14%
	Answered	**562**	

It was easy to plant my shade tree(s)

Answer		Responses	Percent
Strongly agree		374	79.91%
Somewhat agree		77	16.45%
Somewhat disagree		12	2.56%
Strongly disagree		5	1.07%
	Answered	**468**	

I would recommend the program to a friend or relative

Answer		Responses	Percent
Strongly agree		428	76.02%
Somewhat agree		73	12.97%
Somewhat disagree		35	6.22%
Strongly disagree		27	4.80%
	Answered	**563**	

I am satisfied with my overall experience

Answer		Responses	Percent
Strongly agree		372	65.84%
Somewhat agree		120	21.24%
Somewhat disagree		42	7.43%
Strongly disagree		31	5.49%
	Answered	**565**	

EVALUATIONS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
Evaluation, Measurement and Verification of Idaho Power Company PY2021 A/C Cool Credit Program	Residential	ADM	Idaho Power	Impact Evaluation
Idaho Power Company Commercial and Industrial Energy Efficiency Program—Custom Projects 2020 Program Year Impact and Process Evaluation Results	Commercial, Industrial	Tetra Tech	Idaho Power	Impact and Process Evaluation
Idaho Power Company Flex Peak Program 2021 Impact Evaluation Results	Commercial, Industrial	Tetra Tech	Idaho Power	Impact Evaluation
Idaho Power Company Irrigation Peak Rewards Program 2021 Impact Evaluation Results	Irrigation	Tetra Tech	Idaho Power	Impact Evaluation
Idaho Power Company Small Business Direct Install Program 2020 Process Evaluation Results	Commercial, Industrial	Tetra Tech	Idaho Power	Process Evaluation
Idaho Power Home Energy Reports Process Evaluation	Residential	DNV	Idaho Power	Process Evaluation
Impact & Process Evaluation of Idaho Power Company PY2020 Heating & Cooling Efficiency Program	Residential	ADM	Idaho Power	Impact and Process Evaluation

Evaluation, Measurement and Verification of Idaho Power Company PY2021 A/C Cool Credit Program

SUBMITTED TO: IDAHO POWER COMPANY

SUBMITTED ON: FEBRUARY 17, 2022

SUBMITTED BY: ADM ASSOCIATES, INC.

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1. Executive Summary

This report is a summary of the 2021 program year (PY2021) A/C Cool Credit Residential Demand Response (ACCC) Program Impact Evaluation for Idaho Power Company (IPC). The evaluation was administered by ADM Associates, Inc. (herein referred to as "ADM" or as the "Evaluators").

1.1 Impact Evaluation Results

The Evaluators conducted an impact evaluation for IPC's A/C Cool Credit Program during PY2021. The A/C Cool Credit Program's demand reduction amounted to 18.35 kW average over all hours at the meter with an 82.5% realization rate. The Evaluators summarize the program verified demand reductions in Table 1-1 below.

Table 1-1: A/C Cool Credit Program PY2021 Impact Evaluation Results

Number of Participants	Expected Demand Reductions (kW per Household)	Total Expected Demand Reductions (kW)	Verified Demand Reductions (Average kW per Household)	Verified Average Total Demand Reductions (kW)	Realization Rate
20,995	1.06	22,254.70	0.87	18,351.20	82%

Verified program demand reductions by event are summarized in Table 1-2.

Table 1-2: A/C Cool Credit Program PY2021 Impact Results by Event Date

Event Date	Verified Demand Reductions (kW per Household)	Verified Total Demand Reductions (kW)
6/28/2021	0.96	20,051.30
7/12/2021	0.77	16,152.68
7/26/2021	0.87	18,255.18
7/27/2021	0.83	17,488.65
7/28/2021	0.74	15,437.98
7/29/2021	0.92	19,305.29
7/30/2021	1.06	22,245.36
8/4/2021	0.81	17,087.64
8/12/2021	0.91	19,136.72

1.2 Conclusions and Recommendations

The following section details the Evaluators' conclusions and recommendations for the A/C Cool Credit Program evaluation.

1.2.1 Conclusions

The Evaluators provide the following conclusions regarding IPC's A/C Cool Credit Program:

- Utilizing multiple baseline models and assigning the best fitting baseline model on a customer-specific basis resulted in lower bias and smaller errors on proxy event days.
- The current method of estimating program demand reductions utilizing a 3-of-10 Customer Baseline (CBL) approach did not perform as well as other baseline approaches in terms of predicting usage on proxy event days (higher bias and larger errors).
- Regression modeling outperformed CBL modeling in terms of predicting baseline usage on proxy days.
- Higher demand reductions are positively correlated with higher Cooling Degree Days (CDD).
- Overall rates for non-responding devices/opt-out customers were within the normal ranges observed for residential demand response programs.

1.2.2 Recommendations

The Evaluators offer the following recommendations regarding IPC's A/C Cool Credit Program:

- Utilize a mixed model or regression model to estimate demand reductions for the programs. CBLs on their own may systematically overestimate baseline usage and demand reductions for the program.
- Utilize proxy event days to estimate bias and error when determining which model to select for estimating baseline usage.
- As shown in Section 4.1.3, a strong positive correlation exists between CDD and baseline usage, and between CDD and program demand reductions. The Evaluators recommend calling demand response events on days with the highest forecasted CDD to maximize program demand reductions. If numerous events are called on days with lower CDD, and therefore lower expected demand reductions, the Evaluators recommend calculating demand reductions by using average demand reductions from the maximum event (or average demand reductions from the top 3 days with the highest CDD) to avoid penalizing the program or incentivizing calling fewer demand response events.

2. Program Overview

This section of the report provides a glossary of terminology used throughout the report, a description of the A/C Cool Credit Program, and a summary of the impact evaluation objectives, PY2021 event activities, and expected demand reductions from the program.

2.1 Glossary of Terminology

As a first step to detailing the evaluation methodologies, the Evaluators have provided a glossary of terms to follow:

- **Expected Demand Reductions** – Calculated demand reductions used for program and portfolio planning purposes.
- **Verified Demand Reductions** – Demand reduction estimates calculated after the impact evaluation performed by the Evaluators.
- **Realization Rate** – The ratio of Verified Savings to Expected Savings.
- **Net Demand Reductions** – The change in energy consumption directly resulting from program-related actions taken by participants in energy efficiency program, with adjustments to remove savings due to free ridership. For the ACCC program, there is no free ridership and Net Demand Reductions are equal to Verified Demand Reductions.
- **Demand Response (DR) Events** – Specifically-designated hours during which customers reduce their energy consumption. In the Residential sector, this is often conducted through switches placed on customer A/C equipment to reduce load during peak energy consumption hours.
- **Customer Baselines (CBLs)** – A method of calculating baseline usage for demand response programs that involves taking average usage from days prior to the demand response event date, often with an adjustment factor that accounts for actual usage on the event day.
- **Baseline Days** – Days that are used when calculating CBLs or other baseline loads for demand response programs. They typically are non-event, non-holiday weekdays that have similar load or weather characteristics as demand response event days.
- **Proxy Event Days** – Often referred to as "test" days, these are baseline days that are used to test the accuracy baseline predictions.
- **Non-responding Devices (NRDs)** – Devices that are not responding to the demand response event curtailment signal due to a disconnected switch, defective device, or other issue.
- **Opt-Out Customers** – Customers that opt-out of a demand response event by notifying the demand response program that they do not wish to participate in the demand response event.

2.2 Program Description

The ACCC program is a voluntary, dispatchable demand response (DR) program for residential customers in Idaho and Oregon. The ACCC program curtails energy use during peak demand periods via a direct load control device installed on the A/C unit. Eligible customers are provided $5 monthly incentive for three months during the air conditioning season to participate in curtailment events.

Customers' A/C units are controlled using switches that communicate by powerline carrier (PLC) using the same system utilized by IPC's advanced metering infrastructure (AMI). Using communication hardware and software, IPC cycles participants' central air conditioning (A/C) units or heat pumps via a direct load control device installed on the A/C unit, called a switch. The switch is installed on each participating customer's A/C unit, which allows IPC to control the unit during a cycling event. Cycling events are chosen by IPC to reduce system capacity needs during times when summer peak load is high.

The direct load control switch is a small, weatherized plastic box attached to either the exterior of a participant's house or A/C unit. The equipment is installed by a certified field technician.

The switches are called to cycle participating customers' A/C units during "event days." The program event day guidelines are as follows:

- June 15 through August 15 (excluding weekends and July 4);
- Up to four hours per day;
- A maximum of 60 hours per season; and
- At least three events per season.

Each event day has a defined cycling rate. The cycling rate is the percentage of an hour the A/C unit will be turned off by the switch. For example, with a 50% cycling rate, the switch will cycle the A/C unit off for about 30 (nonconsecutive) minutes of each hour during the event. IPC defines the cycling rate for each event day and tracks the communication levels for each unit to validate whether the control signal reaches the switch. For the 2021 season, IPC cycled participants' A/C units at 55%.

In 2021 approximately 22,500 customers participated with a peak demand reduction calculated at 19.4 MW.

2.3 Impact Evaluation Objectives

The primary objective of the impact evaluation is to determine ex-post verified net demand impacts. Our activities during the evaluation estimate and verify demand impacts and identify whether the program is meeting its goals. These activities are aimed to provide guidance for continuous program improvement. The Evaluators summarize the key impact evaluation objectives:

- Calculate demand impacts attributable to the 2021 summer program using IPC's current methodology;
- Report findings and observations, and provide recommendations that enhance the effectiveness of future demand response calculations, and ensure the accurate, transparent reporting of program impacts;
- Determine best practice baseline calculations for determining demand reduction, and make recommendations; and,
- Calculate demand impacts attributable to the 2021 summer program with any changes in calculation methodology if any.

2.4 Demand Response Events

Nine demand response events were called in 2021 between the months of June through August, as displayed in Table 2-1. Demand response events (DR events) were called between the hours of 1600 and 1900 MDT for eight of the DR events and then between 1700 and 2000 MDT for the July 27 DR event.

Table 2-1: Demand Response Events in 2021

June						
S	M	T	W	Th	F	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			
July						
S	M	T	W	Th	F	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
August						
S	M	T	W	Th	F	Sa
						1
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

2.5 Expected Demand Impacts

IPC provided the expected demand impacts for the ACCC Program during PY2021. The Evaluators summarize the expected demand impacts due to the program in Table 2-2 below. The expected reduction is for an event where the temperature reaches 101° F with 55% cycling.

Table 2-2: A/C Cool Credit Program PY2021 Expected Demand Reductions

Program Year	Expected Demand Reductions (kW per Household)	Number of Households	Total Expected Demand Reductions
2021	1.10	20,955	23,050.50

3. Impact Evaluation Methodology

This section presents our overall approach to accomplishing the impact evaluation of IPC's ACCC Program. The Evaluators employed the following approach to complete impact evaluation activities for the program:

- A *Calculated approach with AMI meter data* involves estimating demand impacts by applying several models to measured participant energy consumption AMI meter data. This modeling effort included consumption data from participant customers. This approach does not require on-site data collection for model calibration.

The sections following describe in further detail the Evaluators' activities towards conducting the impact evaluation, followed by the resulting verified impact estimates.

3.1 Database Review

At the outset of the evaluation, the Evaluators reviewed the delivered tracking database to ensure that the ACCC Program documentation conform to industry standards and adequately tracks key data required for evaluation.

3.2 Data Requirements and Data Preparation

The Evaluators summarize the data required and collected to conduct this impact evaluation for the ACCC Program:

- ACCC Program tracking data for PY2021;
- Hourly AMI meter data for all PY2021 participating customers covering the demand response season (June 2021 – August 2021); and,
- The full schedule of ACCC Program events, including the time, date, and duration of each event.

The Evaluators reviewed the data tracking systems associated with the program to ensure that the data provides sufficient information to calculate demand impacts.

3.2.1 Weather Data

In addition to the data provided by IPC and summarized above, the Evaluators collected hourly historical weather data from the National Oceanographic and Atmospheric Administration (NOAA) to estimate the impact of weather on usage. This weather data was collected from two weather stations: the Boise Airport and the Twin Falls Airport. This data was then assigned to each customer based on the customer's account area name, provided by IPC and determined by zip code. Approximately 86% of participants are within the Boise account area.

Using the historical weather data, the Evaluators calculated Heating Degree Hours (HDH) and Cooling Degree Hours (CDH) for use in the regression analysis. HDHs are calculated as temperature values under the heating setpoint (65°F), while CDHs are calculated as temperature values over the cooling setpoint (72°F). The setpoint values for HDHs and CDHs were determined by running regressions with multiple setpoints from 65°F through 75°F. The Evaluators chose the setpoint combination with the highest adjusted R-squared value, demonstrating the best fit for the data.

The Evaluators summarize the weather observed during each event day in Table 3-1 Cooling Degree Days (CDD) is calculated by summing CDH for all hours of the day. Correlations between CDD and demand reductions were made because CDD reflects the build-up of heat a home and is more predictive of demand reductions. CDH during event hours is not as predictive since it does reflect the average heat build-up in the home.

Table 3-1: Event Day Weather Information

Account Area	Event Date	Max Temperature (F)	Average Temperature (F)	CDD
Boise	6/28/2021	102.0	88.8	16.8
Boise	7/12/2021	102.0	83.5	12.2
Boise	7/26/2021	100.0	84.8	12.9
Boise	7/27/2021	100.0	84.5	12.5
Boise	7/28/2021	97.0	82.5	10.6
Boise	7/29/2021	98.1	85.0	13.1
Boise	7/30/2021	99.0	88.1	16.1
Boise	8/4/2021	104.0	86.0	14.4
Boise	8/12/2021	100.0	83.8	12.3
POC/TWIN	6/28/2021	93.0	77.7	7.4
POC/TWIN	7/12/2021	97.0	81.9	10.2
POC/TWIN	7/26/2021	100.0	82.2	10.9
POC/TWIN	7/27/2021	91.9	82.2	10.2
POC/TWIN	7/28/2021	91.9	81.5	9.5
POC/TWIN	7/29/2021	93.0	79.6	8.5
POC/TWIN	7/30/2021	90.0	77.2	6.0
POC/TWIN	8/4/2021	95.0	78.2	8.8
POC/TWIN	8/12/2021	93.0	80.0	8.4

3.2.2 Data Preparation

The following steps were taken to prepare the AMI hourly meter data:

1. Removed participants not enrolled in all DR events (1.75% of participants).
2. Gathered AMI hourly meter data for homes that participated in the program.
3. Removed participants missing AMI hourly meter data (1 participant dropped).
4. Removed participants with average usage of zero for the entirely of the DR season (<1% of participants).
5. Restricted to hourly data during the summer: June 1 – September 30 (1 participant dropped). This restriction is made to ensure the regression and CBL models have enough data to calculate appropriate baselines. Dates outside the summer period are further from the DR season (June 15 – August 15) and provide less useful information for the models, while restricting to just the DR season would not provide enough information to calculate baselines for certain models (e.g. CBLs).
6. Removed participants with any gaps in AMI meter data during DR season (did not occur after above restrictions).
7. Obtained weather data from Boise and Twin Falls NOAA weather stations. Categorized participants by account area name to Boise or Twin Falls/Pocatello area and assigned Boise weather station to Boise participants and Twin Falls weather station to Twin Falls/Pocatello participants.
8. Computed Heating Degree Hours (HDH) and Cooling Degree Hours (CDH) for a range of setpoints. The Evaluators assigned a setpoint of 65°F for HDH and 72°F for CDH. The Evaluators

tested and selected the optimal temperature base for HDDs and CDDs based on model R-squared values.

3.3 Summary of Methodology

The Evaluators employed the following approach to complete impact evaluation activities for the program.

The Evaluators tested a variety of models to address demand reductions associated with the ACCC program. Four different Customer Baseline models (CBLs) were built along with a regression model and a mixed model approach which combined CBLs with regressions. CBL models are defined in Section 3.6.2.

The Evaluators determined that a mixed-model approach resulted in the lowest bias and error for the demand reductions estimates. The mixed model approach assigns a model to each customer that minimizes the error for that customer on proxy event days. Customers were assigned either a regression model or one of four CBL models. Proxy days were defined as the top four non-event, non-holiday, non-weekend days with the highest loads across all summer months.

The Evaluators estimated the demand reductions by kW/household, which corresponds to average observed demand reductions for each device location or household. The number of units per household was not provided to the Evaluators and therefore a kW/unit estimate was not obtained for the program.

Prior to running the model, the Evaluators removed devices that failed to meet the following criteria:

- Missing customer zip codes (due to inability to map to correct weather data); did not occur for any customers;
- Gaps in customer's AMI data (i.e. missing 24 observations per day); did not occur for any customers; and
- Customers with an average usage value of zero during the entire DR season (142 customers).

In the following sections, the Evaluators summarize the activities followed to conduct each of the above analysis.

3.4 Baseline Day and Proxy Day Development

The following sections describe the Evaluator's methodology for selecting baseline days and proxy days for use in the impact analysis.

3.4.1 Baseline Days

The Evaluators developed and utilized baseline days for use in the regression model. Baseline days provide an indication of typical demand usage for each customer on days that are similar to the demand response event days in terms of weather and load during peak hours. The Evaluators use baseline days as a counterfactual, i.e., the demand we would have expected from the customer had the demand reduction event not occurred. The Evaluators defined baseline days as any day that meets the following criteria:

- Is a weekday
- Is a non-holiday day (10 federal yearly holidays)
- Is a non-event day
- Displays a maximum temperature of greater than or equal to 95°F during normal curtailment hours (1600 to 2000)

The Evaluators used the defined baseline days in the regression analysis, further discussed in Section 3.4.

3.4.2 Proxy Days

Once the baseline days were chosen, the Evaluators were able to then choose proxy days. Proxy days were chosen from the previously defined baseline days. The Evaluators defined proxy days as the top four non-event, non-holiday, non-weekend days with the highest loads across all summer months.

The Evaluators used these defined proxy days to determine the ability of the regression and CBL models to predict actual usage for each customer. The results of the proxy day predictions are presented in Section 4.1.1.

3.5 Classification of Non-Contributing Households

The Evaluators identified non-contributing households to assess its impact on demand reductions. Example reasons why a household may be a non-contributor includes:

- Non-responding devices (NRD) are devices that not responsive to the curtailment signal.
- Opt-outs are customer who opt-out of a DR event.
- Customers that are not running their AC (i.e. they away on vacation or at work during the event).

A device is considered a “non-responding device” (NRD) if it is not responsive to the curtailment signal. This would indicate that the switch communications were not working.

Switch communications may be interrupted for a variety of reasons: the A/C unit may not be powered on, the switch may become disconnected or defective, or the participant’s household wiring may prevent communication. In some cases, it may be difficult for utilities to determine the reason the switch is not communicating.

Opt-outs are different than non-responding devices, though the resulting observations are similar. Opt-outs occur when a customer chooses not to participate in the curtailment event. In most cases, when a customer chooses to opt-out, the customer is declining to participate in all subsequent events, rather than a single event. Opt-outs are similar to non-responding devices in that AMI meter data for the household displays no demand reductions during the curtailment event. However, opt-outs can be categorized as opt-outs using customer communication records, or program tracking of opt-out customers.

Customers who are not running their AC unit during the DR event will have a load shape similar to NRD and opt-out customers and appear to not have a demand reduction. For instance, the customer may be on vacation, away at work, or have an AC unit problem.

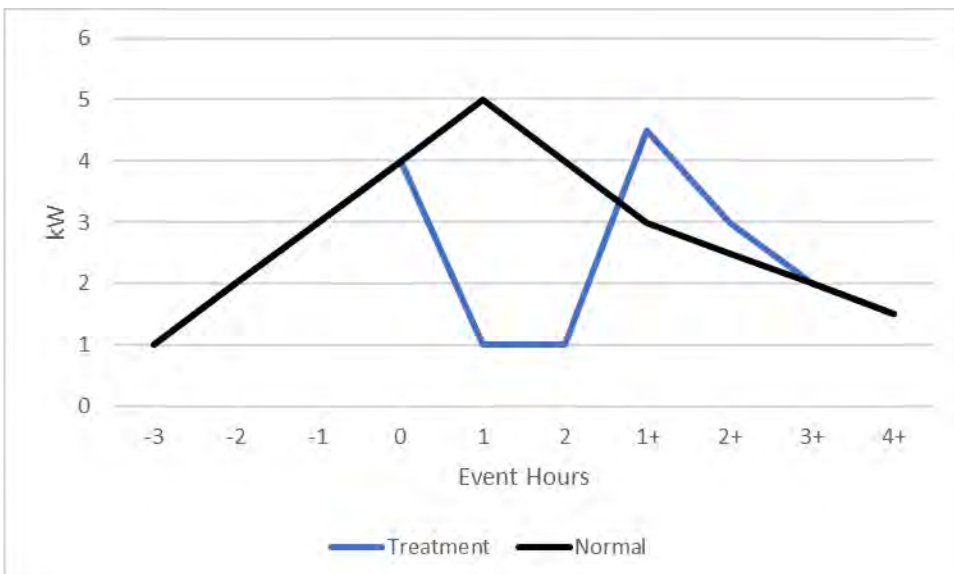
The Evaluators attempted to quantify a separate opt-out rate for the program; however, information on customer opt-outs was not available for the program. As such, the Evaluators calculated a rate that includes all non-contributing households.

The Evaluators identified non-contributing households using a combination of three algorithms:

1. A cumulative sum (CSUM) change in slope analysis
2. A linear 10% decrease in load detection
3. A snapback analysis

When a DR event is called, each device is sent curtailment instructions that result in a significant load drop over the duration of the event. This drop is illustrated in Figure 3-1, which provides an example event and an example of a typical or "baseline" usage curve.

Figure 3-1: Example of Site-Level Load Shapes During Event Hours



The Evaluators define the methodology applied for each algorithm in the following sections.

3.5.1 CSUM Analysis

The CSUM smoothing technique is a rolling sum defined as:

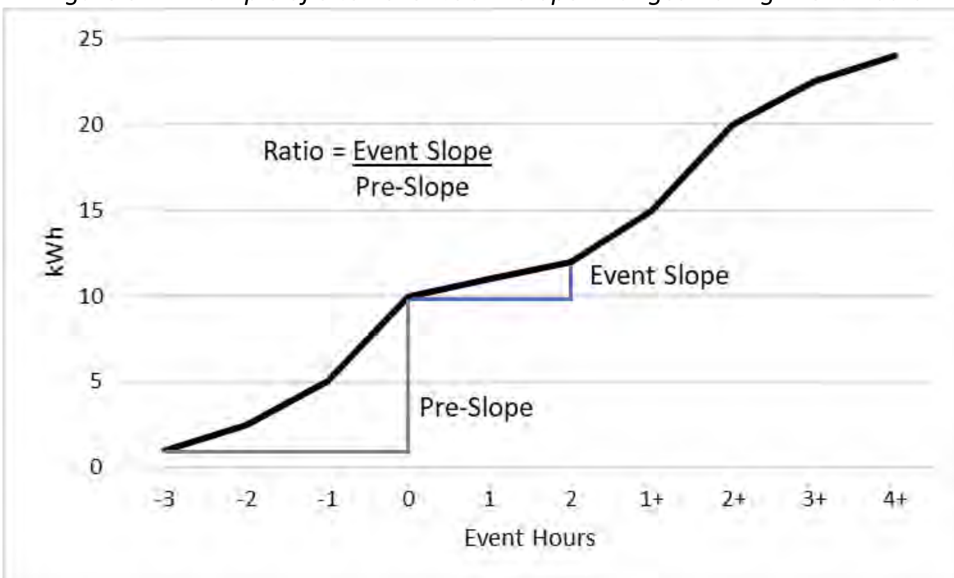
$$x = (a, b, c, \dots, z)\ CSUM(x) = (a, a+b, a+b+c, \dots, a+\dots+z)$$

Where,

x = a vector of kWh measures taken at increasing one-hour intervals during the event day

A smoothed, increasing curve is created by taking the CSUM of each treatment site during the demand response period (Figure 3-2).

Figure 3-2: Example of Site-Level CSUM Slope Changes During Event Hours



The slopes of this curve for the three hours prior to the start of the event and the hours during the event are calculated (Figure 3-2). The Evaluators calculate a ratio of the event period slope divided by the pre-period slope to test if there is a significant change in the slope due to the demand response event. A contributing device is detected by a decrease in the line slope. Therefore, the ratio is less than one. Using this test, the Evaluators defined sites with a slope less than one to be a contributing device, which indicates a decrease in demand during the demand response event.

3.5.2 Linear 10% Decrease Analysis

In parallel with the CSUM analysis, a linear test for 10% reduction in consumption during the demand response event is also employed. For each unique device, the consumption for the hour prior to the event is compared to the consumption during the first hour of the event (Figure 3-2) to detect a reduction in demand greater than 10% with the following equation:

$$\text{Non-Contributing Device if } T1_{kWh} \leq T2_{kWh}$$

Where,

$T1_{kWh} = PriorHr_{kWh} - EventHr_{kWh}$

$T2_{kWh} = PriorHr_{kWh} * 10\%$

$PriorHr_{kWh}$ = demand displayed during the hour prior to the demand response event

$EventHr_{kWh}$ = demand displayed during the first hour of the demand response event

By taking advantage of the processing speed of vectorized programming in the R-Studio environment, every individual site in the program is tested per event.

3.5.3 Snapback Analysis

The Evaluators observed that some customers had higher loads than the baseline would predict during the curtailment event. However, a snapback was observed for these customers in the first hour after the event ended, suggesting these customers had in fact curtailed AC usage, but had higher than expected non-AC usage during the event.

An additional test was developed such that if a customer had a higher load during the first snapback hour compared to the maximum load seen during the curtailment event, they are not classified as a non-contributor.

3.6 Models

This section describes the two model specifications employed by the Evaluators as part of the impact evaluation and measurement of demand impacts for the program:

1. Regression model
2. Customer Baseline (CBL) Model

As part of the evaluation objectives, the Evaluators explored both models to estimate which inputs resulted in the most accurate predictions of demand on proxy days and therefore produces reliable demand impact estimates.

3.6.1 Regression Model

This section describes the regression analysis methodology employed by the Evaluators as part of the impact evaluation and measurement of demand impacts for the program.

The Evaluators estimated demand reductions using a weather-adjusted Linear Fixed Effects Regression (LFER) model. This model specification uses customers' hourly AMI meter data during event and non-event days to estimate average customer-level impact the curtailment event displays on energy demand. The LFER model specifies energy demand as a function of weather, hour, day of the week, and household-level behaviors. The Evaluators identified non-event days during the same month as the demand response events as days with weather patterns that most closely match the weather patterns on the event days. The Evaluators used these days to serve as the counterfactual baseline for event day demand usage. Baseline days are further detailed in Section 3.4.

The final model specification is shown below.

$$Usage\ (kWh)_{it} = \alpha_0 + \beta_1 DOW_t + \beta_2 CDH_{it} + \beta_3 HD_{it} + \beta_4 MA4CDH_{it} + \beta_5 \sum_{h=1}^{24} \alpha_h * Hour_{t,h} + \beta_6 \sum_{i=1}^{n} c_i * Customer_{t,i} + \epsilon_t$$

Where:

α_0 = the intercept term;

t = the index for time intervals;

i = the index for a customer;

$Usage(kWh)$ = average usage during time interval t;

β_k, α_h, c_i = vectors of coefficients for the variables defined below;

DOW = a dummy variable for day of the week during time interval t;

CDH = cooling degree hours during time interval t;

HDH = heating degree hours during time interval t;

$MA24CDH$ = a moving average of the last 24 hours CDH relative to time interval t;

$Customer$ = a dummy variable for customer *i*;

$Hour$ = a vector of dummy variables during time interval t; and

ϵ = the error term.

The Evaluators fit the models to estimate weather-dependent daily demand differences between adjusted baseline and event usage. The Evaluators define the inputs to the models in the following sections.

3.6.2 Customer Baseline (CBL) Models

In addition to the regression model defined above, the Evaluators also explored customer baseline (CBL) models. The Evaluators constructed a 3-of-5 baseline CBL approach and a 3-of-10 CBL baseline approach.

For a 3-of-5 baseline, the Evaluators examine the load data from the most recent five non-event, non-holiday weekdays relative to the event day and calculate the mean demand usage values of the three highest load days.

For a 3-of-10 baseline, the Evaluators examine the load data from the most recent ten non-event, non-holiday weekdays relative to the event day and calculate the mean demand usage values of the three highest days. The unadjusted baseline calculated for both CBL approaches above is then adjusted by comparing the event day usage during the hour prior to the event with the baseline day usage during that same hour. This is used to create an event-day adjustment factor.

The adjustment factor corrects the baseline to align with the weather and load demonstrated on the event day. The Evaluators utilized a 1-hour adjustment offset factor (i.e. the hour prior to the event) and created additive and multiplicative offset factors for both the 3-of-5 CBLs and 3-of-10 CBLs. A 1-hour additive adjustment takes the difference between usage during the hour prior to the event on the event day and the average usage during the hour prior to the event on the selected baseline days and adds it to the unadjusted baseline usage. A multiplicative adjustment takes the unadjusted baseline and multiplies it by the ratio of the two loads referenced above. The 1-hour adjusted baselines are calculated as follows:

$$Additive\ Baseline_{Adjusted} = Baseline_{Unadjusted} + (kW\ Offset\ Window_{Event} - kW\ Offset\ Window_{Baseline}$$

$$Multiplicative\ Baseline_{Adjusted} = Baseline_{Unadjusted} * (kW\ Offset\ Window_{Event} / kW\ Offset\ Window_{Baseline})$$

Where:

$kW\ Offset\ Window_{Event}$ = Average usage 1-hour prior to the event on the event day

$kW\ Offset\ Window_{Baseline}$ = Average usage 1-hour prior to the event on the selected baseline days

The Evaluators used the above equations to estimate 3-of-5 CBLs and 3-of-10 CBLs.

4. Impact Evaluation Results

The Evaluators completed an impact evaluation on Idaho Power's A/C Cool Credit Program to verify unit-level and program-level demand impacts for PY2021. The following section summarizes findings for the program. The Evaluators used data collected and reported in the tracking database and AMI meter data provided by Idaho Power to evaluate demand reductions. The approach summarized below provides the strongest estimate of achieved demand reductions for the program. The Evaluators summarize the impact analysis activities, results, conclusions, and recommendations for the A/C Cool Credit Program in the section below.

4.1.1 Modeling Results

The Evaluators developed six different models based on LFER, CBL, and a mix of CBL and regression (Mixed Model). The Evaluators assessed each model fit on proxy days. The Mixed Model is a combination of regression and CBLs models and selects a CBL or regression baseline on a customer-specific basis using the lowest Relative Root Mean Squared Error (RRMSE).

The Evaluators used RRSME to compare performance for the six different models. Using RRSME as a metric for model performance allows for comparison between different types of models by normalizing the model errors.

Table 4-1 demonstrates the model performance results on proxy days. The Mixed Model displayed the lowest RRMSE and lowest bias and was selected for reporting final program demand reductions because it had displayed the best fit. The 3-of-10 CBL underperformed relative to the other models.

Table 4-1: Model Performance Comparison

Model	RRMSE	RMSE	Bias	Adjusted R-Squared	Best Fit (Smallest Error/Bias)
Mixed Model	0.013	0.049	0.006	NA	X
3-of-5 Additive CBL 1-Hr Offset	0.038	0.141	0.034	NA	
Regression	0.051	0.189	-0.049	0.717	
3-of-5 Multiplicative CBL 1-Hr Offset	0.063	0.234	0.037	NA	
3-of-10 Additive CBL 1-Hr Offset	0.077	0.289	0.075	NA	
3-of-10 Multiplicative CBL 1-Hr Offset	0.089	0.333	0.079	NA	

4.1.1.1 Proxy Day Load Shapes

The figures presented in this section display each model’s performance on proxy days.

The regression model had a tendency to underestimate actual usage. This tends to occur when there are a large number of event days and the remaining days available to use as baseline days are not entirely representative of the event days themselves.

The CBL models tended to overestimate the baselines, with the 3-of-10 baseline having the largest positive bias and largest errors.

The Mixed Model displayed the lowest errors and bias and more accurately predicted the actual usage on proxy days. For example, there are no proxy days when the Mixed Model overestimated or underestimated the actual usage.

Figure 4-1: Regression Proxy Day Performance

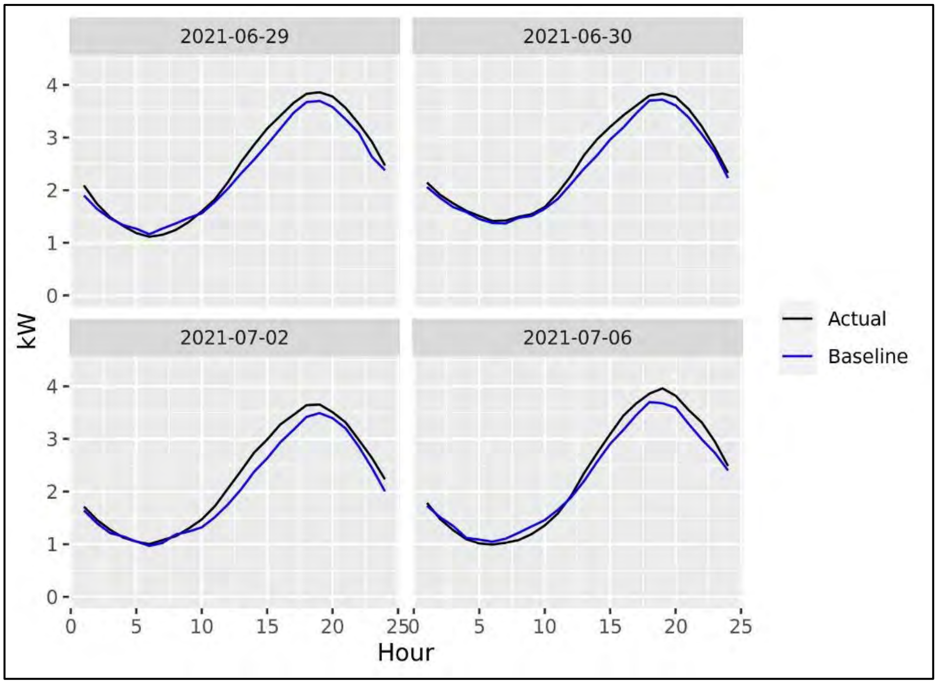


Figure 4-2: Mixed Model Proxy Day Performance

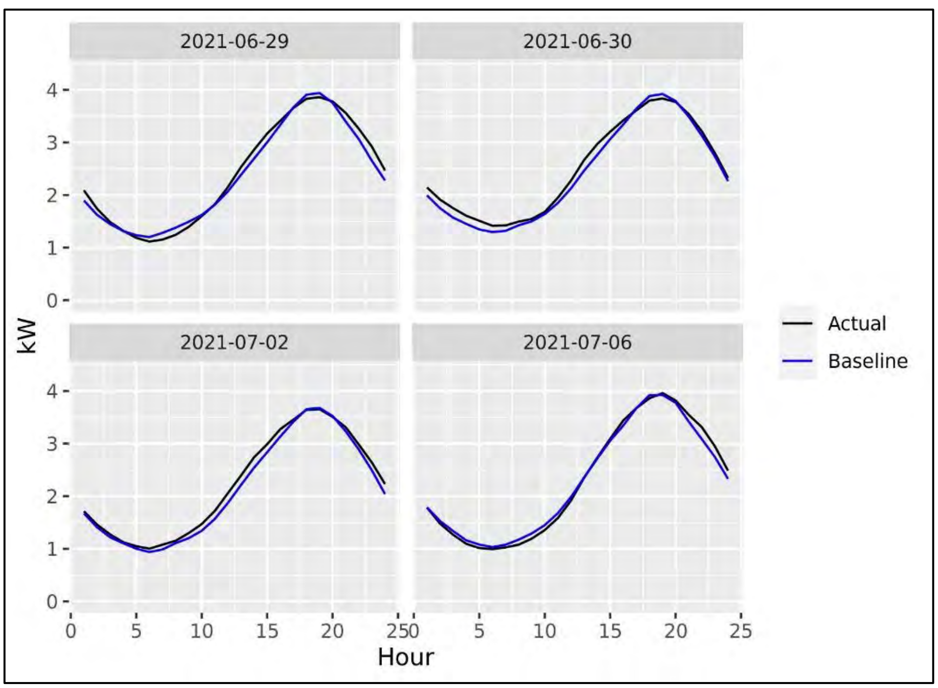


Figure 4-3: 3-of-10 Additive CBL Proxy Day Performance

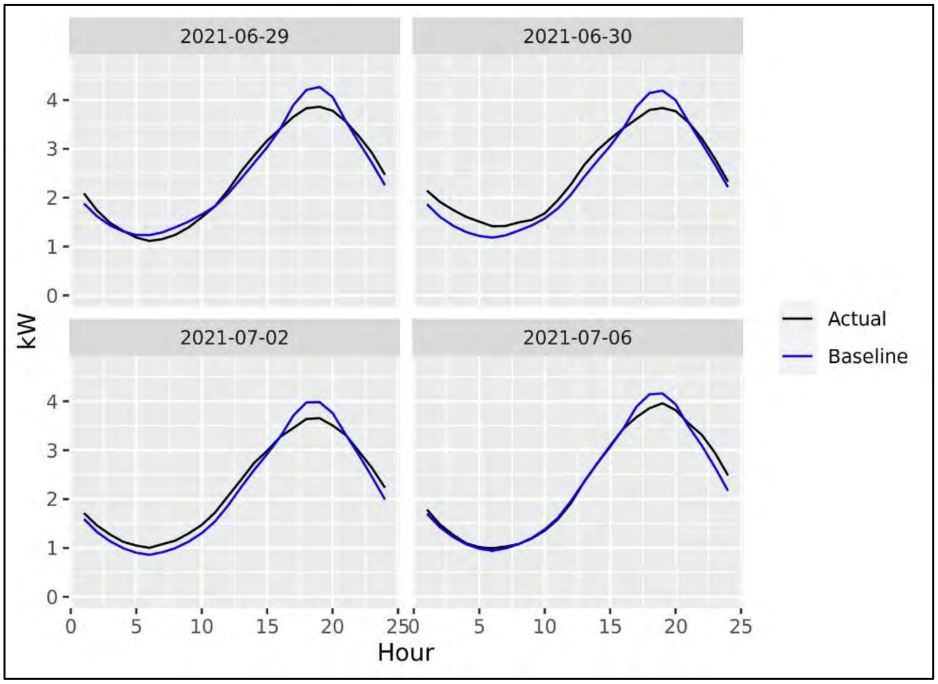


Figure 4-4: 3-of-5 Additive CBL Proxy Day Performance

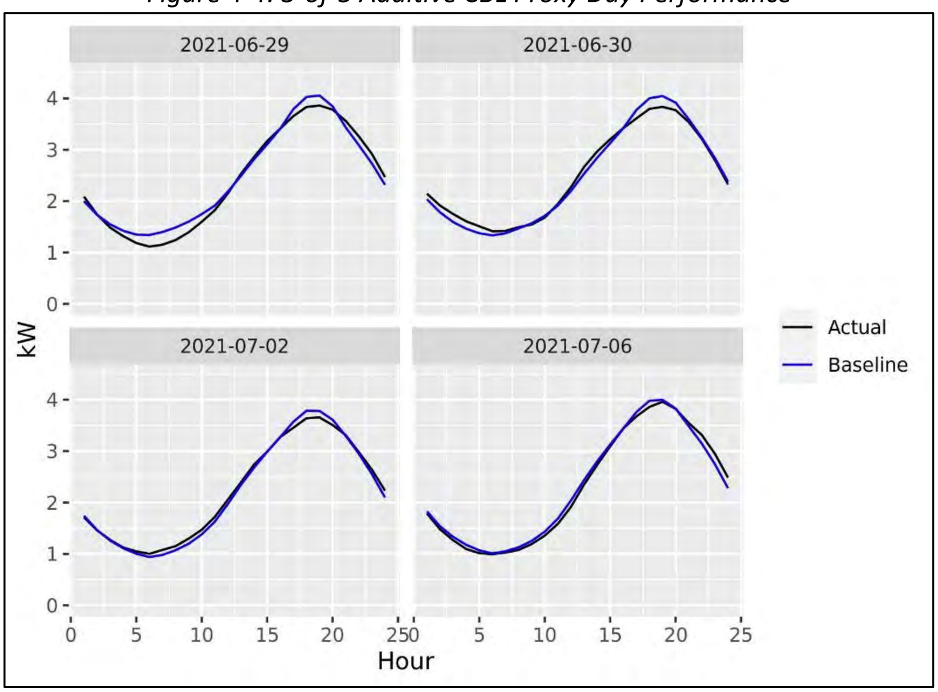


Figure 4-5: 3-of-10 Multiplicative CBL Proxy Day Performance

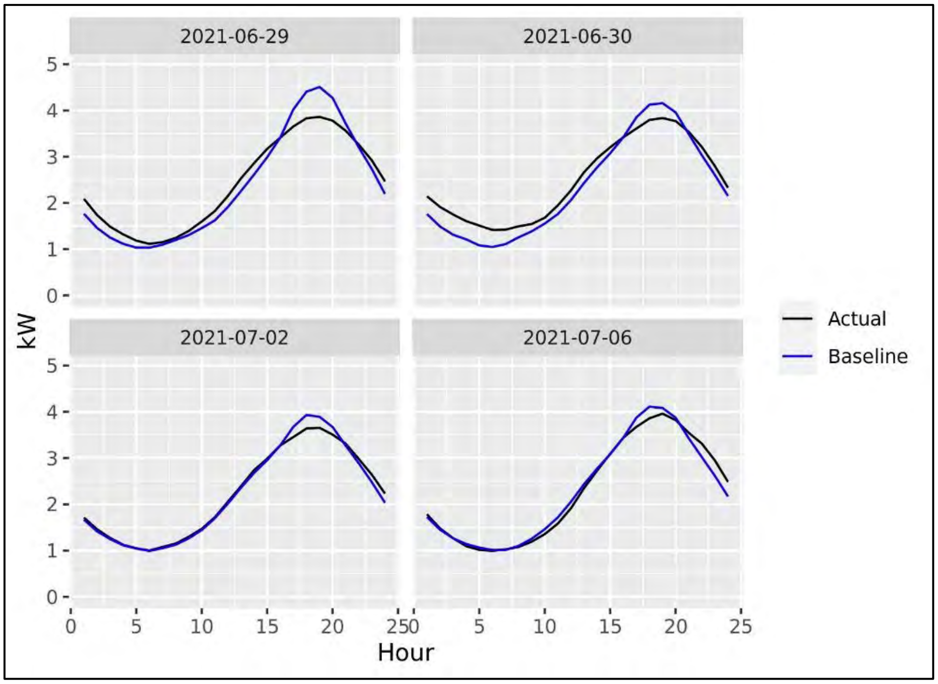
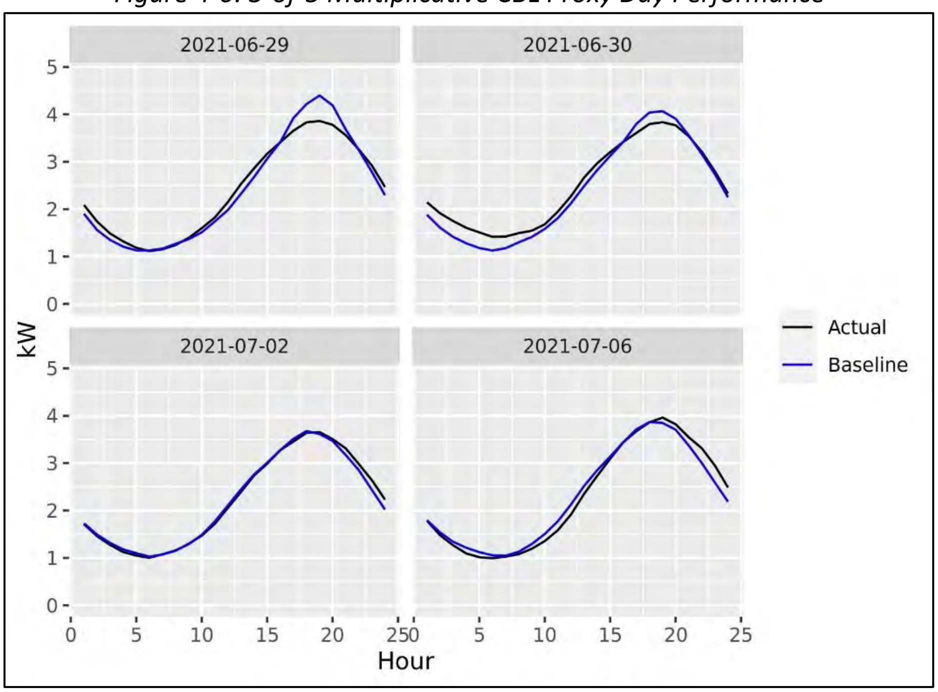


Figure 4-6: 3-of-5 Multiplicative CBL Proxy Day Performance



4.1.1.2 Event Day Load Shapes

The Evaluators summarize each model's performance on event days in the figures provided below.

The regression model performed well, however, on four of the nine event days, the regression model underestimated the baseline. This can be seen by observing the baseline demand in the hours immediately preceding the event and the slightly negative bias shown in the model results above.

The CBL models had a tendency to overestimate usage during the peak hours. This can be seen on days when the baseline value is greater than or equal to the actual usage in the first hour following the curtailment window (i.e. the snapback period).

The Mixed Model performed well on event days and did not underestimate the baseline before the event or overestimate the baseline during the snapback period.

Figure 4-7: Regression Baseline Performance

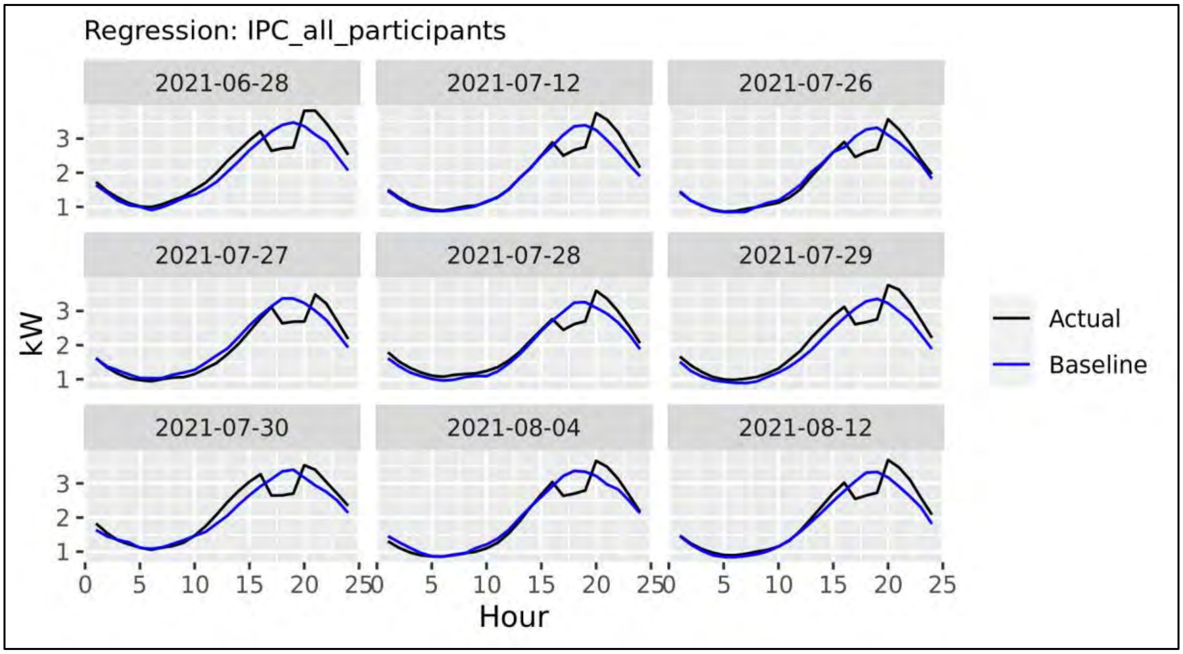


Figure 4-8: Mixed Model Baseline Performance

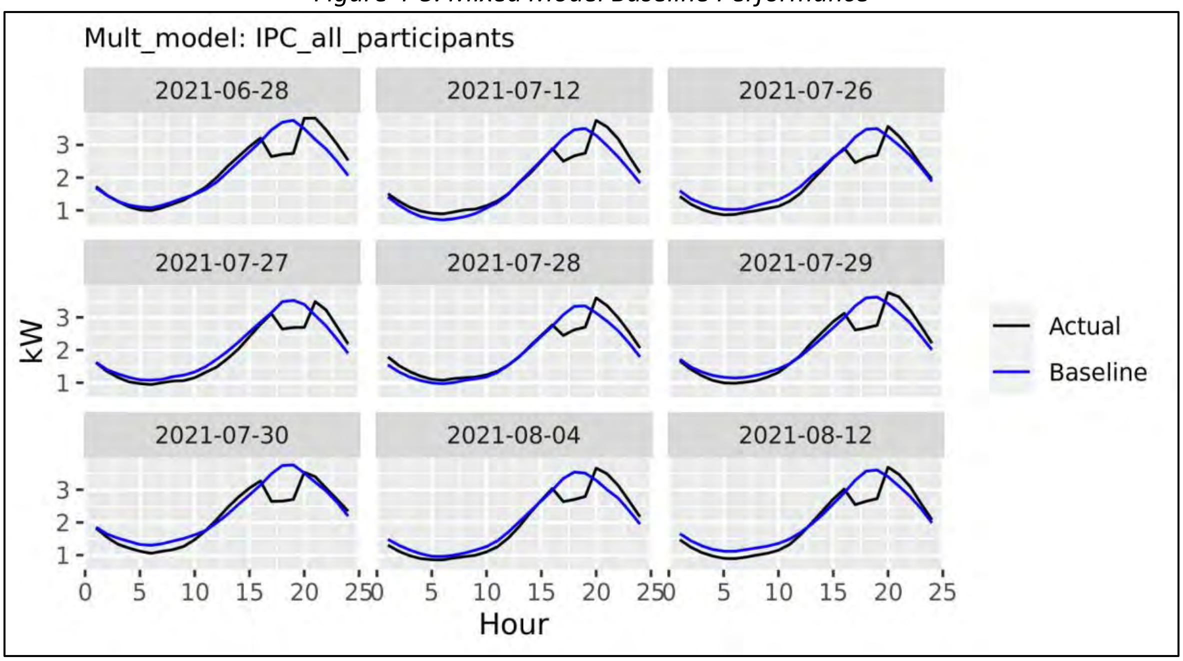


Figure 4-9: 3-of-10 Additive CBL Baseline Performance

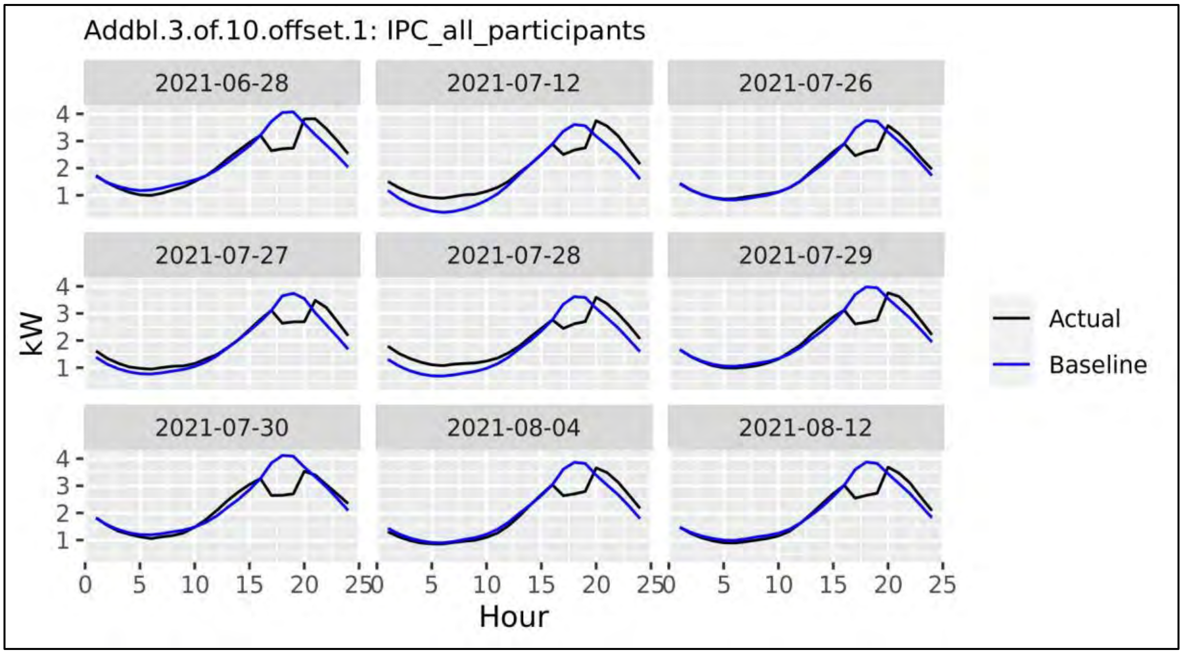


Figure 4-10: 3-of-5 Additive CBL Baseline Performance

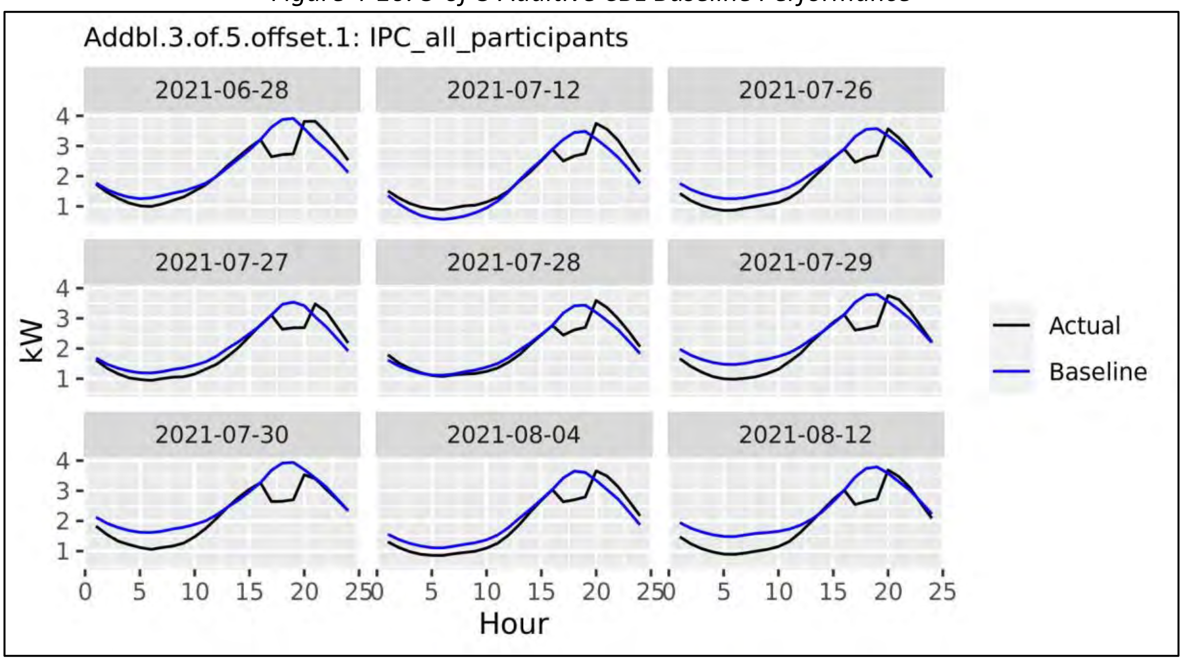


Figure 4-11: 3-of-10 Multiplicative CBL Baseline Performance

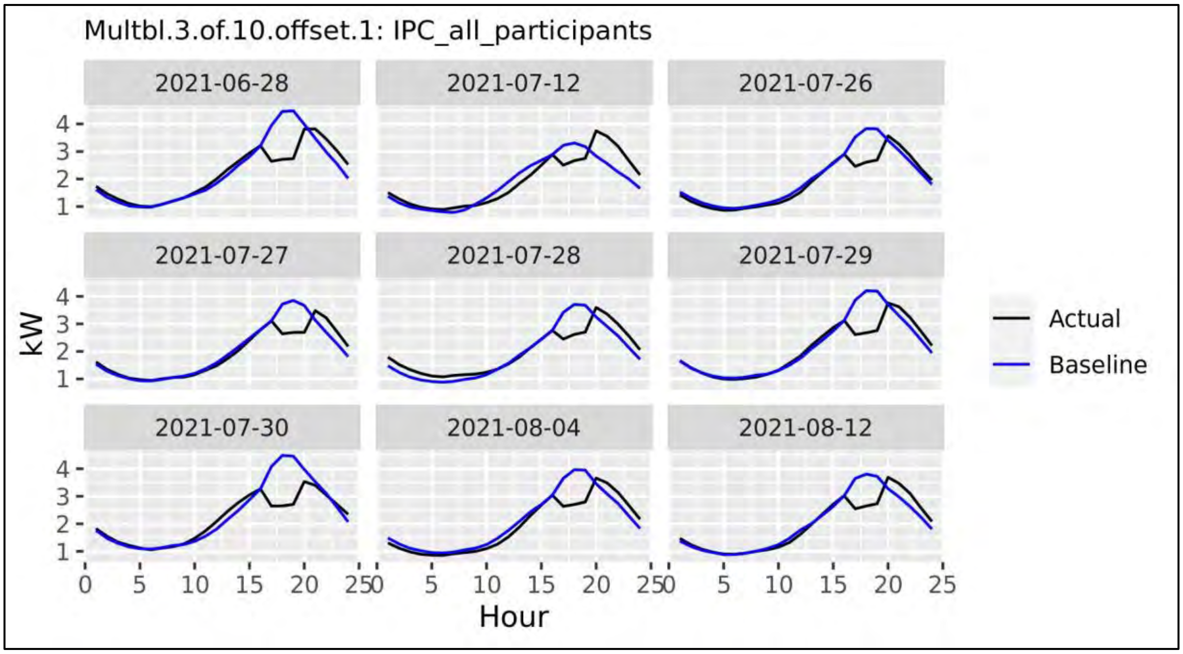
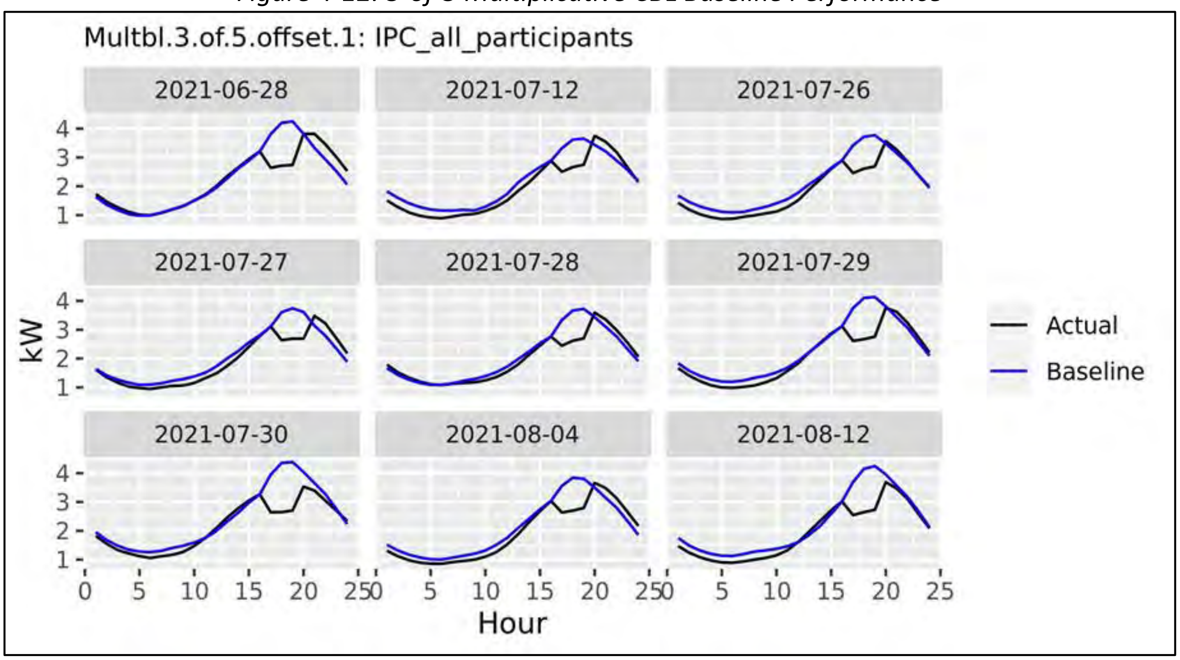


Figure 4-12: 3-of-5 Multiplicative CBL Baseline Performance



4.1.2 Non-Contributing Household Summary

The Evaluators estimated the non-contributing household rate for the program to be 14% across all events. The non-contributing household rate for each event varied between 11% and 17%. Table 4-2 summarizes the non-contributing household rates for each event.

Table 4-2: Non-Contributing Household Rate

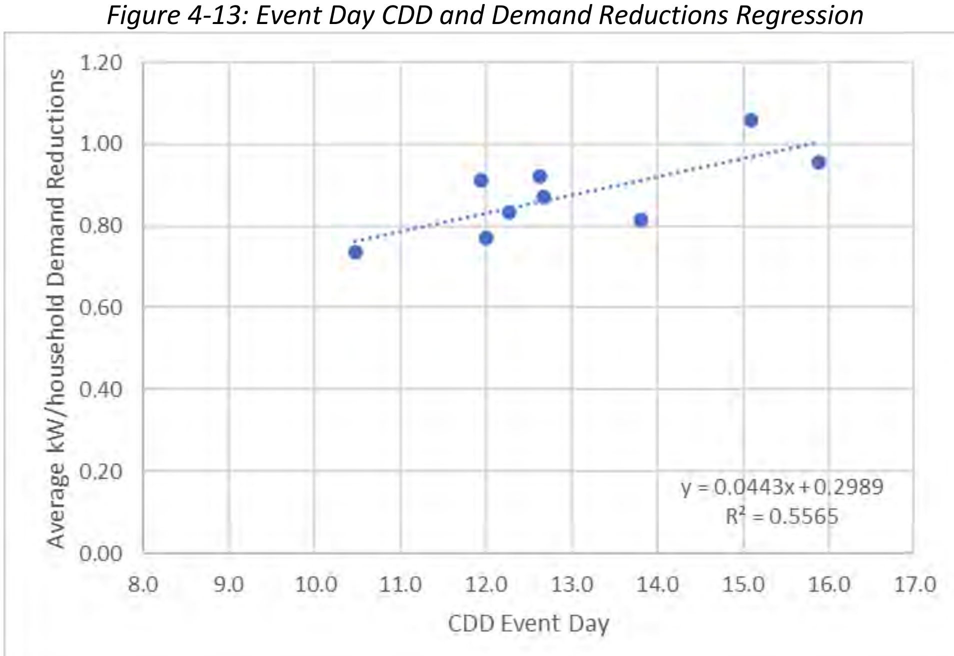
Date	% Non-Contributing Household Rate
6/28/2021	10.96%
7/12/2021	13.66%
7/26/2021	14.39%
7/27/2021	17.18%
7/28/2021	15.52%
7/29/2021	12.53%
7/30/2021	12.92%
8/4/2021	16.64%
8/12/2021	12.87%
Event Average	**14.08%**

4.1.3 Weather and Demand Reduction Correlations

In this section, the Evaluators demonstrate the relationship between weather and observed demand reductions.

Figure 4-13 displays the relationship between CDD and average kW/household demand reductions on event days. A strong positive correlation exists between CDD and demand reductions, indicating that days displaying higher temperatures also display larger demand reductions. The CDD predicts about 56% of the variation in demand reductions according to the R-Squared, indicating that the CDD may explain 56% of the variation in demand reduction.

Figure 4-13: Event Day CDD and Demand Reductions Regression



Interestingly, a higher event time average temperature (F) did not correlate with higher average kW/household demand reductions. Figure 4-14 shows that demand reductions do not increase with higher average event time temperatures (F). This may be due to differences between a home's inside air temperature and the outdoor air temperature. The home's internal air temperature increases are lagged compared to the outdoor air temperature. This suggests that to maximize program demand reductions, events should be called on days with the highest CDD and not simply on days with the highest average temperature during peak hours.

Figure 4-14: Event Time Temperature (F) and Demand Reductions Regression

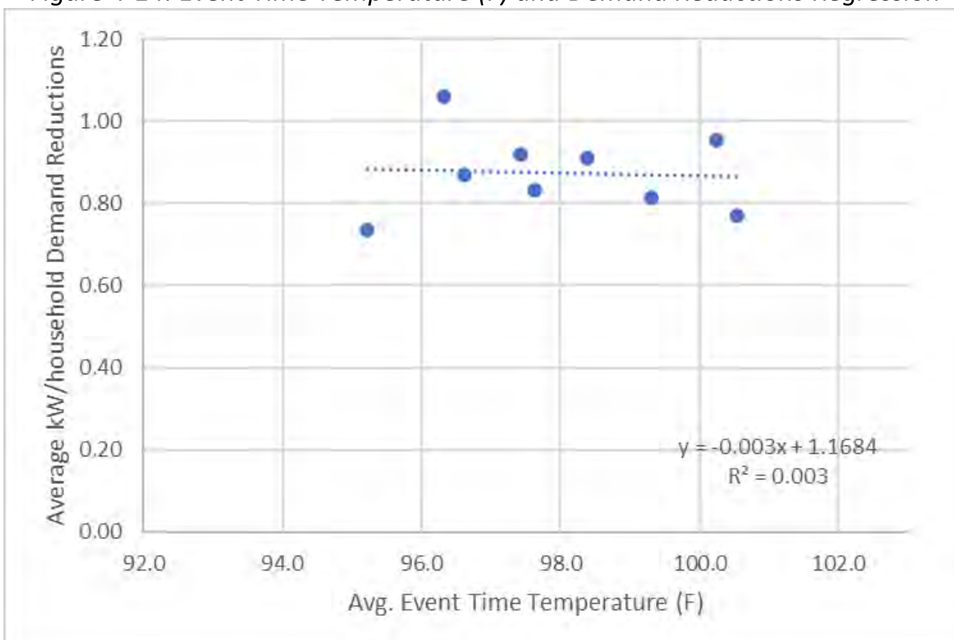
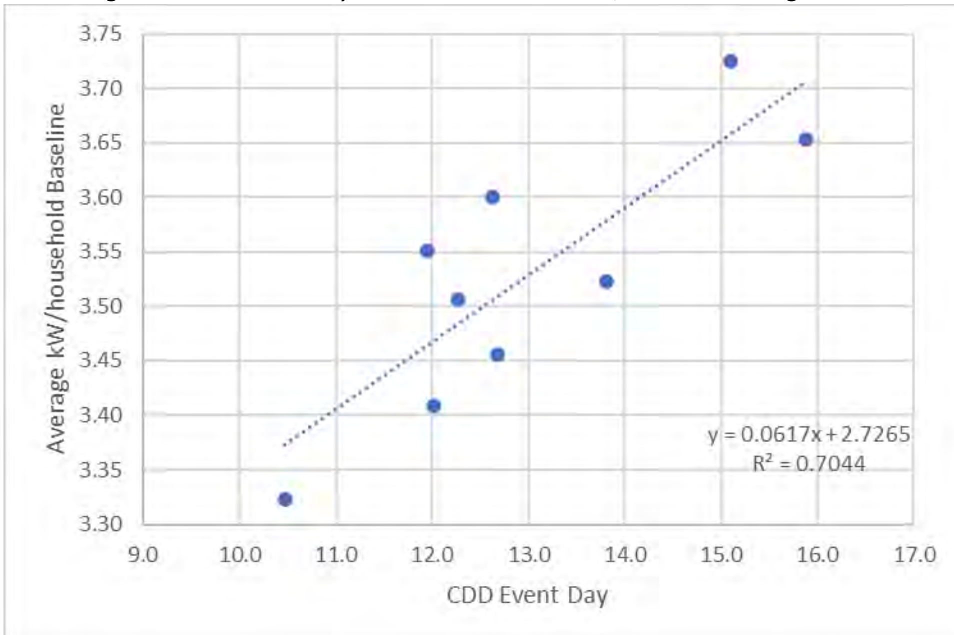


Figure 4-15 confirms the relationship between CDD and kW/household usage during event hours on the event day. This figure shows a strong positive correlation between CDD and baseline kW usage. This confirms that calling events on days with a high forecasted CDD corresponds to days with the highest forecasted peak kW usage. This information can be used to maximize demand reductions.

Figure 4-15: Event Day CDD and Baseline kW/household Regression



4.1.4 Summary of Impact Results

The Evaluators summarize the ACCC Program verified impact evaluation results in this section. Table 4-3 displays the verified ACCC Program demand reductions.

Table 4-3: Verified A/C Cool Credit Program Demand Impacts

Number of Customers	Expected Unit Demand Reductions (kW per Household)	Expected Program Demand Reductions (kW)	Realized Unit Demand Reductions (kW per Household)	Realized Program Demand Reductions (kW)	Realization Rate
20,995	1.06	22,254.70	0.87	18,351.20	82.5%

Verified program demand reductions by event are summarized in Table 4-4.

Table 4-4: A/C Cool Credit Program PY2021 Impact Results by Event Date

Event Date	Verified Demand Reductions (kW per Household)	Verified Total Demand Reductions (kW)
6/28/2021	0.96	20,051.30
7/12/2021	0.77	16,152.68
7/26/2021	0.87	18,255.18
7/27/2021	0.83	17,488.65
7/28/2021	0.74	15,437.98

7/29/2021	0.92	19,305.29
7/30/2021	1.06	22,245.36
8/4/2021	0.81	17,087.64
8/12/2021	0.91	19,136.72

Table 4-5 displays demand reductions for each model. The Evaluators selected the Mixed Model to calculate verified demand reductions for the program as this model had the lowest error and smallest bias. The expected kW savings/unit rate for the program is 1.06 kW/household[1]. The realized MW is 18.35 which corresponds to an 82.5% realization rate.

Table 4-5: Summary of kW Impact by Model

Model	Average Demand Reductions (kW per Household)	Total Average Demand Reductions (kW)	Total Average Demand Reductions (MW)
3-of-10 Additive CBL 1-Hr Offset	1.09	22,899	22.90
3-of-5 Additive CBL 1-Hr Offset	0.93	19,538	19.54
Mixed Model	0.87	18,351	18.35
3-of-10 Multiplicative CBL 1-Hr Offset	1.19	25,016	25.02
3-of-5 Multiplicative CBL 1-Hr Offset	1.18	24,718	24.72
Regression	0.62	13,032	13.03

4.2 Conclusions and Recommendations

The following section details the Evaluators' conclusions and recommendations for the A/C Cool Credit Program evaluation.

4.2.1 Conclusions

The Evaluators provide the following conclusions regarding IPC's ACCC Program:

- Utilizing multiple baseline models and assigning the best fitting baseline model on a customer-specific basis resulted in lower bias and smaller errors on proxy event days.
- The current method of estimating program demand reductions utilizing a 3-of-10 Customer Baseline (CBL) approach did not perform as well as other baseline approaches in terms of predicting usage on proxy event days (higher bias and larger errors).
- Regression modeling outperformed CBL modeling in terms of predicting baseline usage on proxy days.
- Higher demand reductions are positively correlated with higher Cooling Degree Days (CDD).
- Overall rates for non-contributing customers were within the normal ranges observed for residential DR programs.

[1] For the expected kW/unit values, the Evaluators utilized IPC's anticipated kW/ unit reduction at 100F, which corresponds to the average max temperature (F) on event days in 2021.

4.2.2 Recommendations

The Evaluators offer the following recommendations regarding IPC's ACCC Program:

- Utilize a mixed model or regression model to estimate saving for the programs. CBLs on their own may systematically overestimate baseline usage and demand reductions for the program.
- Utilize proxy event days to estimate bias and error when determining which model to select for estimating baseline usage.
- As shown in Section 4.1.3, a strong positive correlation exists between CDD and baseline usage, and between CDD and program demand reductions. The Evaluators recommend calling DR events on days with the highest forecasted CDD to maximize program demand reductions. If numerous events are called on days with lower CDD, and therefore lower expected demand reductions, the Evaluators recommend calculating demand reductions by using average demand reductions from the maximum event (or average demand reductions from the top 3 days with the highest CDD) to avoid penalizing the program or incentivizing calling fewer DR events.

5. Appendix: Regression Results

This appendix provides additional details on the regression analyses conducted for the A/C Cool Credit Program. The Evaluators summarize a comparison of kW/household demand reductions calculation methods and full load reductions for each model by event and hour.

Table 5-1 provides estimates of kW/household demand reductions utilizing various calculation methods according to the following definitions:

- Average kW/household = average reduction across all hours and events.
- Max Any Hour kW/household = average demand reductions for the hour and event displaying the highest load reduction.
- Max Hour kW/household = average demand reductions for the hour displaying the highest load reduction across all events.
- Max Event kW/household = average demand reductions for the event displaying the highest load reduction.

Table 5-1: kW Per Household Demand Reductions by Model and Calculation Method

Model	Average kW per Household	Max Any Hour kW per Household	Max Hour kW per Household	Max Event kW per Household
3-of-10 Additive CBL 1-Hr Offset	1.09	1.47	1.18	1.35
3-of-5 Additive CBL 1-Hr Offset	0.93	1.27	0.99	1.18
Mixed Model	0.87	1.16	0.94	1.06
3-of-10 Multiplicative CBL 1-Hr Offset	1.19	1.83	1.28	1.67
3-of-5 Multiplicative CBL 1-Hr Offset	1.18	1.70	1.26	1.56
Regression	0.62	0.75	0.68	0.67

Table 5-2 through Table 5-7 provides actual kW, baseline kW, and kW reductions by hour and event day for each model. RRMSE, RMSE, and Bias were calculated on proxy event days and are shown with event days because corrections in the baseline kW can be made using the average bias and the bias is a function of the chosen model.

Table 5-2: 3-of-10 Additive CBL 1-Hr Offset Load Reductions by Event and Hour

Event Date	Hour	Actual kW per household	Baseline kW per household	Reduction kW per Household	RRMSE (Proxy Days)	RMSE (Proxy Days)	Bias (Proxy Days)
6/28/2021	17	2.643	3.723	1.080	0.067	0.241	0.067
6/28/2021	18	2.714	4.051	1.337	0.089	0.337	0.089
6/28/2021	19	2.739	4.073	1.334	0.087	0.332	0.085
7/12/2021	17	2.503	3.362	0.859	0.067	0.241	0.067
7/12/2021	18	2.666	3.607	0.942	0.089	0.337	0.089
7/12/2021	19	2.748	3.562	0.814	0.087	0.332	0.085
7/26/2021	17	2.459	3.476	1.017	0.067	0.241	0.067
7/26/2021	18	2.610	3.755	1.145	0.089	0.337	0.089
7/26/2021	19	2.689	3.725	1.036	0.087	0.332	0.085
7/27/2021	18	2.640	3.647	1.007	0.089	0.337	0.089
7/27/2021	19	2.688	3.741	1.053	0.087	0.332	0.085
7/27/2021	20	2.691	3.549	0.858	0.061	0.228	0.059
7/28/2021	17	2.447	3.339	0.892	0.067	0.241	0.067
7/28/2021	18	2.617	3.618	1.001	0.089	0.337	0.089
7/28/2021	19	2.700	3.588	0.888	0.087	0.332	0.085
7/29/2021	17	2.611	3.697	1.086	0.067	0.241	0.067
7/29/2021	18	2.674	3.977	1.303	0.089	0.337	0.089
7/29/2021	19	2.757	3.946	1.189	0.087	0.332	0.085
7/30/2021	17	2.644	3.841	1.197	0.067	0.241	0.067
7/30/2021	18	2.651	4.121	1.470	0.089	0.337	0.089
7/30/2021	19	2.702	4.090	1.388	0.087	0.332	0.085
8/4/2021	17	2.635	3.609	0.974	0.067	0.241	0.067
8/4/2021	18	2.700	3.864	1.164	0.089	0.337	0.089
8/4/2021	19	2.792	3.824	1.031	0.087	0.332	0.085
8/12/2021	17	2.544	3.600	1.056	0.067	0.241	0.067
8/12/2021	18	2.647	3.874	1.228	0.089	0.337	0.089
8/12/2021	19	2.727	3.828	1.101	0.087	0.332	0.085

Table 5-3: 3-of-5 Additive CBL 1-Hr Offset Load Reductions by Event and Hour

Event Date	Hour	Actual kW per household	Baseline kW per household	Reduction kW per Household	RRMSE (Proxy Days)	RMSE (Proxy Days)	Bias (Proxy Days)
6/28/2021	17	2.643	3.621	0.979	0.036	0.128	0.035
6/28/2021	18	2.714	3.878	1.164	0.045	0.170	0.044
6/28/2021	19	2.739	3.913	1.174	0.041	0.157	0.037
7/12/2021	17	2.503	3.215	0.712	0.036	0.128	0.035
7/12/2021	18	2.666	3.447	0.782	0.045	0.170	0.044
7/12/2021	19	2.748	3.483	0.735	0.041	0.157	0.037
7/26/2021	17	2.459	3.314	0.854	0.036	0.128	0.035
7/26/2021	18	2.610	3.552	0.942	0.045	0.170	0.044
7/26/2021	19	2.689	3.575	0.886	0.041	0.157	0.037
7/27/2021	18	2.640	3.466	0.826	0.045	0.170	0.044
7/27/2021	19	2.688	3.539	0.850	0.041	0.157	0.037
7/27/2021	20	2.691	3.421	0.730	0.026	0.096	0.022
7/28/2021	17	2.447	3.176	0.730	0.036	0.128	0.035
7/28/2021	18	2.617	3.415	0.798	0.045	0.170	0.044
7/28/2021	19	2.700	3.437	0.737	0.041	0.157	0.037
7/29/2021	17	2.611	3.535	0.924	0.036	0.128	0.035
7/29/2021	18	2.674	3.774	1.100	0.045	0.170	0.044
7/29/2021	19	2.757	3.796	1.039	0.041	0.157	0.037
7/30/2021	17	2.644	3.679	1.034	0.036	0.128	0.035
7/30/2021	18	2.651	3.918	1.267	0.045	0.170	0.044
7/30/2021	19	2.702	3.940	1.237	0.041	0.157	0.037
8/4/2021	17	2.635	3.426	0.791	0.036	0.128	0.035
8/4/2021	18	2.700	3.650	0.950	0.045	0.170	0.044
8/4/2021	19	2.792	3.610	0.818	0.041	0.157	0.037
8/12/2021	17	2.544	3.454	0.910	0.036	0.128	0.035
8/12/2021	18	2.647	3.741	1.095	0.045	0.170	0.044
8/12/2021	19	2.727	3.789	1.062	0.041	0.157	0.037

Table 5-4: Mixed Model Load Reductions by Event and Hour

Event Date	Hour	Actual kW per household	Baseline kW per household	Reduction kW per Household	RRMSE (Proxy Days)	RMSE (Proxy Days)	Bias (Proxy Days)
6/28/2021	17	2.643	3.473	0.830	0.008	0.027	0.000
6/28/2021	18	2.714	3.721	1.007	0.017	0.065	0.015
6/28/2021	19	2.739	3.767	1.028	0.016	0.062	0.010
7/12/2021	17	2.503	3.240	0.737	0.008	0.027	0.000
7/12/2021	18	2.666	3.479	0.813	0.017	0.065	0.015
7/12/2021	19	2.748	3.506	0.758	0.016	0.062	0.010
7/26/2021	17	2.459	3.284	0.824	0.008	0.027	0.000
7/26/2021	18	2.610	3.527	0.917	0.017	0.065	0.015
7/26/2021	19	2.689	3.555	0.867	0.016	0.062	0.010
7/27/2021	18	2.640	3.512	0.873	0.017	0.065	0.015
7/27/2021	19	2.688	3.566	0.878	0.016	0.062	0.010
7/27/2021	20	2.691	3.439	0.749	0.008	0.029	-0.002
7/28/2021	17	2.447	3.140	0.694	0.008	0.027	0.000
7/28/2021	18	2.617	3.406	0.789	0.017	0.065	0.015
7/28/2021	19	2.700	3.423	0.723	0.016	0.062	0.010
7/29/2021	17	2.611	3.418	0.807	0.008	0.027	0.000
7/29/2021	18	2.674	3.679	1.005	0.017	0.065	0.015
7/29/2021	19	2.757	3.704	0.947	0.016	0.062	0.010
7/30/2021	17	2.644	3.539	0.894	0.008	0.027	0.000
7/30/2021	18	2.651	3.810	1.160	0.017	0.065	0.015
7/30/2021	19	2.702	3.827	1.125	0.016	0.062	0.010
8/4/2021	17	2.635	3.395	0.759	0.008	0.027	0.000
8/4/2021	18	2.700	3.607	0.906	0.017	0.065	0.015
8/4/2021	19	2.792	3.568	0.776	0.016	0.062	0.010
8/12/2021	17	2.544	3.350	0.807	0.008	0.027	0.000
8/12/2021	18	2.647	3.643	0.997	0.017	0.065	0.015
8/12/2021	19	2.727	3.659	0.931	0.016	0.062	0.010

Table 5-5: 3-of-10 Multiplicative CBL 1-Hr Offset Load Reductions by Event and Hour

Event Date	Hour	Actual kW per household	Baseline kW per household	Reduction kW per Household	RRMSE (Proxy Days)	RMSE (Proxy Days)	Bias (Proxy Days)
6/28/2021	17	2.643	3.946	1.303	0.074	0.266	0.071
6/28/2021	18	2.714	4.454	1.740	0.101	0.383	0.096
6/28/2021	19	2.739	4.476	1.738	0.101	0.385	0.087
7/12/2021	17	2.503	3.223	0.720	0.074	0.266	0.071
7/12/2021	18	2.666	3.310	0.644	0.101	0.383	0.096
7/12/2021	19	2.748	3.176	0.428	0.101	0.385	0.087
7/26/2021	17	2.459	3.525	1.066	0.074	0.266	0.071
7/26/2021	18	2.610	3.829	1.219	0.101	0.383	0.096
7/26/2021	19	2.689	3.822	1.134	0.101	0.385	0.087
7/27/2021	18	2.640	3.717	1.077	0.101	0.383	0.096
7/27/2021	19	2.688	3.851	1.163	0.101	0.385	0.087
7/27/2021	20	2.691	3.667	0.976	0.074	0.276	0.060
7/28/2021	17	2.447	3.416	0.970	0.074	0.266	0.071
7/28/2021	18	2.617	3.704	1.087	0.101	0.383	0.096
7/28/2021	19	2.700	3.680	0.980	0.101	0.385	0.087
7/29/2021	17	2.611	3.861	1.250	0.074	0.266	0.071
7/29/2021	18	2.674	4.199	1.526	0.101	0.383	0.096
7/29/2021	19	2.757	4.193	1.435	0.101	0.385	0.087
7/30/2021	17	2.644	4.081	1.437	0.074	0.266	0.071
7/30/2021	18	2.651	4.484	1.833	0.101	0.383	0.096
7/30/2021	19	2.702	4.457	1.755	0.101	0.385	0.087
8/4/2021	17	2.635	3.651	1.016	0.074	0.266	0.071
8/4/2021	18	2.700	3.963	1.263	0.101	0.383	0.096
8/4/2021	19	2.792	3.949	1.157	0.101	0.385	0.087
8/12/2021	17	2.544	3.647	1.103	0.074	0.266	0.071
8/12/2021	18	2.647	3.803	1.157	0.101	0.383	0.096
8/12/2021	19	2.727	3.724	0.996	0.101	0.385	0.087

Table 5-6: 3-of-5 Multiplicative CBL 1-Hr Offset Load Reductions by Event and Hour

Event Date	Hour	Actual kW per household	Baseline kW per household	Reduction kW per Household	RRMSE (Proxy Days)	RMSE (Proxy Days)	Bias (Proxy Days)
6/28/2021	17	2.643	3.810	1.167	0.046	0.167	0.038
6/28/2021	18	2.714	4.204	1.490	0.060	0.229	0.044
6/28/2021	19	2.739	4.251	1.513	0.078	0.299	0.040
7/12/2021	17	2.503	3.319	0.816	0.046	0.167	0.038
7/12/2021	18	2.666	3.619	0.954	0.060	0.229	0.044
7/12/2021	19	2.748	3.655	0.906	0.078	0.299	0.040
7/26/2021	17	2.459	3.420	0.960	0.046	0.167	0.038
7/26/2021	18	2.610	3.716	1.106	0.060	0.229	0.044
7/26/2021	19	2.689	3.773	1.085	0.078	0.299	0.040
7/27/2021	18	2.640	3.606	0.966	0.060	0.229	0.044
7/27/2021	19	2.688	3.743	1.054	0.078	0.299	0.040
7/27/2021	20	2.691	3.614	0.923	0.060	0.224	0.026
7/28/2021	17	2.447	3.337	0.890	0.046	0.167	0.038
7/28/2021	18	2.617	3.666	1.049	0.060	0.229	0.044
7/28/2021	19	2.700	3.724	1.024	0.078	0.299	0.040
7/29/2021	17	2.611	3.747	1.136	0.046	0.167	0.038
7/29/2021	18	2.674	4.102	1.429	0.060	0.229	0.044
7/29/2021	19	2.757	4.138	1.380	0.078	0.299	0.040
7/30/2021	17	2.644	3.952	1.308	0.046	0.167	0.038
7/30/2021	18	2.651	4.354	1.704	0.060	0.229	0.044
7/30/2021	19	2.702	4.385	1.683	0.078	0.299	0.040
8/4/2021	17	2.635	3.557	0.922	0.046	0.167	0.038
8/4/2021	18	2.700	3.842	1.142	0.060	0.229	0.044
8/4/2021	19	2.792	3.809	1.017	0.078	0.299	0.040
8/12/2021	17	2.544	3.689	1.145	0.046	0.167	0.038
8/12/2021	18	2.647	4.149	1.503	0.060	0.229	0.044
8/12/2021	19	2.727	4.245	1.517	0.078	0.299	0.040

Table 5-7: Regression Load Reductions by Event and Hour

Event Date	Hour	Actual kW per household	Baseline kW per household	Reduction kW per Household	RRMSE (Proxy Days)	RMSE (Proxy Days)	Bias (Proxy Days)
6/28/2021	17	2.643	3.224	0.582	0.060	0.215	-0.058
6/28/2021	18	2.714	3.410	0.696	0.044	0.165	-0.042
6/28/2021	19	2.739	3.478	0.739	0.050	0.192	-0.047
7/12/2021	17	2.503	3.115	0.612	0.060	0.215	-0.058
7/12/2021	18	2.666	3.362	0.697	0.044	0.165	-0.042
7/12/2021	19	2.748	3.390	0.641	0.050	0.192	-0.047
7/26/2021	17	2.459	3.073	0.613	0.060	0.215	-0.058
7/26/2021	18	2.610	3.271	0.661	0.044	0.165	-0.042
7/26/2021	19	2.689	3.323	0.634	0.050	0.192	-0.047
7/27/2021	18	2.640	3.388	0.748	0.044	0.165	-0.042
7/27/2021	19	2.688	3.384	0.695	0.050	0.192	-0.047
7/27/2021	20	2.691	3.252	0.561	0.048	0.180	-0.047
7/28/2021	17	2.447	2.984	0.537	0.060	0.215	-0.058
7/28/2021	18	2.617	3.245	0.628	0.044	0.165	-0.042
7/28/2021	19	2.700	3.256	0.556	0.050	0.192	-0.047
7/29/2021	17	2.611	3.073	0.462	0.060	0.215	-0.058
7/29/2021	18	2.674	3.284	0.611	0.044	0.165	-0.042
7/29/2021	19	2.757	3.355	0.597	0.050	0.192	-0.047
7/30/2021	17	2.644	3.136	0.492	0.060	0.215	-0.058
7/30/2021	18	2.651	3.357	0.707	0.044	0.165	-0.042
7/30/2021	19	2.702	3.400	0.698	0.050	0.192	-0.047
8/4/2021	17	2.635	3.220	0.584	0.060	0.215	-0.058
8/4/2021	18	2.700	3.364	0.664	0.044	0.165	-0.042
8/4/2021	19	2.792	3.341	0.548	0.050	0.192	-0.047
8/12/2021	17	2.544	3.066	0.523	0.060	0.215	-0.058
8/12/2021	18	2.647	3.314	0.667	0.044	0.165	-0.042
8/12/2021	19	2.727	3.334	0.606	0.050	0.192	-0.047

Idaho Power Company

Idaho Power Company Commercial and Industrial Energy Efficiency Program – Custom Projects

2020 Program Year Impact and Process Evaluation Results

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The Tetra Tech Evaluation Team was made up of the following individuals: Kimberly Bakalars, Mark Bergum, Adam Jablonski, Graham Thorbrogger, Nathan Kwan, and Kathryn Shirley.

1.0 EXECUTIVE SUMMARY

Tetra Tech is pleased to provide Idaho Power Company (Idaho Power) with a report for the 2021 impact and process evaluation of the 2020 Custom Projects component of the Idaho Power Commercial and Industrial Energy Efficiency Program (CIP). The Idaho Power CIP provides a comprehensive menu of incentives and services to facilitate the implementation of cost-effective energy-efficiency improvements for commercial and industrial customers. Incentives cover retrofits, new construction and major renovation projects, and custom incentives for cost-effective projects not covered on the menu of incentives. In addition, the CIP also provides technical training and energy assessments of customers' facilities.

This report section consists of an introduction describing the program, evaluation activities, and key findings and recommendations. The detailed impact results can be found in section 3, with process results detailed in section 4.

1.1 PROGRAM DESCRIPTION

The Custom Projects Option (also known as Custom incentives, or Custom Projects program) of the Commercial and Industrial Efficiency Program provides monetary incentives and energy auditing services to help identify and evaluate potential energy-saving modifications or projects in new and existing facilities. The goal is to encourage commercial and industrial energy savings in Idaho and Oregon service areas. The Custom Option offers an incentive level of up to 70 percent of the project cost or 18 cents per kilowatt-hour for estimated first-year savings, whichever is less.

Interested customers submit applications to Idaho Power for potential modifications. Idaho Power reviews each application and works with the customer and vendors to gather sufficient information to support the energy-savings calculations. Once projects are completed, customers submit a payment application. Each project is reviewed by Idaho Power engineering staff or a third-party consultant to verify the energy savings methods and calculations. An Idaho Power lighting tool is used to determine all lighting savings and incentives. End-use measure information, project photographs, and project costs are collected through the verification process.

Idaho Power or a third-party consultant conducts onsite power monitoring and data collection before and after project implementation to ensure energy savings are obtained and within program guidelines on many projects, especially the larger and more complex projects. If changes in scope take place on a project, Idaho Power recalculates the energy savings and incentive amount based on the actual installed equipment and performance. The measurement and verification reports provided to Idaho Power include verification of energy savings, costs, estimates of measure life, and any final recommendations.

1.2 METHODOLOGY

To address the evaluation objectives, which included verifying energy impacts attributable to the 2020 program, providing estimates of realization rates, and suggesting enhancements to the savings analysis and reporting, the evaluation team conducted the impact evaluation activities shown in Figure 1.

Figure 1. Impact Evaluation Activities

Tetra Tech also conducted a process evaluation for Custom Projects. Figure 2 highlights the activities undertaken to address the process research objectives.

Figure 2. Process Evaluation Activities

1.3 FINDINGS AND RECOMMENDATIONS

The impact evaluation for the Custom Projects program revealed a successfully run program that has mitigated many of the risks associated with custom energy efficiency programs. The changes implemented since the evaluation of the 2017 program year (PY2017) have significantly improved the program and increased energy savings. The evaluation team found only minor adjustments to ex-ante savings and limited process-oriented opportunities. Overall, findings from the impact evaluation show the program savings calculations are well supported and documented. The standard process to complete project description documents is updated throughout the project implementation. Documentation of the baseline and final savings calculation reasoning allows the evaluators and others to understand the project progression. The verification process implemented for most projects also adjusts the energy savings to include the actual operating conditions of the improved process. Overall, these items attributed to the 99.8 percent realization rate, as shown in Table 1.

Table 1. PY2020 Realization Rates of Sampled Projects

Measure	Ex-Ante kWh	Ex-Post kWh	Realization rate
Refrigeration	24,568,611	24,504,356	99.7%
VFD	23,905,463	24,084,356	100.7%
Other	9,068,218	8,862,126	97.7%
Lighting	1,887,894	1,876,531	99.4%
HVAC	504,749	504,749	100.0%
Energy Management	443,768	443,768	100.0%
Fans	351,519	318,910	90.7%
Controls	189,265	188,425	99.6%
Pump	126,531	121,118	95.7%
Overall	**61,046,018**	**60,904,339**	**99.8%**

The documentation provided for the program showed both application submittal and the verification analysis with a post-install final project review document. The project review explains the changes that occurred between the initial application and verification. The IPC files provided included:

- Application
- Engineering analysis and calculations

- Verification Report
- Tracking system screenshot of project closeout
- Post-install project description

The IPC files did not initially include most spreadsheet calculation files completed by third-party engineers. These files were easily obtained throughout the evaluation. The consistent documentation and ease of extracting the documents simplified the impact evaluation of the sampled projects. The ease of understanding that the impact evaluation team had with the documentation reflects that the quality control and quality assurance of the Custom Projects program is standardized. A standardized quality assurance and quality control process eliminates risks that unseen variables impact individual calculations.

The Custom Projects program addressed all the PY2017 evaluation findings through thoughtful implementation of the program that incorporates the goals of the recommendation. The improvements made by IPC have reduced the risks associated with custom calculated energy savings. The efforts to complete a verification visit after the installation and start-up of the project reduced the variability in evaluated realization rates typically found in a custom program.

In addition to the technical components to claim energy savings, the Custom Projects program representatives, energy advisors, and third-party verification engineers have built the relationships and underlying trust leading to unique outcomes for Idaho Power. The Custom Projects program in PY2020 showed a comprehensive approach to energy efficiency that requires high levels of technical competency and relationship trust between participants, market actors, and IPC staff. As a result, the participant's projects identify and implement operations coordinated with equipment and maintenance to unlock energy efficiency, which is typically a theoretical opportunity. In particular, refrigeration projects in the program are advanced. The calculations are coordinated with small operational adjustments, design criteria, and the expertise of the IPC staff and third-party verification staff to verify implementation and support the commissioning of the project once installed. Based on our experience, the refrigeration projects implemented with the support of the IPC Custom Projects program would not have occurred in other regions of the country because the market would be unable to design the improvements, coordinate efforts of installation and operation, or explain the engineering concepts to the DSM program staff.

1.3.1 Impact Recommendations

The following impact recommendations are provided for Idaho Power's consideration:

Maintain the long-term focus of the Cohort projects. The cohort participants typically do not show savings in the first year of participation. Still, verification phone calls indicated that each municipal department participant had changed their approach to decisions about new projects and ongoing management of their system to increase the focus on energy efficiency and operating costs. The changed behaviors indicate that the energy savings will continue beyond the active involvement of the IPC Custom Projects program. The participants also indicated that they would like to bring the Cohort approach to other departments within their municipality and feel that they can easily engage their supervisors based on the previous track record of program participants.

Continue to build relationships in the market. The local market for renovating or building new projects is developed where sophisticated systems-based energy efficiency is delivered above the standard equipment improvements. The IPC Custom Projects program has directly supported this market progress through (1) developing staff as trusted advisors to customers and trade allies, (2) consistently delivering energy efficiency incentives that are near to initial estimates, (3) providing third-party verification engineering calculations to confirm energy efficiency, and (4) trusting the participants to operate their systems with the attention to detail required to deliver energy savings.

Consider determining energy savings using a consumption analysis approach. The energy efficiency of complicated projects can be identified by analyzing interval consumption data of the facility or through sub-metering. This approach will provide actual energy savings from projects without the complicated engineering spreadsheets to determine the impact of each successive adjustment. To deliver this approach, IPC would need to pre-plan the measurement and verification necessary to collect operating data for pre-install and post-install periods and account for non-routine adjustments at the project locations. However, IPC's relationships and technical development in the local market provide the foundation to deliver energy savings on this type of program effectively. The analysis outcome will simplify the energy efficiency calculations and burden to provide the necessary documentation and deliver actual energy savings based on the participant's operating conditions and continuous improvement. However, the actual energy savings for the performance periods will increase the variability of the claimed savings, which will decrease the program's ability to provide consistent estimates of energy savings from project inception to incentive payment.

1.3.2 Process Recommendations

The following process recommendations are provided for Idaho Power's consideration:

Update the Custom tab of the CIP logic model to account for recent program changes. A review of the logic model for the Custom Projects, Retrofits, and New Construction components of the CIP shows that the Custom Projects program follows the inputs, activities, outputs, and outcomes originally outlined quite well. And as planned, the program has intentionally shifted some measures from Custom to Retrofits, namely lighting. References to lighting in the Custom logic model should be reviewed, as most lighting measures have transitioned to the Retrofits portion of CIP.

Add a check box for new construction or equipment replacement to the Custom application. Collecting new construction or equipment replacement information for Custom projects was an output of the application process in the logic model. This information on the application form will allow for distinct tracking of the type of projects receiving Custom incentives.

Continue to focus on efficient and effective communication between all parties providing Custom services. Based on feedback from program participants and the third-party engineers, communication regarding the program is working well and is expected to improve with the new Idaho Power staff. Relationships with customers built by Idaho Power staff and third-party engineers translate into successful projects. Areas for improvement are minor but include:

- Increasing communication regarding the appropriate CIP path for projects. Customers may not initially determine the best path (Custom, New Construction, or Retrofits), so IPC staff and engineering contractors should continue to communicate closely on routing applications to the best-suited path. The logic model outlines the Pre-Approval stage is where this review and communication would most likely occur.

- Understanding of which CIP path and application to use can also be facilitated by the Idaho Power Energy Advisors and program staff. Idaho Power staff have developed trusted relationships with the clients that participate in the CIP programs, especially Custom Projects. Most Energy Advisors provide a great deal of support to their respective customers. However, when new staff joins Idaho Power as Energy Advisors, they may need to rebuild trust with customers and be coached on the expected level of support. It is also the case that when customers have staffing changes, support and relationships will be rebuilt.

- Training for customers and contractors has been a valuable tool for Idaho Power in the past. Consider ways to support virtual training or education given the current environment. It will efficiently facilitate outreach to more customers and ensure they receive a consistent message. It also allows new Idaho Power staff to build relationships with contractors and customers to strengthen communication.

2.0 INTRODUCTION

2.1 PROGRAM OVERVIEW

The Custom Projects program provides monetary incentives and energy auditing services to help identify and evaluate potential energy-saving modifications or projects in new and existing facilities. The goal is to encourage commercial and industrial energy savings in Idaho and Oregon service areas. The Custom Projects program offers an incentive level of up to 70 percent of the project cost or 18 cents per kWh for estimated first-year savings, whichever is less.

New to the Custom Projects program in 2020:

- Energy Management - Incentive of $0.025 per kWh saved up to 100% of eligible costs
- Leak Assessment and Fix of Compressed Air Leaks - $0.025 per kWh saved up to 100% of eligible repair costs.
- Leak Assessment and Fix of Underground Water Leaks - $1,000 per five miles of pipe for a third-party leak assessment and $0.18 per kWh saved up to 70% of eligible repair costs identified through leak assessment.
- Energy Scoping Assessments - up to $4,500 of engineering services is reimbursed for energy scoping assessments. Three firms are available for this service.

Interested customers submit applications to Idaho Power for potential modifications that have been identified by the customers, Idaho Power, or by a third-party consultant. Idaho Power reviews each application and works with the customer and vendors to gather sufficient information, through audits if needed, to support the energy-savings calculations. Idaho Power currently has six third-party contractors assisting them with audits and savings estimates.

Once projects are completed, customers submit a payment application. Each project is reviewed by Idaho Power engineering staff or a third-party consultant to verify the energy savings methods and calculations. End-use measure information, project photographs, and project costs are collected through the verification process.

Idaho Power or a third-party consultant conducts onsite power monitoring and data collection before and after project implementation to ensure energy savings are obtained and within program guidelines on many projects, especially the larger and more complex projects. If changes in scope take place on a project, Idaho Power recalculates the energy savings and incentive amount based on the actual installed equipment and performance. The measurement and verification reports provided to Idaho Power include verification of energy savings, costs, estimates of measure life, and any final recommendations. Table 2 shows the 2020 projects and annual energy savings by primary project measure:

Table 2. PY2020 Custom Option Summary by Project Measure

Measure	Number of projects	kWh saved	Percent of program savings	PY2017 percent of program savings
VFD	15	32,217,243	34.3%	31.4%
Refrigeration	18	30,168,378	32.1%	16.7%
Lighting	89	12,566,042	13.4%	22.0%
Other	2	9,068,218	9.6%	2.4%

Measure	Number of projects	kWh saved	Percent of program savings	PY2017 percent of program savings
Energy Management	11	2,202,821	2.3%	5.5%
Motors	1	1,895,391	2.0%	0.0%
Pump	12	1,815,041	1.9%	1.9%
HVAC	4	1,471,836	1.6%	1.1%
Compressed Air	9	1,083,535	1.2%	14.9%
Fans	3	876,224	0.9%	0.0%
Controls	5	641,988	0.7%	4.1%
Total	**169**	**94,006,717**		

There were several very large VFD and refrigeration projects completed in PY2020. The projects, which saved between 7 million and 15 million kWh each, increased the VFD savings to 2.5 times higher than reported in PY2017. Refrigeration savings increased to four times the size of PY2017 savings. The refrigeration measures increased their overall weight in the program while the lighting and compressed air decreased significantly as a share of the program[1]. It is worth noting that all new lighting projects were transitioned to prescriptive programs in the spring of 2020. Lighting projects that were pre-approved prior were allowed to complete their projects within the Custom program. Controls and energy management also decreased as a percentage of the program, but the impact of the percentage adjustment was small on the overall performance of the program.

2.1.1 Marketing & Outreach

The Custom Projects program is promoted through IPC's existing account management and program management relationships with customers and trade allies, including engineers and equipment providers. The Custom Projects program utilizes a cohort system to focus outreach and participation for specific customer types to provide more meaningful projects.

Custom Projects engineers and key account energy advisors engaged in the following outreach activities in 2020:

- In-person and virtual visits to large commercial and industrial (C&I) customers to conduct initial facility walk-throughs, commercial/industrial efficiency program informational sessions, and training on specific technical energy-saving opportunities
- Sponsorship for the 2020 Idaho Rural Water Conference (in person) and the 2020 ASHRAE Technical Conference (virtual)
- Engineer presentations at the Cohort for Schools Mid-term and Final Workshops (virtual), Water Cohort Workshops (in-person and virtual), and the Eastern Oregon Operators Conference (virtual)

Cohort offerings are also driving a significant number of new projects in addition to increasing vendor engagement from the Streamlined Custom Efficiency (SCE) offering. Capital projects promoted or identified in strategic energy management offerings are reported and incentivized through other Idaho Power C&I programs, not as a cohort savings number. Current Cohort offerings include:

[1] Lighting savings actually increased over PY2017; however, the overall program savings increased which reduced the percentage of the program metric.

- The Municipal Water Supply Optimization Cohort (MWSOC)
- Wastewater Energy Efficiency Cohort (WWEEC)
- Eastern Idaho Water Cohort (EIWC)
- Continuous Energy Improvement (CEI) Cohort for Schools

In 2020, Idaho Power contractors completed 11 scoping assessments for Idaho Power customers. These assessments identified over 6,000 MWh of savings potential and will promote future projects.

Idaho Power presented large-format checks and publicized the events for interested customers, though interest was down during COVID-19. IPC also released a Water Supply Cohort Success Story brochure and a new Custom Projects tip sheet for underground water leaks.

2.1.2 Tracking & Reporting

The Project Pre-Approval and Payment Applications for the Custom Projects program collect information from the program applicant, including the following:

- Account information including business name and account number, installation address, and contact information
- Project description
- Estimated project costs and savings
- Project timeline information (dates)
- Payee information, if different from the account holder

This information is stored in the program tracking database, CLRIS. In addition to the information above, the CLRIS database includes:

- Project ID
- Customer rate class and SIC code
- Application and approval dates with Idaho Power contacts
- Measure description and category
- Gross kilowatt-hour savings estimates for application, post-install, and final
- Project cost and incentive amounts

2.2 EVALUATION ACTIVITIES

The evaluation activities conducted for the Custom Projects program are summarized in Table 3. Researchable issues and the sampling strategy for desk reviews and onsite visits are also discussed in this section.

Table 3. PY2020 Custom Projects program Evaluation Activities

Activity	Sample size	Objective
Interviews with program staff and engineers	3 interviews	Calls were completed to understand program design and delivery, obtain program staff perspective on program successes and challenges, and identify researchable issues. We included interviews with third-party engineering firms.
Review of program delivery and marketing materials	NA	Materials such as marketing brochures, program manuals, outreach plans, and the program website were reviewed for messaging and communication benefits.

Activity	Sample size	Objective
Tracking system review	NA	The tracking system was reviewed to determine if all necessary inputs are tracked and if reporting tools contain sufficient information for program review.
Desk reviews	27 projects	Review project documentation and calculations to assess the accuracy of savings claimed for each project. This included reviewing the custom calculators and the project documentation for agreement with guidelines for custom projects.
Equipment verification	8 projects	Although visits were originally planned, the evaluation team determined virtual verification was warranted given increasing COVID-19 variants. Sites were sampled to verify the installation of measures and check assumptions used in savings calculations. Eight projects received verification information by phone. We were unable to complete calls for two projects because of staff shortages and customers preferring to receive a list of email questions. The emails were not returned sufficiently completed to be valuable for impact evaluation.
Consumption Analysis verification	2 projects	Two projects were selected for review of consumption data to identify energy savings.

2.2.1 Evaluation Goals

The following impact evaluation goals were addressed through the various evaluation activities:

- Determine and verify the energy (kWh, kW) impacts attributable to the 2020 program. Ex-ante savings estimates are determined using various sources, including internal/external engineering calculations, the Regional Technical Forum (RTF) deemed savings, and program technical reference manuals (TRMs).
- Provide credible and reliable program energy and non-electric impact estimates and ex-post realization rates attributed to each program for the 2020 program year through engineering analysis, desk review, and site visits.
- Document the status of the electronic documentation to meet the needs of energy efficiency calculations.
- Provide recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.

The following process evaluation goals were addressed through the various evaluation activities:

- Determine if IPC follows program design and implementation best practices, including program mission, logic, documentation, management, training, and reporting.
- Gather feedback from both participants and trade ally experiences with the program to establish satisfaction levels and suggestions for improvements.

Investigate the integration of the Retrofits and New Construction tracks of the program and identify opportunities for better integration.

3.0 IMPACT EVALUATION

The following sections provide a detailed review of the impact evaluation methodology, evaluation results, and recommendations from the evaluation activities.

3.1 METHODOLOGY

The impact methodology consisted of the five primary evaluation activities shown in Figure 3. Each activity is explained in more detail below.

Figure 3. Process for Verifying Program Savings

Data Review and Sampling

Idaho Power program staff made the following files available to the Tetra Tech team for review.

General materials:

- Custom Project database for 2020
- Non-lighting Pre-Approval and Payment Application forms
- C&I EE Programs Policy and Procedures Manual 2020

Individual project files for sampled projects

- Applications
- Submitted project documents
- Savings estimation files/calculators/reports
- M&V reports, IPC internal reviews and reports, QA/QC notes, site inspection notes, and photographs

Most of the review was based upon project files securely delivered to the evaluation team by an internet-based file-sharing site that required log-in access. The documentation downloaded included the necessary files except for the savings calculators. The calculators were delivered via the same online file-sharing site.

Table 4. PY2020 Custom Projects Sampling Summary

Sampling stratum	Service points (Unique qty.)	Total projects (Total qty.)	Sample service points	Sample projects (Total qty.)	Sample kWh savings percentage
Refrigeration	18	18	4	4	26.1%
VFD	12	15	6	7	25.4%
Other & Motors	3	3	2	2	9.6%
Lighting	43	89	3	4	2.0%

Sampling stratum	Service points (Unique qty.)	Total projects (Total qty.)	Sample service points	Sample projects (Total qty.)	Sample kWh savings percentage
Energy Management Cohort	11	11	4	4	0.5%
Streamlined (Comp. Air, Fans, Pumps)	19	20	2	2	0.4%
Custom (HVAC, Controls, Comp. Air, Pumps)	12	13	4	4	0.8%
Total	**103**[2]	**169**	**18**	**27**	**64.9%**

Sampling was conducted to select individual projects within each sampling stratum. Once the project was sampled, additional projects or measures at the service point[3] were incorporated into the sample, which increased the number of projects or measures sampled and the number of service points per sampling stratum. However, the overall sample of service points did not increase. This process resulted in the selection of 27 projects at 18 unique locations.

Two projects were required in the sample to meet the 90/10 precision requirements; a new construction food processing facility and an industrial facility with major renovations at a campus. Together, these participants account for 59% of the claimed program savings and will heavily weigh into the program's overall precision and realization rate. The remaining projects were sampled randomly from each stratum.

Complete Desk Reviews

Tetra Tech staff conducted desk reviews of the sampled project files. This engineering documentation review was conducted to describe the project, confirm tracking data, identify key assumptions, and determine critical questions before the site verification phase.

Conduct Site Verification

The evaluation team provided Idaho Power Energy Advisors with 15 of the 18 service points, and they initiated outreach to the participants to introduce the evaluation team. Participants were asked to schedule a site verification for the week of January 10, 2022. Of the three sites not provided to energy advisors, one site was identified by Idaho Power that would not allow access for the project. The other two sites were removed to verify savings using a consumption analysis on the interval data.

Initially, sites were scheduled for in-person visits. But with COVID-19 variants increasing in prevalence and respect for the nature of the processing facilities that we were reviewing, Tetra Tech and Idaho Power decided to switch to virtual visits. A combination of Teams meetings, emails, and consumption analysis was used to verify the necessary information for each site. Tetra Tech engineers conducted each site verification, and Idaho Power staff were invited to attend the verification meetings.

The site verification inspectors interviewed the participant to identify the operation of the equipment and the most relevant specifications for the energy efficiency calculations. Verifying key operating

[2] There are 103 unique service points for PY2020 program & 18 in the sample, but some fall into multiple categories and therefore the sum of the column is more than the total shown.
[3] Each service point is a facility located at a unique address.

assumptions and equipment performance confirms the installation and attention to the operating parameters. The evaluation inspectors asked key questions to confirm assumptions and determine satisfaction with the program process.

Verify kWh Savings

The final step of the impact evaluation combined desk review and site verification information to provide quality assurance for each reviewed project, describe any revisions to project assumptions and actual conditions, and update calculations to finalize evaluated savings.

The data gathered from the site verifications was reconciled with the information from the initial desk reviews. Eight service points had a completed desk review and site verification. Two additional service points had a consumption analysis completed, and the remaining eight service points had only a desk review completed. We reviewed multiple measures and projects for service points that had more than one, resulting in the review of 27 measures as shown in Table 5.

Table 5. PY2020 Custom Project Review Summary

Sampling stratum	Reviewed addresses	Evaluated projects	Evaluated kWh percent of program	Evaluated kWh savings
Refrigeration	18	4	26.1%	24,568,611
VFD		7	25.4%	23,905,463
Other & Motors		2	9.6%	9,068,218
Lighting		4	2.0%	1,887,894
Energy Management Cohort		4	0.5%	443,768
Streamlined (Comp. Air, Fans, Pumps)		2	0.4%	351,519
Custom (HVAC, Controls, Comp. Air, Pumps)		4	0.8%	820,545
Total	**18**	**27**	**64.9%**	**61,046,018**

3.2 IMPACT REVIEW RESULTS

Overall, the evaluation found that the Custom Projects portion of CIP had an impact realization rate of 99.8 percent with relative precision of 0.84 percent at the 90 percent confidence interval. The overall and measure category realization rates are shown in Table 6.

Table 6. PY2020 Realization Rates of Sampled Projects

Measure	Ex-Ante kWh	Ex-Post kWh	Realization Rate
Refrigeration	24,568,611	24,504,356	99.7%
VFD	23,905,463	24,084,356	100.7%
Other	9,068,218	8,862,126	97.7%
Lighting	1,887,894	1,876,531	99.4%
HVAC	504,749	504,749	100.0%
Energy Management	443,768	443,768	100.0%

Measure	Ex-Ante kWh	Ex-Post kWh	Realization Rate
Fans	351,519	318,910	90.7%
Controls	189,265	188,425	99.6%
Pump	126,531	121,118	95.7%
Overall	**61,046,018**	**60,904,339**	**99.8%**

The overall realization rate for the 2020 Custom Projects is nearly 100 percent and less than one percent different from the previous evaluation. But we identified during the last evaluation that the variability of the project realization rates was a concern and added risk to the program. This year's evaluation results are different because there is less variability in the individual project results, with most close to 100 percent.

3.2.1 Refrigeration

Refrigeration projects account for 32 percent of the 2020 Custom Projects savings. The sample included four projects which accounted for 40 percent of the sampled kilowatt-hours. Two projects were retrofits of existing refrigerated facilities, and two were new construction low-temperature facilities. Table 7 shows the realization rates for the savings claimed is nearly 100 percent for all projects.

Table 7. PY2020 Custom Refrigeration Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
1948	15,645,820	15,645,824	100.0%
2392	7,994,418	7,994,418	100.0%
2410	630,547	628,729	99.7%
2646	297,826	235,385	79.0%
Overall	**24,568,611**	**24,504,356**	**99.7%**

Food storage refrigeration requires many assumptions based upon the heat load of the food brought into storage and the individual setting of the refrigeration heat transfer fluids. Overall, the evaluation team found that the assumptions were conservative for the baseline condition. The post-install condition was well documented and supported by the site verifications completed.

Project ID 1948: This is a new construction potato processing facility that installed a quick freeze tunnel for freezing potato products. A total of six upgrades were completed to the refrigeration system of the tunnel. This project had an email exchange of questions for verification, although the participant staff could not complete the responses because of staffing concerns. The calculations used Micro-AXCESS modeling software with historical utility data, equipment specifications, and spot logged data to support assumptions. The baseline model efficiency was consistent with standard ammonia refrigeration efficiency, which correlates to the use of conservative assumptions. The evaluation team agreed with the upgraded system model and the baseline assumptions, and the realization rate is 100 percent.

Project ID 2392: This is a new construction cold storage facility that completed a ground-up analysis to reduce the exterior wall space, install advanced controls, and use more efficient equipment. Overall, there are 11 energy efficiency improvements calculated. The evaluation team completed a consumption analysis to confirm the energy model of the facility. The evaluation team agrees with the modeled calculations as submitted, and the consumption analysis indicates that the energy savings calculations are accurate. It is noted that the interval consumption data showed an increase in energy consumption

12 months after project start-up, which equates to over a doubling of the refrigeration load if all equipment operations remained the same. The period outside the 12 months is typically outside the performance period, so this was not incorporated in the evaluation savings. The evaluation team found a realization rate of 100 percent.

Project ID 2410: The site is a frozen food manufacturing facility that installed VFD on existing compressors for an ammonia refrigeration system in Building #2 and replaced ceiling insulation and a condenser for an R22 refrigeration system in Building #1. A site verification was conducted and found one adjustment to plant operating hours. The ammonia system calculation used existing operating setpoints and estimated compressor motor efficiencies and refrigeration load profiles to create an hourly energy model to estimate the system baseline energy consumption. The upgraded equipment efficiencies and controls setpoints were entered into the model to develop the post-install energy consumption. The EM&V review found that the calculator is acceptable. The R22 calculation is based on the heat load reduction of the building shell insulation improvement. The reduced heat load was applied to the R22 system estimated operating efficiency under plant operating load and non-operating load. EM&V upgraded the model to use the TMY3 hourly weather data file. The combination of these two adjustments slightly reduced energy savings to 99.7 percent.

Project ID 2646: The site is a dairy plant that replaced an existing refrigeration condenser with a larger one, which reduced the required total energy usage of the condenser fans and compressors upstream of the condenser. A site verification was conducted and found no adjustments to the project documentation. The calculation used existing operating setpoints and estimated compressor motor efficiencies and refrigeration load profiles to create an hourly energy model to estimate the system baseline energy consumption. The upgraded equipment efficiencies and controls setpoints were entered into the model to develop the post-install energy consumption. The EM&V review found that the calculator is acceptable. However, the model included several incorrect cell calculation links. The evaluation adjusted the calculator links, leading to a 79 percent realization rate.

3.2.2 Variable Speed Drives

Variable speed drive projects account for 34 percent of the 2020 Custom Projects savings. The sample included seven projects which accounted for 39 percent of the sampled kilowatt-hours. Two of the projects claimed 12 million and 8 million kilowatt-hours per year, respectively, and accounted for nearly all the VFD claimed efficiency savings. The overall realization rate in Table 8 for the savings claimed is slightly higher than 100 percent.

Table 8. PY2020 Custom VFD Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
2508	12,069,452	12,064,156	100.0%
1961	8,856,181	8,856,181	100.0%
2314	1,800,796	1,800,796	100.0%
2345	766,959	992,554	129.4%
2583	152,529	111,123	72.9%
2454	148,542	148,542	100.0%
2405	111,004	111,004	100.0%
Overall	**23,905,463**	**24,084,356**	**100.7%**

Variable speed drive projects are installed in various locations and facility types. Overall, the calculations provided document the existing and post-install operating conditions. However, market partners who are infrequent contributors to the Custom Projects program completed several of the submittals. The results for these projects were more likely to have calculation adjustments. EM&V found that the assumptions made were conservative for the baseline condition. The post-install condition was well documented and supported by the site verifications completed.

Project ID 2508: The project installed VFDs on pumps and fans at the new central utility plant (B39) and the new R&D manufacturing facility (B51) at an industrial campus. A site verification call was attempted for this facility, although staffing shortages required that the verification questions be submitted through email. The email responses were not returned because of increasing staff shortages. The project was expected to include VFDs on 9,116 horsepower of motors. The project started in 2018 and used the Idaho Power Technical Reference Manual (TRM) that was valid for that time, which included a prescribed value for VFDs installed in industrial facilities. This method was chosen due to its simplicity and its conservative nature. However, Idaho Power completed a third-party verification post-install to confirm the large savings amount was reasonable. This post-install identified a portion of motors was not installed and that the energy savings for a sample of the motors were reasonable. The evaluation team agrees with the verification report. The evaluation team did identify two pumps that were smaller than 5 kilowatts, and therefore, were not eligible for the TRM incentive value. The small change reduced savings slightly, but the realization rate applied to the project is 100 percent.

Project ID 1961: The project was completed at a new construction potato processing facility with 888 motors that installed VFDs and supporting PLC controls, and high-efficiency gearboxes were installed on the potato transport equipment. A site verification call was attempted for this facility, although staffing shortages required that the verification questions be submitted through email. The email responses were not returned because of increasing staff shortages. The calculation assumed the hours of operation for processing and ventilation equipment and assumed that all motor requirements operate at a constant speed. The baseline assumed a conservative load factor, and the setpoints were measured during operation for the post-install condition. Some points were spot metered during verification to confirm the actual energy use of key equipment. The evaluation team agrees with the calculations and assumptions, and the realization rate is 100 percent.

Project ID 2314: The project expanded the operation of a raw milk processing facility. The project installed VFD on pumps throughout the facility. The evaluation team completed a consumption analysis on the interval consumption data from the facility to identify energy savings and consumption patterns matching the calculations. The calculation included daily hours in production, cleaning, and other operating profiles. Each pump was matched to one of the operating profiles, and the measured VFD setting was applied.

The consumption analysis identified the consistent pattern of operation detailed in the calculation. It also found a significant increase in maximum kilowatt demand starting in 2020, indicating the processing rate is increasing. It was also noted that the daily shutdown for cleaning had become more defined increasing energy efficiency as the plant operated longer. The evaluation team is confident the energy savings calculated are conservative based on the long-term consumption data analyzed, and the realization rate is 100 percent.

Project ID 2345: The project installed VFDs on the 700 HP forced draft fan, and two 200 HP boiler feed water pumps at an industrial facility. The calculations used short-term monitoring to create an average load for the fan and pumps. This average load was multiplied by the two operating conditions to determine savings. The evaluation team utilized short-term monitoring to create an annual hourly load profile. The energy consumption was determined using the pump curve, and the resulting energy savings was higher than the ex-ante savings and resulted in a 129 percent realization rate.

Project ID 2583: The project installed variable frequency drives (VFDs) on a total of eight pumps at a new construction well-pumping facility and booster pump facility for a city water department. The evaluation team completed a site verification phone call and determined that the expected load for the pumping system has not yet been required. The booster station was just turned on in the last two months. The evaluation team did not adjust the expected load in the calculations because projections are still on track for the municipality but are being realized slower than expected. The calculation used estimated pump curves to determine the pump shaft power for the water demand projection. The evaluation team adjusted the calculation to add the motor and VFD efficiency into the energy consumption, removed a 0.95 multiplier that was adjusting for a future booster station, and reduced the number of days in the annual profile to 365. Overall, these adjustments resulted in a realization rate of 73 percent.

Project ID 2454: The site is an industrial food processing facility that upgraded emergency exhaust fans in the Ammonia Refrigeration Room by putting VFD and occupancy sensors on fans. A site verification found that the control system and equipment are operating as documented. The calculation identified the difference between one fan operating 24 hours a day compared to an average of 1.25 hours per day when connected to the occupancy sensor. The second fan is considered for emergency use only in both models. The evaluation team agrees with the calculation, and the realization rate is 100 percent.

Project ID 2405: The site is an industrial food processing facility that added VFDs to fans and pumps associated with the roasted vegetable line. The site verification identified that this project is being removed and relocated to another food processing plant. The participant has already contacted Idaho Power to determine the best course of action of removing the project before the five-year term of the incentive agreement is compete. The evaluation team determined that the first-year savings are valid and evaluated as the processing line remains in place. The calculation measured actual VFD setpoints during operation to determine post-install calculation. The baseline was determined using the pumps at full power with an 80 percent load factor. The evaluation team agreed with the energy savings, and the realization rate is 100 percent.

3.2.3 Other

The Other project category includes two projects accounting for 10 percent of the 2020 Custom Projects savings. The sample included two projects which accounted for 15 percent of the sampled kilowatt-hours. The overall realization rate in Table 9 for the savings claimed is 98 percent.

Table 9. PY2020 Custom Other Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
1953	7,650,517	7,650,517	100.0%
2396	1,417,701	1,211,609	85.5%
Overall	**9,068,218**	**8,862,126**	**97.7%**

The other project category for projects included industrial water treatment. One project had some VFDs as a secondary measure that the evaluation team categorized in the Other category to keep them with the main unit. Overall, the calculations provided document the existing and post-install operating conditions. One of the projects had an interactive effect that was not applied. The evaluation team did not complete site verifications for these projects; for one their staff were too busy and the other would not allow anyone on site.

Project ID 1953: A new facility was constructed at a food processing campus that required well water to be treated for operations. A site verification call was attempted for this facility, although staffing shortages required that the verification questions be submitted through email. The email responses were not returned because of increasing staff shortages. The evaluated savings documented the assumptions and flows associated with the project's water reduction and wastewater treatment components. The baseline was developed using the operating profiles of two other similar facilities on campus. Data logging was conducted on the new facility to identify key energy consumption components, including the aeration basin blowers and booster pumps. The energy savings was the difference between the measured energy consumption post-install and the baseline facility. The evaluation team agreed with the approach and calculation, and the realization rate is 100 percent.

Project ID 2396: The project expanded a raw water treatment system at an industrial facility. The project replaced an existing skid-mounted treatment system with a different treatment system type and increased the size by five times. The energy calculations found the energy savings from the skid-mounted systems based on an M&V period of parallel operation. Supplementary equipment energy efficiency improvements were calculated based upon the system's requirements. EM&V agrees with the baseline and post-install measurements and documented assumptions. However, the calculation for pumps supporting the skid-mounted system used the baseline of higher pressure necessary for the old skid system, although the pressure reduction energy savings already accounted for the pressure reduction in the skid-mounted calculation. Adjusting the baseline operating pressure to match the new system requirements resulted in a realization rate of 86 percent.

3.2.4 Lighting

Lighting projects account for 13 percent of the 2020 Custom Projects savings. The sample included four projects which accounted for three percent of the sampled kilowatt-hours. The projects sampled were located at three sites that completed at least one other non-lighting project. Table 10 shows realization rates for each project, with the total realization rate for lighting savings claimed at 99.4 percent.

Table 10. PY2020 Custom Lighting Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
2564	1,180,596	1,148,188	97.3%
2559	511,759	525,447	102.7%
2081	187,103	194,461	103.9%
1703	8,436	8,435	100.0%
Overall	**1,887,894**	**1,876,531**	**99.4%**

The lighting project category was included in the Custom Projects program because lighting upgrades were being completed at the same time as other projects. Idaho Power has transitioned all lighting projects to prescriptive programs at this point. Overall, the calculations provided document the existing and post-install operating conditions.

Project ID 2564: The retrofit replaced the lighting with DLC, or ENERGY STAR-qualified LED lighting at a food processing facility. A site verification call was attempted for this facility, although staffing shortages required that the verification questions be submitted through email. The email responses were not returned because of increasing staff shortages. A total of 4,266 lighting fixtures were installed using a lighting inventory calculator and the assumed 8,760 hours per year. The evaluation team determined that fourteen lighting models required an adjusted wattage which had the overall effect of reducing the energy savings. The realization rate is 97 percent.

Project ID 2559: The retrofit replaced exterior metal halide lighting with LED lighting and controls at a hospital. The energy savings calculation used the 2018 Idaho Power Lighting Tool. The evaluation team updated the lighting tool to use the 2021 version, which increased savings slightly with the same information. The realization rate is 103 percent.

Project ID 2081: The retrofit replaced interior metal halide lighting fixtures with DLC qualified LED lighting fixtures at a food processing facility. A site verification call was completed, and the participant confirmed the baseline metal halide lighting fixtures from records and confirmed the current operation of the LED fixtures. The calculation used the Idaho Power Lighting Tool to determine savings. The evaluation team adjusted one lighting fixture wattage to match the DLC Certification, which increased savings slightly and resulted in a realization rate of 104 percent.

Project ID 1703: The retrofit replaced interior T12 fluorescent lighting with DLC qualified LED lighting fixtures at a food processing facility. A site verification call was completed, and the participant confirmed the baseline T12 lighting from memory and confirmed the current operation of the LED fixtures. The calculation used the Idaho Power Lighting Tool to determine savings. The evaluation team found that all lighting fixture wattages matched the DLC Certification. The resulting realization rate is 100 percent.

3.2.5 HVAC

HVAC projects account for one percent of the 2020 Custom Projects savings. The sample included one project, which accounted for less than percent of the sampled kilowatt-hours. Table 11 shows the realization rate for the savings claimed is 100 percent.

Table 11. PY2020 Custom HVAC Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
2096	504,749	504,749	100.0%

The HVAC project category includes a minimal number of custom projects. Most are routed through the prescriptive program or categorized based on the VFD or Controls. Overall, the documentation supports the calculations.

Project ID 2096: The project installed a centralized chiller and cooling tower to replace an existing central chiller and cooling tower and a series of distributed air-cooled chillers. The improvement increased the cooling efficiency but increased the distribution equipment's energy consumption, including chilled water pumps. The energy calculation was based on the load difference between a baseline and post-install eQuest model. The model was calibrated to the 24-month historical consumptions, and the resulting chilled water load profile was used to calculate the energy savings difference between chilling systems. The Trane Chiller Plant Analyzer identified the energy use for the chillers, cooling towers, chilled water pumps, and condenser water pumps for both the baseline and retrofit conditions. The evaluation team agreed with the modeling, and the realization rate is 100 percent.

3.2.6 Energy Management

The energy management projects are part of the Water Supply Optimization Cohort (WSOC). These projects account for about 2 percent of the 2020 Custom Projects savings. The sample included four projects which accounted for less than one percent of the sampled kilowatt-hours. Three of the projects were in year 3 of participation, and one was in year 2 of the program. Table 12 shows the realization rate for the savings claimed is 100 percent.

Table 12. PY2020 Custom Energy Management Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
1968	243,184	243,184	100.0%
2662	88,670	88,670	100.0%
2659	86,993	86,993	100.0%
2654	24,921	24,921	100.0%
Overall	**443,768**	**443,768**	**100.0%**

The cohort offerings focus on changing the behavior of municipal departments to look at their operations, and future building plans to consider the energy consumption impacts of decisions. The participants interviewed by the evaluation team indicated that participation in the program had improved their decision-making and operations within the department. Each participant tracks the energy consumed and gallons pumped/treated at various locations in their system. These values are tracked internally and delivered to Idaho Power implementers to calculate monthly energy savings based on the baseline metric. Capital projects which create energy efficiency savings with Idaho Power projects are subtracted from the cohort results.

Project ID 1968: This project is a municipality that participated in the Water Supply Optimization Cohort (WSOC). Participation started in early 2018. This city has nine groundwater wells with total annual use of approximately 1.3 billion gallons of water. The goal of the WSOC is to identify and implement energy savings projects related to the water supply distribution system in the city. The evaluation team completed a site verification call with the municipality and found that the energy savings are happening because of the process implemented through the cohort. They expect to continue to see improvement in the department's energy consumption and are continuously looking for more ways to improve. The calculations are completed by a third-party engineer who receives the monthly data. The baseline energy and water load were captured from 2016 and 2017. The cohort began measurement in 2018, and 2020 is the second year of participation. The list of improvements completed is reflective of the energy savings seen in the monthly metric (kWh/MG). The realization rate is 100 percent.

Project ID 2662: This project is a municipality that participated in the Water Supply Optimization Cohort (WSOC). Participation started in 2016. This city has eight groundwater wells with total annual use of approximately 1.6 billion gallons of water. The goal of the WSOC is to identify and implement energy savings projects related to the water supply distribution system in the city. The calculations are completed by a third-party engineer who receives the monthly data. The baseline energy and water load were captured from 2013 through 2015. The cohort began measurement in 2016, and 2020 is the third year of participation. The list of improvements completed is reflective of the energy savings seen in the monthly metric (kWh/MG). The realization rate is 100 percent.

Project ID 2659: This project is a municipality that participated in the Water Supply Optimization Cohort (WSOC). Participation started in late 2015. This city has six groundwater wells with total annual use of approximately 960 million gallons of water. The goal of the WSOC is to identify and implement energy savings projects related to the water supply distribution system in the city. The calculations are completed by a third-party engineer who receives the monthly data. The baseline energy and water load were captured from 2013 through 2015. The cohort began measurement in 2016, and 2020 is the third year of participation. The list of improvements completed is reflective of the energy savings seen in the monthly metric (kWh/MG). This participant completed capital projects outside the cohort energy savings calculation, and IPC correctly handled those projects to ensure no overlap. The realization rate is 100 percent.

Project ID 2654: This project is a municipality that participated in the Water Supply Optimization Cohort (WSOC). Participation started in early 2016. This city has five groundwater wells with total annual use of approximately 135 million gallons of water. The goal of the WSOC is to identify and implement energy savings projects related to the water supply distribution system in the city. The evaluation team completed a site verification call with the municipality and found that the energy savings are happening because of the process implemented through the cohort. They described the cohort as critical to incorporating new growth and operating efficiently when fire pumps are not on. They expect to continue to see improvement in the department's energy consumption and are continuously looking for more ways to improve. The calculations are completed by a third-party engineer who receives the monthly data and operates two models (east and west). The baseline energy and water load were captured from 2013 through 20115. The cohort began measurement in 2016, and 2020 is the third year of participation. The list of improvements completed is reflective of the energy savings seen in the monthly metric (kWh/MG). The realization rate is 100 percent.

3.2.7 Fan

Fan projects account for less than one percent of the 2020 Custom Projects savings. The sample included one project, which accounted for less than one percent of the sampled kilowatt-hours. The realization rate for the savings claimed is 100 percent, as shown in Table 13.

Table 13. PY2020 Custom Fan Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
2463	351,519	318,910	90.7%

The fan project category included a new construction building that required sophisticated ventilation. The project used an augmented potato storage energy calculator tool, a good tool for process systems requiring ventilation. However, the uncertainty around the unique operations of the facility led to lower savings.

Project ID 2463: The project was a new construction advanced bee storage facility that included several energy-efficiency upgrades. The calculations focused on the ventilation and climate control system and were submitted as a streamlined application. The evaluation team completed a site verification call with the owner and identified that the expected operating conditions changed after operating the facility for two seasons. The number of bee colonies, storage season time estimates, and bee ventilation requirements were updated to reflect actual site conditions, which resulted in decreased fan VFD and EEV savings. In addition, the evaluation team updated the weather data file to use the 2005 TMY3 from Burley Municipal Airport per the TRM directive. The combined effect of these adjustments resulted in a realization rate of 91 percent.

3.2.8 Controls

Controls projects account for less than one percent of the 2020 Custom Projects savings. The sample included two projects which accounted for less than one percent of the sampled kilowatt-hours. Table 14 shows the realization rate for the savings claimed is 99.6 percent.

Table 14. PY2020 Custom Controls Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
1722	178,310	178,310	100.0%
2069	10,955	10,115	92.3%

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
Overall	**189,265**	**188,425**	**99.6%**

The sampled controls projects included controls as part of upgrading other equipment. The projects were not solely control upgrades or commissioning. However, both project results rely heavily on the controls for energy efficiency. They could easily be categorized as another measure type. Regardless of categorization by the IPC team, the documentation supports the calculations.

Project ID 1722: The retrofit expanded the capacity of a wastewater treatment facility UV Disinfecting, by installing a second bank with increased controls to manage the flow and lighting concurrently. The energy efficiency is determined by calculating the energy intensity (kWh/mgd) for the existing and new UV lights and then multiplied by the average flow rate to get the final energy savings. The existing UV light energy intensity is calculated by taking the total energy consumption of the old UV lights and dividing it by the average daily flow rate in 2017. The retrofit UV light energy intensity is calculated from the short-term data logging of power draw from each UV bank for one month and dividing by the average daily flowrate for that time period. The energy savings intensity (kWh/mgd) difference is then multiplied by the 2020 flow rate to achieve the ex-post energy savings. The evaluation team had minimal adjustments to the calculation, and the realization rate is 100 percent.

Project ID 2069: The site is a municipal sewer plant that upgraded the powered ventilation system by putting VFDs and occupancy sensors on exhaust fans. The calculation identified the difference between one fan operating 24 hours a day at full evacuation air changes compared to 50 percent of the air changes per hour when unoccupied and full air changes per hour when occupied. It is expected that the facility will be occupied less than one hour per day. The evaluation team agrees with the calculation approach, although the pump affinity laws were applied without conservative factors. The evaluation team found that the unoccupied horsepower requirement is higher than expected, which reduces energy savings. The realization rate is 92 percent.

3.2.9 Pump

Pump projects account for two percent of the 2020 Custom Projects savings. The sample included one project, which accounted for less than one percent of the sampled kilowatt-hours. Table 15 shows the realization rate for the savings claimed is 96 percent.

Table 15. PY2020 Custom Pump Impact Results Summary

Project ID	Claimed kWh	Evaluated kWh	Realization Rate
2558	68,513	68,513	100.0%
2516	58,018	52,605	90.7%
Overall	**126,531**	**121,118**	**95.7%**

The pump applications were both submitted as streamlined applications. While both reviewed projects reduced the pump size in a retrofit application, one of the projects created savings primarily through a VFD. Although the project could be categorized, the energy calculation results worked well within the streamlined program. Overall, the documentation supports the calculations.

Project ID 2558: The project installed two 15 HP pumps with VFDs to provide a 12-story multifamily building with increased water pressure. This project was submitted as a streamlined application. The evaluation team completed a site verification with the participant representatives and building manager, which verified the pressure setting matched the documentation and that the pump hours appeared consistent with operations. Baseline energy consumption was developed from short-term monitoring of the existing pump. The upgraded system consumption was also developed based on short-term monitoring. The evaluation team agreed with the calculation process and verified that the current operation matches the short-term monitoring. Therefore, the realization rate is 100 percent.

Project ID 2516: The project replaced a 40 HP effluent pump at a municipal wastewater treatment plant with a 15 HP pump. This project was submitted as a streamlined application. Baseline energy consumption was calculated by first conducting a linear regression on current and flow rate, dividing the daily flow rates into 12 bins, then counting the number of days/hours the old pump operated within each bin during 2018. The post-install file used the same bins with the pump curve to determine pump efficiency and ultimately energy consumption of the new system under similar conditions. The evaluation team adjusted the calculation to determine the energy consumption in hourly intervals. The resulting calculation decreased savings to a realization rate of 91 percent.

3.3 REVIEW OF PY2017 IMPACT RECOMMENDATIONS

As part of the impact evaluation, Tetra Tech reviewed IPC's progress against the recommendations made during the last impact evaluation of the 2017 program. The table below highlights IPC's actions to address each of the previous impact recommendations.

Table 16. PY2017 C&I Custom Projects Program Recommendations

Category	Key finding and recommendation	PY2020 implementation	Status
Electronic Files and Calculators	Idaho Power should collect and file the Excel calculators.	The Custom Projects program transitioned well to fully digital files, although the third-party engineering companies still hold the original files. All documents were easily accessible by IPC staff and the third party.	Complete
Post-Install Verification	The engineering team should identify customers for post-verification visits to discuss control settings and the potential adjustment impacts.	The Custom Projects program implemented third-party verification for most projects in PY2020. The verification was well received by the participants and captured the operating parameters or equipment and controls after the initial start-up of the custom installation	Complete
Streamlined Applications	The evaluation found that the assumptions for the streamlined projects resulted in more variation from actual conditions than their more "custom" counterpart projects. Idaho Power should continue to monitor the benefits of the process efficiency with the potential variation in savings rigor.	The IPC Custom Projects program has continued to identify streamlined project types and transferred some previously custom projects to the prescriptive program. These efforts have decreased the administrative burden for some projects and eliminated custom program interaction with some customer types.	Actively addressing
Cohort Program	Continue close communications with Wastewater Cohort contacts.	The cohort group expanded beyond the municipal wastewater departments in PY2017 to include municipal water departments. Participants indicated that although	Complete

Category	Key finding and recommendation	PY2020 implementation	Status
		communication with Idaho Power has decreased, they have a clear understanding of their objectives and can operate more independently. They also have a better understanding of when contacting IPC staff is necessary. The adjusted communication protocols are working well.	
Calculation improvements	Use Regional Technical Forum (RTF) method for New Construction Baseline.	New Construction baselines are individually developed by the third-party verification partner or through the use of the updated TRM. Baselines are more consistent and well documented.	Complete
	Use rated capacity and wattage for equipment.	Rated capacity was consistently used in calculations	Complete
	Consider requiring a pump curve submission for pumping projects.	Pump curves were consistently documented and used in project calculations.	Complete
	Monitor specific dairy projects for adjustments to incoming milk temperature.	No dairy projects were reviewed in this evaluation.	N/A

4.0 PROCESS EVALUATION

The following sections provide a detailed review of the process evaluation methodology, evaluation results, and recommendations from the evaluation activities.

4.1 METHODOLOGY

The process methodology consisted of the four primary evaluation activities shown in Figure 4. Each activity is explained below.

Figure 4. Process Evaluation Activities

Materials Review

Tetra Tech read the *Idaho Power Commercial and Industrial Energy Efficiency Policies and Procedures Manual* dated January 2021. We also reviewed the program logic model developed in 2018 for the entire CIP at the time, including Retrofits, New Construction, and Custom Projects components.

Program staff interviews

Idaho Power staff responsible for the program delivery provided Tetra Tech staff with an overview of the program design, objectives, staffing, outreach, procedures, tracking, and achievements. Idaho Power program staff also responded to evaluation questions and provided requested materials.

Third-party engineer interviews

Idaho Power works with three external engineering firms to provide audits and M&V services for the C&I Custom component. We reached out to all three firms and completed interviews with two. The two firms we interviewed provide the bulk of the audits and M&V required for Custom projects.

Participant interviews

Once desk reviews were completed, participants were contacted for clarifications regarding the equipment they installed and to ask them a series of process questions. The process topics included (1) how they learned about Custom Projects, (2) who assisted them in scoping their projects and filling out the application, (3) their satisfaction with several aspects of participation, (4) what they liked best about their experience, and (5) anything they would recommend improving about the program. We received feedback from ten participants through phone calls and emails.

4.2 PROCESS REVIEW RESULTS

Idaho Power follows program management best practices with a program manual and logic model developed for the CIP suite of programs. Communication with third-party engineering firms is working well, and IPC has developed strong relationships with both engineers and customers.

4.2.1 Materials Review

Tetra Tech reviewed both the 2020 and 2021 versions of the *Idaho Power Commercial and Industrial Energy Efficiency Policies and Procedures Manual*. The 2020 version was updated through November of 2019, and the 2021 version was updated in January 2021. Edits to the manual included slight customer eligibility changes and equipment adjustments.

The program manual includes a good overview of all CIP offerings from Idaho Power. In addition, it offers sufficient detail for each major component (Custom, Retrofits, and New Construction), such as pre-approval and payment application processes and inspection requirements. Other commercial offerings, including Energy Assessments, Energy-Saving Kits, Flex Peak, Green Rewind, and Technical Training, are briefly described for the reader.

The IPC contact information and revision history sections are also beneficial to both internal utility and external partner and customer users. Other resources listed include approximately 25 organizations like ASHRAE, ENERGY STAR®, and Integrated Design Labs.

The primary program manual sections include the following:

1. Program Overview - including eligibility requirements
2. Program Offerings - Retrofits, New Construction, Custom Projects, Additional Offerings
3. Steps to Participate - Lighting retrofits, Non-lighting retrofits, New Construction
4. Custom Projects - steps to participate
5. Energy Efficient Assessments
6. Inspections, Measurement and Verification
7. False Information
8. Pre-Approval
9. Satisfaction of Customers
10. Program Staff Contact Information
11. Commercial & Industrial Energy Efficiency Program Terms and Conditions
12. Other Resources
13. Review and Revision History

Our review of the CIP logic model developed in 2018 shows that the CIP's Custom component closely follows the program design and delivery steps laid out in the logic model. The major steps of (1) project identification and outreach, (2) pre-approval applications, (3) IPC project review, (4) project implementation, and (5) customer final application, are all in line with the current program delivery as outlined in the program policies and procedures manual.

In addition, the short and long-term outcomes of the program are being realized. As mentioned in the impact evaluation section of the report, confirmed or adjusted energy savings are accurately tracked. We also found that another key outcome was realized. The outcome "measures are identified for movement to prescriptive after sufficient project track record" has occurred with the shift of lighting measures to the Retrofits component of CIP.

Realizing these outcomes may require adjustments to outputs in other areas of the program logic model to update it to reflect current delivery practices. For instance, in the pre-approval application phase, IPC continues to enter pre-approval application information in CLRIS. However, lighting projects from the IPC lighting team may no longer be sent to Custom but be passed to Retrofits instead.

As part of the impact review process, we attempted to identify whether Custom projects were new construction or equipment replacement. It would be helpful to add a clarifying field to the Custom Projects application to clearly identify the type of project. This information on the application form will allow for distinct tracking of the type of projects receiving Custom incentives and facilitate communication with customers and engineers. We recommend updating the logic model's Pre-approval Applications output field.

Another output of the pre-approval application activity stage of the logic model was routing projects to the Retrofits or New Construction component of CIP if that was more appropriate. At this stage of the application process, it would be beneficial to increase the amount of communication between IPC, third-party engineers, and customers to ensure all parties know where a program may be routed and how that will impact the services and incentives for the project. This funneling of projects is appropriate and output of both the Custom and New Construction program pre-approval application processes. However, the third-party engineers mentioned it as one of the potential improvements in communication that could clarify project status.

4.2.2 Interview Engineers

We contacted the three engineering firms Idaho Power provided and completed interviews with two of them in November 2021. The two firms we interviewed understand their roles and responsibilities, conducting the bulk of the scoping assessments and M&V required for Custom projects.

These engineering firms bring existing relationships with Idaho Power customers, which facilitate the identification and support of Custom projects. Most Custom projects are the result of relationships with customers. The engineers mentioned that awareness of the CIP opportunities could improve, as some contractors and customers are unfamiliar with the incentive options. They know IPC account managers or energy advisors communicate with customers frequently and can update them on program offerings.

The engineering firms report having strong relationships with Idaho Power staff. They like the support they receive from IPC program staff and energy advisors and feel the communication will become even better with a few new staff on board. One area of communication that the engineers requested was regarding project routing between Custom, New Construction, and Retrofits. There was a bit of concern about customer confusion with different applications, but customers we spoke with did not mention any application confusion. Measures transitioning from Custom projects to Retrofits also create some uncertainty, and engineers would welcome increased communication about those measures as well.

Engineering firms provide scoping audits with reports (SARs) for projects and feel these large scoping audits provide the best relationship with customers. For customer projects, they also provide energy analysis reports (EARs) and final inspection reports (FIRs). Engineering firms report project status to IPC monthly and said that current changes to make check-in meetings more structured have been beneficial.

4.2.3 Interview Participants

After the desk reviews, as part of the site verification, Tetra Tech staff asked participants several process questions. The general topics included their experience with the third-party engineer or IPC support for their project, satisfaction with their program experience, what worked best for them, and what they would improve about the process.

We gathered feedback from 10 Custom Project participants; three in the Capital region, two in the Canyon region, three in Southern, and two in Eastern. Feedback covered seven Energy Advisors and two Cohort participants.

Most of the ten participants who responded have long-standing relationships of about 10 years or more with Idaho Power; three of them for at least 15 years. Participants mentioned learning about the program through various interactions with Idaho Power staff, but most commonly their Energy Advisor. Several companies also participate in other programs, such as Flex Peak or Retrofits. When asked about their impression of the Idaho Power Custom Projects program compared with other Idaho Power programs, one participant explained the difference well:

> *The Custom program offers additional flexibility to address energy-efficient operations and provides a mechanism to support unique aspects of industrial applications of technology. The prescriptive programs are designed around limited scope and constrain the use to defined limits.*

Support for determining the scope of the Custom projects came from a variety of sources. The two cohort participants named Idaho Power and the third-party engineers as their primary supporters. Three participants identified their corporate engineers and partner contractors as most involved in the project scoping phase. Two more participants mentioned their corporate engineers and contractors but also indicated Idaho Power staff played a key role. One participant received help from their contractor and Idaho Power staff, while two others relied heavily on third-party engineering firms.

When it came time to apply for the program incentive, seven of the ten responding participants had internal staff working on the application. A few of them also enlisted the assistance of contractors. One said the third-party engineer completed it for them. Six of the ten acknowledged receiving help from Idaho Power staff to complete their application correctly. Two participants mentioned that the Custom Projects applications require more work and assistance but are worth it and that support is easy to get.

Seven of the participants discussed the final inspection process with us. Six of them thought the inspections went well, while the seventh mentioned a few COVID-19 restriction challenges. Three of the participants said they made adjustments as a result of the inspection. The other three said no adjustments were needed.

We asked the participant to rate their satisfaction on a list of factors using a scale of 0 to 10, where 0 is not at all satisfied and 10 is very satisfied. Participants rated their satisfaction with the Custom Projects program overall and specific items such as the incentive amount, application process, time to receive the incentive, and support received. Average ratings across the responding participant were high. At least one participant rated all aspects a "10." A few others were very satisfied but mentioned that they do not give anything a rating of 10.

Table 17. PY2020 Custom Participant Satisfaction Response Summary

Factors	Mean rating	Count	Minimum rating	Maximum rating
Overall program satisfaction	8.8	10	7	10
Equipment or improvements eligible for the program	8.8	9	8	10
Incentive amount	8.8	9	7	10
Application process	8.3	8	5	10
Support received through the program	8.3	8	5	10
Time to receive incentive	8.1	8	5	10
Clarity of program requirements	8.1	8	5	10

One participant accounted for most of the "5" ratings. That participant felt they did not receive as much support as possible. However, it should be noted that there was a change in company staff in the early stages of planning the project, which likely affected the respondent's answers.

Nine of the ten participants have recommended the program to other companies. The tenth had not but would if the opportunity arose. One participant said they even talked with other utilities about offering a similar type of program, and public works staff have been sharing their experience with other facilities.

> "I work with lots of other utility DSM programs in my position. I feel that Idaho Power is the top utility I work with."
> Custom Participant

The cohort feedback is slightly different from the other interviews because the participants are working to change their decision-making process to incorporate energy efficiency into all decisions. The measure does not have a defined scope. The interview focused on how the decision-making within the department has changed as a result of participation.

The participants interviewed described the decision-making process after participation as completely different from before engagement with the program. Each held regular meetings with key operators and engaged staff to find continuous improvement opportunities. Each used the monthly metrics developed by the program as a component of operating and planning decisions. Both indicated it is easy to get the municipality administration on board with projects and enjoyed the good press associated with Idaho Power press releases about the program participants.

Participants provided numerous reasons they liked the Custom Projects option from Idaho Power. One important activity a participant thinks IPC does really well is getting the estimates close to the actual incentive. In other locations, the incentive can be drastically reduced once the project is installed, leaving a bad taste and making it less likely for the participant to do the next energy efficiency project. IPC has always been close on the incentive, and he feels he is more easily able to justify projects because the incentive amount is not in question.

A couple of the participants found the accolades and acknowledgment of their participation were important in their industry or market sector. Others felt the partnership with Idaho Power was a definite benefit to their business. And a few expressed appreciation for the incentives and support that allowed them to implement energy efficiency at their company. Below are comments regarding what participants liked most about the Custom Projects program:

Accolades	Partnership	Incentives & Support
• IPC provides great PR for the City and specifically the Water Department • It's a way to get project results recognized in a different path from the internal recognitions	• At the beginning when I was meeting with other wastewater supervisors, operators, I enjoyed IPC sharing ideas with my peers • Simplicity, great service, great communication, and couldn't ask for a better partner • The one-on-one interaction with the IPC team and their support services	• Getting money for putting in the correct equipment • Getting the check and working with IPC to make the justification • Impressed with how they worked with Condo/HOA organizations to make the projects happen. It can make the difference between a go or no go decision for these customers

Five of the respondents had no specific suggestions when we asked participants about one thing they would change about the Idaho Power Custom Projects program. The other five mentioned a variety of ideas:

> *The free annual scoping study is helpful in generating ideas. The detailed study gets a robust level of savings and costs. But there is an opportunity to detail out the M&V needed for the*

verification - because it is something that may easily be incorporated during design or installation, instead of coming back later and hooking on a meter to measure things.

Maybe more involvement from Idaho Power (support and clarity about the program). An Idaho Power webinar on the procedural process of incentives would be helpful (how to put together the specs/design/application).

A walk-through with Idaho Power or engineering staff would be helpful and getting detailed audits on likely projects.

Improve access to additional measures that include considerations for CO2 reduction and environmental improvements. Programs that address pure KWH reductions regardless of the technology used to reduce the load. Addition of microgrid options and incentives for industrial and commercial operations.

When there are new developments being considered, can the City pull in the Idaho Power program so the utility staff can work with the developer engineers to integrate the water system? The City departments take over utility systems once the development is finished but we don't get a lot of input to the design and coordination - so the advanced system energy efficiency focus that the City uses is not applied.

I would like Idaho Power to get involved in public works and provide their level of service to that department.

Idaho Power Company

Idaho Power Company Flex Peak Program

2021 Impact Evaluation Results

TETRA TECH

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The Tetra Tech evaluation team included the following individuals: Kimberly Bakalars, Najoua Jouini, Sam Meisterman, 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 2021 program impacts for the Flex Peak program. This report section consists of a summary outlining the program, evaluation activities, and key findings and recommendations. The program and evaluation are described in Section 2, and the program's impact evaluation is detailed in Section 3.

1.1 PROGRAM DESCRIPTION

Idaho Power has operated the Flex Peak program since 2015. It 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.

The program pays participants a financial incentive for reducing load within their facility. Customers with the ability to nominate or provide load reduction of at least 20 kW are eligible to enroll in the program. Participants receive notification of a load reduction event two hours before the start of a peak event, and events last between two to four hours.

The program is delivered by Idaho Power staff. Idaho Power energy advisors communicate with current participants and interested customers to encourage enrollment. The Flex Peak opportunity is also included in C&I Energy Efficiency Program collateral and outreach.

1.2 METHODOLOGY

Tetra Tech conducted several evaluation activities to address the impact evaluation goals. The evaluation goals included reviewing program documentation and meter data, verifying claimed load reduction, discussing any discrepancies, and identifying ways Idaho Power can improve the program analysis process.

The evaluation activities started with program documentation and tracking review, followed by baseline and load reduction calculations, a comparison of results, and a review of the analysis process.

1.3 FINDINGS AND RECOMMENDATIONS

Overall, Tetra Tech's opinion is that the Flex Peak program operated effectively in 2021, resulting in considerable load reductions. Despite the COVID-19 pandemic, Idaho Power has effectively retained most Flex Peak participants (Table 1). Participation slightly decreased in 2021; Idaho Power had 139 sites from 61 customers enrolled in the program in 2021, compared to 141 sites from 62 participants enrolled in 2020 and 145 sites from 64 participants enrolled in 2019.

The average nominated demand reduction outlined in Table 1 represents the load reduction committed averaged across the season events and customers. The average demand reduction is the load reduction achieved averaged across the season events and sites. The max average demand reduction represents the highest hourly average demand reduction achieved for the season. The realization rate is the percentage of load reduction achieved (average demand reduction) versus the amount of load reduction committed (average nominated demand reduction).

In 2021, the Flex Peak program achieved a realization rate of 78 percent based on a nominated demand reduction average across five events of 29 MW with the max season nomination of 36 MW.

The realization rates were higher in 2021 than 2020 as the average nominated demand reductions were lower across all events. Similar to the 2020 season, the COVID-19 pandemic significantly impacted the event performance and realization rates, limiting customers' operations and their ability to reduce load.

Table 1. Program Average Demand Reductions and Realization Rates from 2018 to 2021[1,2]

Program Season	Customers enrolled	Sites enrolled	Average nominated demand reduction (MW)	Claimed average demand reduction (MW)	Claimed max average demand reduction (MW)	Claimed program realization rate (%)
2018	140	65	29.4	26.3	27.3	89.5%
2019	145	64	35.6	27.5	28.8	77.2%
2020	141	62	35.9	23.2	23.7	64.6%
2021	139	61	29.0	22.6	30.6	77.9%

The *High 3 of 10* baseline method with additive *Day-of-Adjustment* (DOA) was utilized to verify curtailment reductions and realization rates. Tetra Tech found that Idaho Power accurately applied the method with minor discrepancies. The differences between claimed to evaluated realization rates are minor and mostly attributed to different rounding practices.

Table 2. 2021 Claimed and Evaluated Realization Rates per Event*

Event date	Event timeframe	Nominated demand reduction (kW)*	Claimed realization rate (%)	Evaluated realization rate (%)
June 28	4-8 p.m.	26,319	99.9%	99.3%
July 16	4-8 p.m.	27,469	67.6%	67.4%
July 26	4-8 p.m.	25,669	65.0%	64.9%
July 29	4-8 p.m.	25,669	74.6%	74.7%
August 12	4-8 p.m.	27,069	82.6%	82.2%
Average		**26,439**	**77.9%**	**77.7%**

* The realization rate is the percentage of load reduction achieved (average demand reduction) versus the amount of load reduction committed (average nominated demand reduction).

Through the impact evaluation activities, Tetra Tech has identified the following recommendations for consideration by Idaho Power.

- **Continue using the current baseline calculation methodology.** Idaho Power uses the *High 3 of 10* baseline approach with additive DOA capped at 20 percent. The baseline is calculated for each event hour for accuracy. Based on the benchmarking study conducted by Tetra Tech, Idaho Power's load reduction calculation approach follows industry best practices; it falls within the bounds of methodologies recommended by regional transmission organizations (RTO) and independent system operators (ISO).

[1] 2018–2020 values are extracted from Idaho Power's Flex-Peak Program End-of-Season Annual Reports.

[2] The reductions in this table include 9.7 percent system losses. The data and results for the rest of the report are at the meter level and do not include system losses.

- **Increase accuracy of calculations through consistent and transparent rounding practices.** Minor discrepancies in load reduction calculations resulted from inconsistent rounding practices and rounding occurring at the early steps of the calculations. While rounding differences create only minor discrepancies in calculations, the differences have the potential to sum to a level that creates confusion or doubt. Applying a standard rounding practice and documenting it will reduce the burden on Idaho Power and others using the calculation results. Tetra Tech recommends that rounding occurs at the last step of the calculation process.
- **Continue streamlining the load reduction analysis process.** The current process for calculating load reductions is completed through multi-spreadsheet files per customer with one calculation sheet per meter, which can be time-consuming and prone to errors. Idaho Power is developing a SAS script to efficiently produce the same results and limit human error. The SAS script was tested in 2021 using the 2020 meter data. Tetra Tech supports Idaho Power's decision to automate and streamline the calculation process and recommends thorough documentation of the analysis steps and assumptions.
- **Establish data validation and quality control protocols.** Idaho Power currently excludes negative values and error codes from the load reduction calculations. In all calculations, hours are treated as 0 kW where no curtailment was achieved. Tetra Tech recommends that Idaho Power documents rules for handling errors, missing data, and other data validation steps to enhance transparency and allow for repeating calculation steps and results. Idaho Power can describe how any missing data points or data entry errors are addressed and document what was missing, corrected, or when erroneous data were changed from the original data for analysis purposes. Any data that are ultimately removed or changed from the original data set should be annotated with the assignable cause.
- **Continue working with customers to refine their nominated load reduction.** Idaho Power has been effectively retaining most of its Flex Peak participants. While Idaho Power had typically achieved realization rates of 85 percent or greater in pre-COVID-19 pandemic seasons, those numbers were reduced to 65 percent in 2020 and 78 percent in 2021. As a lesson learned from the COVID-19 pandemic, Idaho Power can revisit the nominations for each customer (especially the 51–200 kW nomination group) to align them closer with realistic reduction opportunities.

2.0 INTRODUCTION

2.1 PROGRAM OVERVIEW

Idaho Power has operated the Flex Peak program since 2015. It 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. Along with Idaho Power's other DR programs—Irrigation Peak Rewards and the Residential A/C Cool Credit Program—the program supports Idaho Power in reducing generation and transmission resources and delaying the need to build supply-side resources.

The program pays participants a financial incentive for reducing load within their facility. Customers with the ability to nominate or provide load reduction of at least 20 kW are eligible to enroll in the program. Participants receive notification of a load reduction event two hours before the start of the peak event, and events last between two to four hours. The parameters of the program are in Schedule 76 in Oregon and Schedule 82 in Idaho and include the following:

- A minimum of three events will occur each program season (June 15 to August 15).
- Events can occur any weekday, excluding July 4, between 2 p.m. and 8 p.m.
- Event duration is two to four hours and up to 15 hours per week, but no more than 60 hours per program season.
- Idaho Power will notify participants two hours before the initiation of an event.
- If prior notice of an event has been sent, Idaho Power can choose to cancel the event and notify participants of cancellation 30 minutes before the start of the event.

Program rules allow weekly opt-out options for enrolled customers. Each customer can submit a Flex Peak Opt-Out Request Form and, therefore, is not expected to provide any load reduction during that week. The site is automatically re-instated in the program the following week unless an additional opt-out request is submitted.

2.1.1 Marketing and Outreach

Idaho Power energy advisors communicate with current participants and interested customers to encourage enrollment. The Flex Peak opportunity is also included in C&I Energy Efficiency program collateral and outreach.

2.1.2 Tracking and Reporting

Idaho Power collects hourly advanced metering infrastructure (AMI) data for almost half of the Flex Peak program participants and hourly MV90 data for the other half. Usage data is collected from 6/1/2021 to 8/15/2021 for all participants. The data is tracked by device location since participants may enroll multiple meters in the program.

Idaho Power provides participants with post-event usage reports showing hourly baseline, actual usage, and load reduction. The information assists participants in refining their nomination for future events. The data could be used to determine which participating sites may provide more load reduction or need to change their reduction strategy if nomination amounts were not achieved.

Idaho Power calculates load reductions and realization rates for each site and event. Load reductions during events are calculated by comparing them to a baseline calculated using a ten-day period. The baseline is the average kilowatt-hour of the highest energy usage days during the event availability time (2–8 p.m.) from the highest three days out of the last ten non-event, non-holiday weekdays. Once the original baseline is calculated for each site, an adjustment is included in the methodology called the *Day-of-Adjustment* (DOA) that is used to arrive at the adjusted baseline.

2.2 EVALUATION OVERVIEW

The Flex Peak program was last reviewed for impacts by a third-party in 2015 and 2016 and is reviewed internally on an annual basis. The following impact evaluation goals were outlined in the 2021 RFP and were addressed through the various evaluation activities:

- understand the program operations and impact calculation,
- calculate demand impacts attributable to the 2021 summer program using Idaho Power's current *High 3 of 10* baseline methodology with DOA, and
- provide recommendations to enhance the effectiveness and accuracy of future demand response calculations.

2.2.1 Evaluation Activities

The evaluation activities for the Flex Peak program are summarized in Table 3.

Table 3. Flex Peak Program Impact Evaluation Activities

Activity	Sample size	Objective
Interviews with program staff	1	Understand program design and delivery. Obtain program staff perspective on program successes and challenges. Identify researchable issues.
Review program materials	N/A	Review documentation as needed to provide context to load reduction calculations, meter data, and event data.
Calculate baseline and load reductions	2021 participants	Evaluate the adoption for each customer and each site, the impact as sites are aggregated, and the reduction over the five events.

2.2.2 Data and Sampling

Idaho Power program staff made the files outlined below available to the Tetra Tech team for review. Additional files were requested and received as necessary to complete the impact evaluation for the Flex Peak program.

- Program documentation: Application, Nomination Change Request, Opt-out Request
- Nomination amount for each device location and event
- Flex Peak time mapping and event summaries
- 2021 Flex Peak customer list
- Participant meter data:
  - AMI data, hourly for 66 sites from 6/1/2021 to 8/15/2021, and
  - MV90 data, hourly aggregate reading for 76 sites from 6/1/2021 to 8/15/2021.

The Flex Peak calculations were conducted using the full set of 2021 participants.

3.0 IMPACT EVALUATION RESULTS

Idaho Power had 61 customers with 139 sites enrolled in the program in 2021, and they called five events during the program season. The table below shows the event dates and timeframes. Participants were notified at 2 p.m. for all events.

Table 4. Flex Peak Events in 2021

Event date	Event timeframe
6/28/2021	4 p.m. - 8 p.m.
7/16/2021	4 p.m. - 8 p.m.
7/26/2021	4 p.m. - 8 p.m.
7/29/2021	4 p.m. - 8 p.m.
8/12/2021	4 p.m. - 8 p.m.

3.1 METHODOLOGY

The impact methodology consisted of the four primary evaluation activities (Figure 1). Each activity is explained in more detail below.

Figure 1. Process for Verifying Program Load Reductions

3.1.1 Program Staff Interview

The first step in evaluating the Flex Peak program was to discuss the program design and performance with Idaho Power staff during the kick-off meeting on September 13, 2021. The meeting helped Tetra Tech better understand the program design and delivery, discuss program successes and challenges, and identify and prioritize researchable questions for the evaluation. Regular check-in meetings were held to report progress, and scheduled ad hoc meetings were held to clarify inconsistencies.

3.1.2 Program Documentation and Tracking Review

Once we had background on the Flex Peak program from staff, we reviewed the program documentation and tracking system provided by Idaho Power. Idaho Power supplied the tracking system to the evaluation team in separate Excel spreadsheets. As described in Section 2.2.2, the provided spreadsheets included information about the date and time of the events, participating customers and their kilowatt-hour nomination amount for each event, MV90 and advanced metering infrastructure (AMI) hourly interval data for the summer season, and individual meter numbers and identification numbers. Idaho Power also provided summary spreadsheets of the load reduction calculations and a sample of calculation sheets that show the calculation steps. Tetra Tech reviewed the data and methods by which Idaho Power calculated load reduction, including (1) analyzing interval meter data, (2) the calculation approach used to develop individual participant load reductions, and (3) assessing data from the program tracking system. For the Flex Peak program, each participant had its own Excel workbook developed to estimate the baseline conditions, allowing for individual meters to be used to develop program load reduction, with the program load reduction being the sum of participant load reductions.

3.1.3 Baseline and Load Reduction Calculation

Data aggregation and validation were completed before calculating the baseline and load reduction for each event hour and meter. The data provided by Idaho Power was combined and matched using the meter number. Missing information was requested and verified with Idaho Power to ensure a complete and accurate dataset was used in the baseline and load reduction calculations. Any negative values and error codes were excluded from the load reduction calculations to replicate Idaho Power's approach. Hours where no curtailment was achieved are treated as 0 kW in all calculations.

The baseline methodology utilized by Idaho Power in 2021 is the same methodology utilized in previous seasons (*High 3 of 10* baseline method). The baseline is calculated using a ten-day period, representing the average kilowatt-hour of the highest energy usage days during the event timeframe (2–8 p.m.) from the highest three days out of the last ten non-event non-holiday weekdays. Individual baselines are calculated for each event hour and meter. Once the original baseline is calculated, an adjustment is applied to arrive at the adjusted baseline (additive the *Day-of-Adjustment* (DOA)).

As described in Section 4, adjustments are used to more accurately represent load conditions on the event day. Adjustments are used when the load is lower or higher than the historical data, 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 kilowatt-hour and the average curtailment day kilowatt-hour during hours 2-3 before the event start. The DOA is calculated as a flat kilowatt-hour and is applied to all baseline hours and capped at ±20 percent of the original baseline kilowatt-hour. The DOA is symmetrical, having an upward or downward adjustment to the baseline, and is applied to the original baseline kilowatt-hour for each meter for each hour during the event.

Tetra Tech utilized the same baseline method with additive DOA to calculate load reduction for participating sites of all five events in the 2021 season.

3.1.4 Comparison of Results and Review of the Analysis Process

Tetra Tech verified whether the evaluated load reduction and claimed load reduction match as a last step in the impact evaluation. When discrepancies were identified, Tetra Tech worked closely with Idaho Power to identify root causes for the differences. This step and the previous steps helped shape the recommendations provided by Tetra Tech to streamline the program analysis process.

3.2 IMPACT REVIEW RESULTS

Using the *High 3 of 10* baseline method with DOA, Tetra Tech developed a model to calculate the load reduction for each participating site and event. Idaho Power called five events during the 2021 program season; on June 28, July 16, July 26, July 29, and August 12.

Each site or meter had a committed or "nominated" load reduction established before the program season. In 2021, participants had a committed load reduction of 36 MW at the start of the season. Despite the COVID-19 pandemic, participation has been maintained with a slight decrease in participating sites; Idaho Power had 139 sites from 61 customers enrolled in the program in 2021, compared to 141 sites from 62 participants enrolled in 2020.

In 2021, the nominated site load reduction varied from 5 kW to 3000 kW. As Figure 2 shows, the nomination groups with the most sites were in the 0–50 kW and 51–200 kW ranges, accounting for approximately 37 percent of the sites each.

Figure 2. Numbers of Participating Sites by Nominated Load Reduction Group

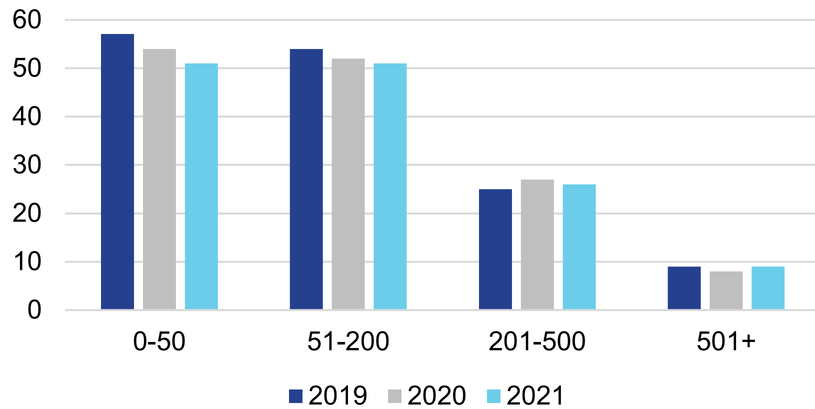
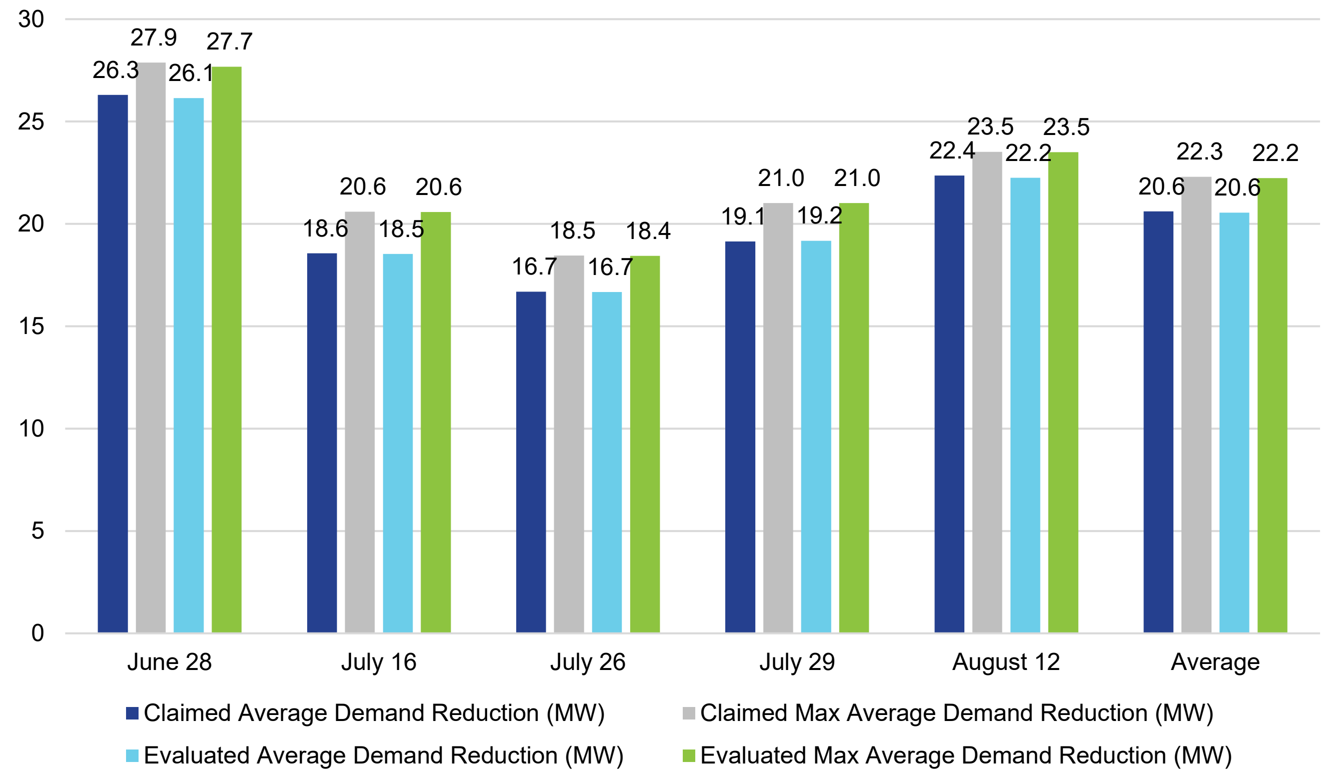


Figure 3 shows how similar the average demand reduction and maximum average demand reduction that Idaho Power and Tetra Tech calculated for each of the five curtailment events. The maximum average demand reduction achieved ranged from a low of 18.4 MW for the July 26 event to a high of 27.7 MW for the June 28 event. The July 26 event's average of 16.7 MW reduction achieved a realization rate of 65 percent, while the June 28 event's average of 26.1 MW reduction achieved a realization rate of 99 percent. The five events had an average realization rate of 78 percent combined.

Figure 3. 2021 Claimed and Evaluated Average Demand Reduction and Max Average Demand Reduction Achieved per Event[3]



The realization rates were higher in 2021 compared to 2020 as the average nominated demand reductions were lower across all events. Similar to the 2020 season and as noted in Idaho Power's 2020 End-of-Season report, the event performance and realization rates were significantly reduced due to the impact of the COVID-19 pandemic on customers' operations and ability to reduce load. Typically, Idaho Power had achieved realization rates of 85 percent or greater in seasons before the COVID-19 pandemic. The COVID-19 pandemic had a significant impact on reduction results as many customers could not participate during curtailment events. In addition, many national account big box stores and HVAC-dependent businesses could not curtail load due to increased outside air requirements and using more energy to meet air quality requirements within facilities.

Figure 4 represents the realization rates achieved by each nomination group, averaged across all five events. The realization rate is the percentage of load reduction achieved (average demand reduction) versus the amount of load reduction committed (average nominated demand reduction).

Each site's average load reduction (across five events) was divided by its average nomination across the five events and then grouped by size to calculate the results. The figure shows that the sites with the largest nominated load reduction, 501+ kW, achieved the highest average realization rate across the five events at 85 percent. The 501+ kW group had the lowest portion of sites enrolled in the program, totaling nine sites, accounting for seven percent of total enrolled sites. The smallest nomination class, 0–50 kW, was a close second with an average realization rate of 84 percent.

[3] Reductions are at the meter and do not include system losses of 9.7 percent.

The 0–50 kW group had the largest portion of sites enrolled in the program, totaling 51 sites, accounting for 37 percent of total enrolled sites. The second smallest class, 51–200 kW, also had 51 sites enrolled; however, it achieved the lowest average realization rate of 47 percent. The 201–500 kW group had 26 sites enrolled and achieved a realization rate of 75 percent.

The trend with the smallest and largest groups performing above the middle segments aligns with results from previous seasons.

Figure 4. Claimed and Evaluated Average Realization Rate by Each Nomination Group

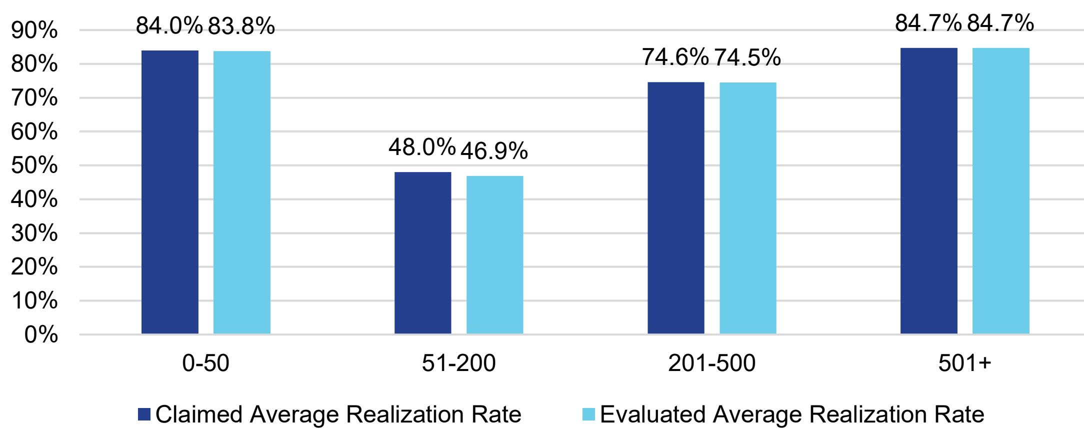


Table 5.shows the 2021 claimed and evaluated season realization rates at each site. The realization rate represents the percentage of load reduction achieved (average demand reduction) versus the amount of load reduction committed (average nominated demand reduction) averaged across the five curtailment events. The number of sites for participating customers varied between 1 site or meter to 16 sites or meters. Realization rates for each event are detailed in Appendix A.

Table 5. 2021 Season Realization Rates per Participant

Site number	Claimed season realization rate	Evaluated season realization rate
1	51.2%	51.2%
2	31.0%	30.9%
3	1.9%	2.1%
4	20.8%	23.0%
5	69.5%	69.5%
6	71.6%	71.7%
7	50.9%	50.8%
8	76.9%	76.8%
9	144.0%	144.0%
10	16.0%	15.9%
11	117.0%	116.9%

Site number	Claimed season realization rate	Evaluated season realization rate
12	48.6%	49.7%
13	17.2%	17.4%
14	19.5%	19.4%
15	5.0%	4.2%
16	69.4%	69.7%
17	56.0%	58.3%
18	49.0%	48.7%
19	116.9%	116.8%
20	77.0%	76.9%
21	164.0%	163.9%
22	36.3%	36.2%
23	0.3%	0.1%
24	10.9%	10.7%
25	75.6%	75.5%
26	119.5%	120.0%
27	23.8%	24.7%
28	61.2%	60.9%
29	219.4%	219.5%
30	1.2%	1.9%
31	1.0%	4.1%
32	4.0%	3.4%
33	6.0%	4.1%
34	29.0%	32.8%
35	21.2%	21.4%
36	8.1%	8.1%
37	2.8%	2.7%
38	19.5%	19.5%
39	116.5%	116.6%
40	271.1%	271.3%
41	108.6%	108.6%
42	228.2%	226.2%
43	157.6%	157.5%
44	29.3%	29.4%
45	48.9%	48.9%

Site number	Claimed season realization rate	Evaluated season realization rate
46	13.2%	13.2%
47	36.6%	36.6%
48	75.9%	75.9%
49	1.6%	1.6%
50	30.1%	30.1%
51	30.0%	29.9%
52	32.3%	32.4%
53	30.3%	28.6%
54	28.6%	28.4%
55	75.8%	75.8%
56	19.5%	19.1%
57	67.5%	67.6%
58	163.0%	163.0%
59	70.6%	70.7%
60	141.9%	141.9%
61	16.3%	16.4%
62	132.8%	132.8%
63	142.1%	142.1%
64	769.4%	769.5%
65	23.6%	23.4%
66	7.3%	7.3%
67	13.0%	12.8%
68	17.1%	17.0%
69	6.3%	6.4%
70	14.9%	14.6%
71	8.8%	8.8%
72	179.4%	180.1%
73	49.3%	30.2%
74	18.5%	18.3%
75	166.9%	166.9%
76	38.4%	38.6%
77	27.4%	27.5%
78	122.4%	122.8%
79	87.9%	88.0%

Site number	Claimed season realization rate	Evaluated season realization rate
80	39.0%	39.1%
81	58.4%	57.9%
82	99.5%	99.5%
83	45.3%	44.7%
84	32.1%	31.6%
85	19.3%	19.3%
86	35.8%	33.5%
87	54.3%	54.0%
88	6.5%	6.5%
89	17.8%	17.7%
90	10.9%	11.0%
91	5.2%	5.3%
92	2.6%	2.6%
93	101.3%	101.3%
94	38.6%	38.8%
95	84.0%	84.0%
96	8.2%	8.1%
97	103.2%	103.2%
98	70.0%	69.7%
99	20.3%	20.2%
100	136.8%	121.3%
101	67.2%	67.2%
102	0.9%	0.9%
103	11.3%	12.1%
104	7.3%	7.4%
105	5.9%	5.9%
106	18.7%	14.7%
107	87.7%	87.7%
108	64.4%	64.3%
109	16.1%	16.0%
110	54.5%	54.5%
111	6.9%	6.9%
112	36.4%	36.4%
113	22.4%	22.7%

Site number	Claimed season realization rate	Evaluated season realization rate
114	69.5%	69.1%
115	128.1%	93.5%
116	64.8%	64.9%
117	127.2%	127.1%
118	101.7%	101.7%
119	143.9%	143.5%
120	124.7%	121.4%
121	161.3%	161.5%
122	233.7%	234.0%
123	206.8%	206.2%
124	104.3%	104.5%
125	143.5%	143.4%
126	168.6%	168.1%
127	186.2%	185.9%
128	93.4%	92.7%
129	67.3%	66.9%
130	101.8%	102.2%
131	35.3%	41.6%
132	11.3%	11.3%
133	39.3%	38.7%
134	100.6%	100.4%
135	39.5%	39.3%
136	6.1%	6.1%
137	67.8%	67.7%
138	119.4%	119.1%
139	1.2%	1.2%

Most of the differences in realization rates between the claimed and evaluated realization rates are attributed to different rounding practices; however, Tetra Tech identified discrepancies in the results of seven sites or meters resulting from either clerical errors or miscalculation, as outlined in Table 6. Five of the seven discrepancies produced the highest differences between claimed and evaluated demand reductions (site numbers 73, 115, 106, 4, and 100).

The clerical error risk is an issue that Idaho Power staff are aware of and have been taking steps to address. At the time of the evaluation, Idaho Power was already making progress on code-based analysis that would eliminate the same type of carry-through error we found for the five cases mentioned below.

Table 6. Discrepancies Between Claimed and Evaluated Average Demand Reductions

Site number	Event date	Claimed average demand reduction (kW)	Evaluated average demand reduction (kW)	Difference (kW)	Reason for discrepancy
73	August 12	111.3	7.4	103.8	Clerical
115	June 28	139.8	32.6	107.1	Clerical
106	June 28	53.3	6.2	47.0	Clerical
4	July 29	126.5	166.1	-39.6	Clerical
100	July 16	40.0	11.3	28.7	Rounding
120	July 26	66.5	58.8	7.7	Clerical
42	June 28	22.5	17.0	5.5	Double-count

Clerical error: The calculation sheets had the correct value, while the summary sheet had a different number.
Rounding error: The rounding of meter data in the calculation sheet resulted in different baseline date selections (e.g., July 2 instead of July 8).
Double-counting error: The calculation sheet double-counted June 22 and June 24 in baseline calculations.

APPENDIX A: 2021 CLAIMED AND EVALUATED REALIZATION RATES

The table below outlines the 2021 *claimed* realization rates for each event and the season realization rates.

Table 7. 2021 Claimed Realization Rates per Participant

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
1	53.4%	30.0%	103.8%	68.9%	0.0%	51.2%
2	54.1%	11.9%	25.7%	5.7%	57.7%	31.0%
3	3.7%	0.7%	5.3%	0.0%	0.0%	1.9%
4	17.0%	0.0%	50.6%	36.1%	0.0%	20.8%
5	25.2%	23.8%	45.4%	21.4%	232.0%	69.5%
6	82.1%	54.0%	72.2%	78.6%	71.3%	71.6%
7	58.1%	66.9%	87.4%	42.1%	0.0%	50.9%
8	156.0%	51.4%	43.5%	78.0%	55.4%	76.9%
9	98.3%	99.0%	102.8%	96.0%	323.9%	144.0%
10	43.3%	19.0%	0.0%	12.1%	5.6%	16.0%
11	N/A	124.3%	93.1%	118.0%	132.5%	117.0%
12	48.0%	11.0%	7.0%	46.0%	131.0%	48.6%
13	13.4%	0.0%	0.0%	0.0%	72.6%	17.2%
14	11.0%	0.0%	55.5%	0.0%	31.0%	19.5%
15	0.0%	13.5%	1.0%	0.0%	10.5%	5.0%
16	52.0%	70.0%	22.0%	0.0%	203.0%	69.4%
17	10.0%	76.7%	123.3%	65.0%	5.0%	56.0%
18	5.0%	0.0%	104.0%	97.5%	38.5%	49.0%
19	79.5%	150.2%	104.2%	109.5%	141.2%	116.9%
20	114.0%	91.7%	90.3%	88.8%	0.0%	77.0%
21	201.4%	227.9%	193.6%	2.9%	194.3%	164.0%
22	0.0%	77.5%	66.8%	6.5%	30.8%	36.3%
23	1.2%	0.0%	0.0%	0.2%	0.0%	0.3%
24	0.4%	8.0%	22.6%	22.6%	0.8%	10.9%
25	76.1%	84.4%	109.0%	73.3%	35.3%	75.6%
26	135.0%	121.3%	121.3%	108.8%	111.3%	119.5%
27	9.0%	16.0%	3.0%	53.0%	38.0%	23.8%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
28	206.7%	71.7%	1.7%	0.8%	25.0%	61.2%
29	221.0%	249.0%	244.0%	250.0%	133.0%	219.4%
30	1.0%	0.0%	3.5%	0.5%	1.0%	1.2%
31	0.0%	5.0%	0.0%	0.0%	0.0%	1.0%
32	5.0%	5.0%	5.0%	5.0%	0.0%	4.0%
33	7.5%	20.0%	2.5%	0.0%	0.0%	6.0%
34	15.0%	20.0%	65.0%	20.0%	25.0%	29.0%
35	0.0%	0.0%	2.0%	0.0%	104.0%	21.2%
36	0.3%	0.0%	0.0%	0.0%	40.3%	8.1%
37	13.2%	0.3%	0.2%	0.2%	0.2%	2.8%
38	20.5%	0.3%	27.6%	21.3%	27.5%	19.5%
39	334.8%	189.4%	58.5%	0.0%	0.0%	116.5%
40	486.0%	476.5%	275.5%	117.5%	0.0%	271.1%
41	150.1%	167.7%	192.9%	32.3%	0.0%	108.6%
42	50.0%	45.6%	361.7%	405.0%	278.9%	228.2%
43	348.3%	367.8%	115.0%	139.7%	98.0%	157.6%
44	10.3%	67.1%	26.0%	20.6%	22.5%	29.3%
45	17.4%	43.4%	58.4%	55.7%	69.5%	48.9%
46	27.9%	0.0%	1.3%	23.0%	13.6%	13.2%
47	0.0%	16.0%	0.0%	8.7%	158.3%	36.6%
48	104.4%	127.5%	0.0%	0.0%	147.8%	75.9%
49	0.4%	0.8%	0.4%	2.5%	4.3%	1.6%
50	28.4%	12.8%	36.5%	39.9%	33.1%	30.1%
51	111.3%	37.8%	0.0%	0.0%	0.6%	30.0%
52	81.0%	35.8%	41.0%	3.9%	0.0%	32.3%
53	80.0%	27.9%	21.4%	20.0%	2.1%	30.3%
54	115.4%	3.2%	7.5%	7.5%	9.3%	28.6%
55	64.4%	69.4%	53.7%	101.1%	90.5%	75.8%
56	24.1%	42.4%	17.1%	7.4%	6.5%	19.5%
57	0.0%	0.0%	23.9%	233.4%	80.1%	67.5%
58	186.4%	280.3%	10.1%	127.8%	210.4%	163.0%
59	49.0%	0.0%	114.3%	158.3%	31.5%	70.6%
60	210.3%	83.5%	144.2%	129.2%	136.4%	141.9%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
61	54.0%	11.5%	0.0%	0.0%	16.2%	16.3%
62	112.0%	134.9%	204.5%	0.0%	212.5%	132.8%
63	59.7%	216.3%	135.0%	299.7%	0.0%	142.1%
64	2572.9%	653.8%	335.4%	216.3%	68.6%	769.4%
65	58.0%	0.0%	0.0%	53.0%	7.0%	23.6%
66	1.8%	1.5%	4.8%	28.5%	0.0%	7.3%
67	1.0%	18.3%	0.5%	45.3%	0.0%	13.0%
68	0.0%	0.0%	14.0%	68.8%	2.5%	17.1%
69	12.0%	18.5%	0.0%	0.0%	0.8%	6.3%
70	14.5%	19.0%	11.8%	23.0%	6.3%	14.9%
71	6.0%	2.8%	0.0%	33.3%	1.8%	8.8%
72	142.5%	115.6%	210.6%	226.3%	201.9%	179.4%
73	50.7%	39.1%	0.0%	0.0%	171.2%	49.3%
74	37.0%	0.0%	N/A	N/A	N/A	18.5%
75	41.6%	11.9%	95.4%	650.5%	35.3%	166.9%
76	34.0%	0.0%	5.3%	4.3%	148.3%	38.4%
77	36.4%	70.7%	0.0%	30.0%	0.0%	27.4%
78	391.0%	0.0%	61.0%	49.0%	111.0%	122.4%
79	108.5%	18.0%	152.5%	160.5%	0.0%	87.9%
80	94.5%	52.0%	0.0%	3.5%	45.0%	39.0%
81	249.0%	0.0%	0.0%	0.0%	43.0%	58.4%
82	0.0%	36.8%	210.4%	138.6%	111.8%	99.5%
83	81.3%	1.3%	7.5%	75.0%	61.3%	45.3%
84	36.9%	37.5%	28.1%	33.8%	24.4%	32.1%
85	20.0%	5.0%	1.3%	25.0%	45.0%	19.3%
86	51.0%	0.0%	0.0%	86.0%	42.0%	35.8%
87	73.8%	0.0%	8.8%	126.3%	62.5%	54.3%
88	21.8%	5.8%	4.8%	0.0%	0.0%	6.5%
89	13.8%	15.0%	19.8%	19.8%	20.3%	17.8%
90	19.3%	3.5%	12.3%	9.3%	10.0%	10.9%
91	10.0%	12.0%	0.0%	0.0%	4.0%	5.2%
92	0.0%	1.7%	0.0%	0.0%	11.2%	2.6%
93	0.0%	236.3%	152.5%	117.5%	0.0%	101.3%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
94	11.1%	55.7%	55.4%	41.8%	29.3%	38.6%
95	206.3%	99.8%	1.0%	27.0%	86.0%	84.0%
96	27.0%	7.3%	5.0%	1.3%	0.3%	8.2%
97	87.1%	318.5%	87.7%	0.0%	22.5%	103.2%
98	107.5%	23.8%	7.5%	91.3%	120.0%	70.0%
99	25.0%	33.3%	3.0%	20.3%	19.8%	20.3%
100	135.6%	100.0%	157.5%	172.5%	118.1%	136.8%
101	147.2%	81.4%	N/A	N/A	10.1%	67.2%
102	1.8%	0.0%	N/A	N/A	N/A	0.9%
103	0.0%	22.5%	N/A	N/A	N/A	11.3%
104	0.0%	15.2%	0.0%	0.0%	21.5%	7.3%
105	0.0%	0.0%	0.0%	3.4%	26.0%	5.9%
106	22.2%	0.5%	66.7%	2.4%	1.8%	18.7%
107	126.1%	98.1%	97.2%	40.7%	76.4%	87.7%
108	65.0%	58.3%	66.8%	66.3%	65.7%	64.4%
109	0.0%	3.0%	0.2%	76.9%	0.3%	16.1%
110	75.6%	0.4%	72.7%	62.5%	61.4%	54.5%
111	31.1%	0.0%	3.4%	0.0%	0.0%	6.9%
112	44.7%	27.7%	45.5%	20.5%	43.8%	36.4%
113	11.7%	10.7%	13.7%	0.0%	76.0%	22.4%
114	70.4%	90.4%	93.8%	0.0%	92.9%	69.5%
115	199.6%	129.3%	140.7%	0.0%	170.7%	128.1%
116	89.6%	87.9%	61.1%	0.0%	85.4%	64.8%
117	192.9%	128.9%	161.4%	5.7%	147.1%	127.2%
118	84.9%	94.7%	127.6%	120.5%	80.6%	101.7%
119	280.5%	0.0%	34.5%	206.5%	198.0%	143.9%
120	165.5%	82.0%	133.0%	171.5%	71.5%	124.7%
121	122.5%	109.5%	212.0%	164.0%	198.5%	161.3%
122	171.0%	196.0%	301.5%	274.0%	226.0%	233.7%
123	168.5%	186.0%	197.5%	233.5%	248.5%	206.8%
124	105.5%	118.5%	123.5%	107.0%	67.0%	104.3%
125	132.5%	146.0%	194.5%	176.5%	68.0%	143.5%
126	123.5%	118.0%	169.5%	301.0%	131.0%	168.6%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
127	187.5%	170.5%	214.0%	185.0%	174.0%	186.2%
128	6.5%	14.5%	145.5%	218.0%	82.5%	93.4%
129	43.5%	114.0%	57.5%	74.5%	47.0%	67.3%
130	57.5%	88.5%	107.0%	122.0%	134.0%	101.8%
131	37.5%	6.3%	88.8%	20.0%	23.8%	35.3%
132	0.0%	7.5%	25.0%	7.5%	16.3%	11.3%
133	16.3%	31.3%	36.3%	61.3%	51.3%	39.3%
134	55.5%	55.5%	95.0%	193.5%	103.5%	100.6%
135	106.8%	40.0%	0.0%	21.5%	29.3%	39.5%
136	6.3%	4.0%	4.2%	3.0%	13.0%	6.1%
137	89.1%	97.4%	22.5%	70.6%	59.3%	67.8%
138	71.7%	111.0%	166.7%	107.3%	140.3%	119.4%
139	3.0%	0.0%	0.4%	0.0%	2.4%	1.2%

N/As represent sites that were not able to participate in the respective events.

The table below outlines the 2021 *evaluated* realization rates for each event and the season realization rates.

Table 8. 2021 Evaluated Realization Rates per Participant

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
1	53.4%	30.0%	103.8%	68.9%	0.0%	51.2%
2	54.1%	11.7%	25.6%	5.6%	57.5%	30.9%
3	4.5%	0.7%	5.2%	0.0%	0.1%	2.1%
4	17.0%	0.0%	50.5%	47.5%	0.0%	23.0%
5	25.6%	23.6%	45.0%	21.2%	231.9%	69.5%
6	82.0%	54.2%	72.1%	78.6%	71.4%	71.7%
7	57.9%	67.0%	87.1%	41.8%	0.0%	50.8%
8	155.7%	51.6%	43.4%	78.2%	55.3%	76.8%
9	98.3%	99.0%	102.8%	96.0%	323.9%	144.0%
10	43.1%	18.7%	0.0%	12.1%	5.5%	15.9%
11	N/A	124.2%	93.2%	117.9%	132.3%	116.9%
12	52.4%	11.2%	7.0%	46.1%	131.8%	49.7%
13	13.7%	0.0%	0.0%	0.0%	73.1%	17.4%
14	11.0%	0.0%	55.3%	0.0%	30.9%	19.4%
15	0.0%	12.8%	1.3%	0.3%	6.5%	4.2%
16	52.2%	72.4%	23.0%	0.0%	200.9%	69.7%
17	8.5%	78.6%	128.0%	71.2%	5.2%	58.3%
18	2.7%	0.0%	104.8%	98.5%	37.5%	48.7%
19	79.2%	149.6%	104.2%	109.6%	141.2%	116.8%
20	113.5%	92.0%	90.2%	88.8%	0.0%	76.9%
21	202.2%	227.7%	195.5%	2.2%	192.1%	163.9%
22	0.0%	77.2%	66.7%	6.4%	30.4%	36.2%
23	0.6%	0.0%	0.0%	0.1%	0.0%	0.1%
24	0.5%	7.8%	22.5%	22.5%	0.5%	10.7%
25	76.0%	84.4%	108.9%	73.0%	35.3%	75.5%
26	132.0%	119.5%	121.9%	111.3%	115.2%	120.0%
27	11.8%	16.3%	3.0%	52.9%	39.6%	24.7%
28	205.5%	70.1%	2.5%	2.2%	24.3%	60.9%
29	221.2%	250.6%	242.9%	250.2%	132.8%	219.5%
30	3.1%	0.6%	2.3%	1.9%	1.5%	1.9%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
31	0.9%	1.9%	0.0%	11.6%	6.1%	4.1%
32	6.2%	5.8%	0.0%	1.5%	3.6%	3.4%
33	5.0%	12.4%	3.1%	0.2%	0.0%	4.1%
34	9.8%	33.0%	62.8%	31.7%	27.0%	32.8%
35	0.2%	0.0%	2.3%	0.0%	104.3%	21.4%
36	0.0%	0.0%	0.0%	0.0%	40.3%	8.1%
37	13.2%	0.2%	0.0%	0.1%	0.0%	2.7%
38	20.5%	0.3%	27.5%	21.4%	27.7%	19.5%
39	334.9%	189.7%	58.6%	0.0%	0.0%	116.6%
40	486.7%	476.5%	275.3%	117.7%	0.0%	271.3%
41	150.0%	167.7%	192.8%	32.4%	0.0%	108.6%
42	37.7%	46.0%	361.7%	406.0%	279.5%	226.2%
43	347.1%	368.8%	115.0%	139.2%	97.9%	157.5%
44	10.2%	67.2%	26.3%	20.8%	22.4%	29.4%
45	17.6%	43.2%	58.2%	56.0%	69.6%	48.9%
46	28.1%	0.0%	1.3%	22.9%	13.8%	13.2%
47	0.0%	16.0%	0.0%	8.7%	158.3%	36.6%
48	104.5%	127.4%	0.0%	0.0%	147.8%	75.9%
49	0.4%	0.8%	0.3%	2.4%	4.2%	1.6%
50	28.3%	12.7%	36.5%	39.9%	33.1%	30.1%
51	111.3%	37.6%	0.1%	0.0%	0.6%	29.9%
52	81.1%	35.8%	41.0%	3.9%	0.0%	32.4%
53	81.9%	26.7%	20.6%	12.1%	1.8%	28.6%
54	115.6%	3.0%	7.4%	6.8%	9.1%	28.4%
55	64.2%	69.2%	53.8%	101.1%	90.5%	75.8%
56	24.1%	42.6%	14.9%	7.6%	6.3%	19.1%
57	0.0%	0.0%	23.9%	233.6%	80.3%	67.6%
58	186.3%	280.4%	10.1%	127.8%	210.4%	163.0%
59	48.4%	0.0%	114.9%	159.0%	31.1%	70.7%
60	210.2%	83.5%	144.4%	129.3%	136.4%	141.9%
61	54.3%	11.4%	0.0%	0.0%	16.2%	16.4%
62	112.0%	135.0%	204.6%	0.0%	212.5%	132.8%
63	59.4%	216.5%	135.8%	298.9%	0.0%	142.1%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
64	2572.9%	654.0%	335.4%	216.4%	68.7%	769.5%
65	57.7%	0.0%	0.0%	52.2%	7.0%	23.4%
66	1.8%	1.7%	5.2%	27.6%	0.0%	7.3%
67	0.6%	18.4%	0.3%	44.8%	0.0%	12.8%
68	0.0%	0.0%	14.3%	68.2%	2.4%	17.0%
69	13.0%	18.9%	0.0%	0.0%	0.0%	6.4%
70	14.4%	18.2%	11.3%	22.4%	6.5%	14.6%
71	6.0%	2.5%	0.0%	33.5%	2.2%	8.8%
72	143.2%	115.8%	210.9%	228.3%	202.4%	180.1%
73	50.9%	39.0%	0.0%	0.0%	11.4%	30.2%
74	36.7%	0.0%	N/A	N/A	N/A	18.3%
75	41.6%	11.8%	95.3%	650.5%	35.3%	166.9%
76	33.7%	0.0%	5.7%	4.5%	148.9%	38.6%
77	36.5%	70.8%	0.0%	30.0%	0.0%	27.5%
78	390.7%	0.0%	61.5%	50.6%	111.3%	122.8%
79	108.8%	18.0%	152.4%	160.7%	0.0%	88.0%
80	94.2%	51.1%	0.0%	3.4%	46.5%	39.1%
81	246.9%	0.0%	0.0%	0.0%	42.6%	57.9%
82	0.0%	37.3%	210.5%	138.5%	111.4%	99.5%
83	80.1%	0.5%	8.0%	73.6%	61.4%	44.7%
84	37.0%	37.4%	25.7%	34.6%	23.3%	31.6%
85	18.6%	3.2%	2.2%	27.0%	45.4%	19.3%
86	49.9%	0.0%	0.0%	83.9%	33.8%	33.5%
87	74.5%	0.0%	5.9%	125.1%	64.5%	54.0%
88	21.9%	5.6%	4.9%	0.0%	0.0%	6.5%
89	13.8%	15.1%	19.6%	19.7%	20.2%	17.7%
90	19.3%	3.7%	11.9%	9.7%	10.2%	11.0%
91	7.4%	13.4%	0.1%	1.3%	4.2%	5.3%
92	0.0%	1.8%	0.0%	0.0%	11.2%	2.6%
93	0.0%	235.8%	149.6%	121.2%	0.0%	101.3%
94	10.8%	55.6%	56.1%	42.0%	29.5%	38.8%
95	206.4%	99.4%	1.5%	27.1%	85.7%	84.0%
96	27.2%	7.0%	4.6%	1.3%	0.4%	8.1%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
97	86.8%	318.7%	87.8%	0.0%	22.6%	103.2%
98	109.7%	24.4%	5.1%	88.7%	120.9%	69.7%
99	24.6%	33.1%	3.0%	20.5%	19.7%	20.2%
100	134.7%	28.3%	154.4%	171.2%	117.8%	121.3%
101	147.2%	81.4%	N/A	N/A	10.1%	67.2%
102	1.7%	0.0%	N/A	N/A	N/A	0.9%
103	0.0%	24.3%	N/A	N/A	N/A	12.1%
104	0.0%	15.6%	0.0%	0.0%	21.3%	7.4%
105	0.0%	0.0%	0.0%	3.4%	26.0%	5.9%
106	2.6%	0.5%	66.7%	2.3%	1.5%	14.7%
107	126.4%	97.6%	97.1%	41.0%	76.5%	87.7%
108	64.9%	57.8%	67.0%	66.0%	65.8%	64.3%
109	0.0%	2.9%	0.2%	76.8%	0.2%	16.0%
110	75.9%	0.4%	72.5%	62.5%	61.4%	54.5%
111	31.2%	0.0%	3.5%	0.0%	0.0%	6.9%
112	44.7%	27.5%	45.3%	20.6%	43.7%	36.4%
113	11.7%	10.7%	14.0%	0.0%	77.1%	22.7%
114	69.2%	90.1%	92.6%	0.0%	93.4%	69.1%
115	46.6%	124.7%	135.3%	0.0%	161.1%	93.5%
116	89.3%	88.5%	61.7%	0.0%	84.8%	64.9%
117	192.6%	129.0%	162.1%	5.0%	147.1%	127.1%
118	85.0%	94.8%	127.6%	120.4%	80.7%	101.7%
119	280.0%	0.0%	35.4%	204.3%	198.0%	143.5%
120	166.2%	81.6%	117.6%	170.0%	71.7%	121.4%
121	122.2%	109.8%	212.5%	165.3%	197.7%	161.5%
122	171.3%	196.3%	302.2%	273.8%	226.2%	234.0%
123	168.1%	185.7%	197.0%	231.9%	248.4%	206.2%
124	105.8%	118.2%	122.9%	108.7%	67.0%	104.5%
125	132.3%	147.0%	195.6%	174.7%	67.5%	143.4%
126	123.2%	117.4%	167.9%	300.2%	131.6%	168.1%
127	186.9%	169.9%	214.2%	184.4%	174.0%	185.9%
128	6.0%	14.2%	145.7%	216.2%	81.3%	92.7%
129	43.8%	113.5%	56.7%	74.3%	46.5%	66.9%

Site number	June 28 event realization rate	July 16 event realization rate	July 26 event realization rate	July 29 event realization rate	August 12 event realization rate	Season realization rate
130	57.0%	89.1%	107.5%	122.0%	135.5%	102.2%
131	38.2%	14.9%	108.6%	21.0%	25.5%	41.6%
132	0.0%	7.8%	23.1%	10.1%	15.5%	11.3%
133	14.9%	31.7%	36.7%	62.0%	48.4%	38.7%
134	55.6%	56.0%	95.7%	193.2%	101.6%	100.4%
135	106.7%	39.6%	0.0%	21.1%	29.2%	39.3%
136	6.4%	4.0%	4.1%	3.0%	12.9%	6.1%
137	89.1%	97.3%	22.5%	70.7%	59.1%	67.7%
138	71.0%	110.9%	166.1%	107.6%	139.9%	119.1%
139	3.0%	0.0%	0.4%	0.0%	2.4%	1.2%

N/As represent sites that were not able to participate in the respective events.

Idaho Power Company

Idaho Power Company
Irrigation Peak Rewards Program

2021 Impact Evaluation Results

TETRA TECH

February 14, 2022

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ACKNOWLEDGEMENTS

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We would like to 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.

The Tetra Tech evaluation team included the following individuals: Kimberly Bakalars, Mark Bergum, Jonathan Hoechst, Najoua Jouini, Jesse Russell, 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 2021 program impacts for the Irrigation Peak Rewards (IPR) program. This report section consists of an introduction describing the program, evaluation activities, and key findings and recommendations. The program's impact evaluation is detailed in Section 3.0.

1.1 PROGRAM DESCRIPTION

The IPR program is a voluntary demand response program available to Idaho Power's 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). Program parameters are listed below:

- June 15 to August 15 (excluding Sundays and July 4)
- Up to four hours per day between 1:00 p.m. and 9:00 p.m.
- Event start times may vary
- 9:00 p.m. option is a self-selected extended option
- Up to 15 hours per week
- No more than 60 hours per season
- At least three events per season

IPR is available to Idaho Power irrigation customers receiving service under Schedules 24 and 84 in Idaho and Oregon. Eligibility is based on prior participation at the pump location. The program is delivered by Idaho Power staff, primarily by a program specialist with support from the agricultural representatives, agricultural engineer, the energy efficiency evaluation staff, and many others within Idaho Power.

There are two options for shut-off: an automatic dispatch option, where Idaho Power sends a signal to a unit that shuts off the customer’s pump, and a manual dispatch option, where the customer is responsible for shutting down their pumps. The load reduction may span a seven-hour timeframe with four groups. In 2021, the earliest group started at 2:00 p.m. and each group is off for four hours.

1.2 METHODOLOGY

Tetra Tech conducted several evaluation activities to address the impact evaluation goals. The evaluation goals included reviewing program data files, verifying claimed load reduction, discussing discrepancies, and identifying ways Idaho Power can improve the program analysis process.

The evaluation started with program data sources and consumption data review, followed by baseline and event consumption identification and load reduction calculations. Finally, we incorporated the non-measured participants into the final evaluated results.

1.3 FINDINGS AND RECOMMENDATIONS

The IPR program is well-managed with comprehensive support from Idaho Power staff, including highly knowledgeable program specialists and support staff. In 2021 the program managed 2,235 irrigation meter locations to strategically reduce the load consumed over a four-hour period. The strategic enrollment means that the program delivers load reduction that varies by event time of day and date for four dispatch groups. The overall program load reduction can occur over seven hours on an event day.

In 2021, the IPR program delivered load reduction on eight event days, ranging from 71 to 257 MW, with a maximum realization rate of potential load reduction between 76 and 94 percent. The evaluation measured 84 to 98 percent of the load reduction per event day, providing a high level of confidence for claimed load reduction.

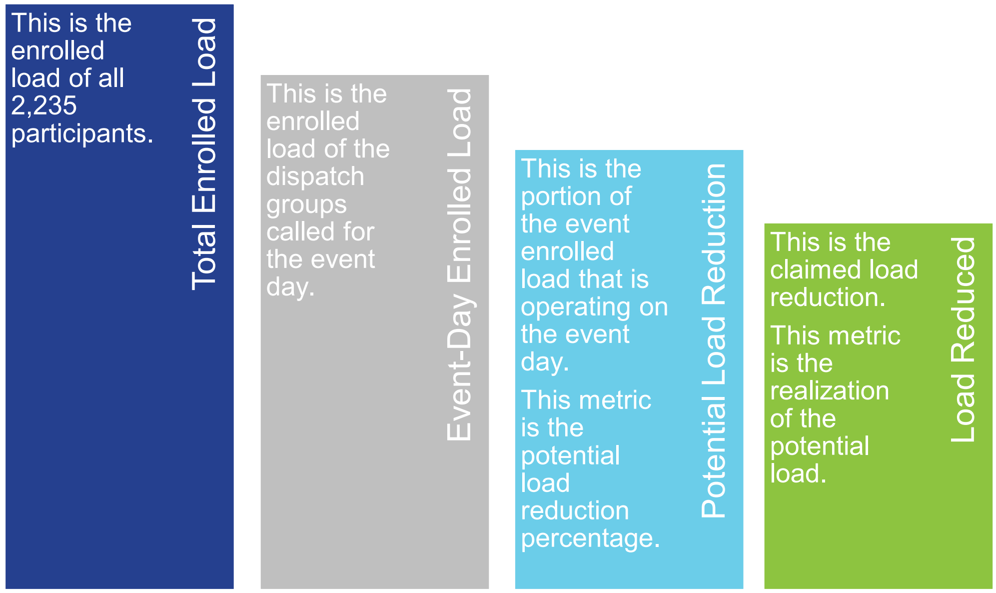
Table 1. Program Results[1]

Date	Event meter load reduction (MW)	Realization of potential reduction	Generation load reduction (MW)
18-Jun	168	91.0%	184
28-Jun	234	90.5%	257
12-Jul	96	86.1%	105
16-Jul	168	94.2%	184
26-Jul	112	89.4%	123
29-Jul	121	76.1%	133
30-Jul	65	87.3%	71
12-Aug	109	87.8%	120

In reviewing the program performance, it is important to recognize that the total enrolled load cannot be reduced through program implementation for two reasons. First, each event calls only some of the total devices through the dispatch groups. Second, at the time of the event, all the irrigation systems may not be operating and therefore cannot reduce load that day. Figure 1 provides explanations of the different groups of enrolled load and load reduction referred to in this report.

[1] The data and results in this report are at the meter level and do not include system losses of 9.7 percent. System losses would be added to represent results the Idaho Power system as a whole experience, except in Table 1 in the Executive Summary where system losses have been added under the 'Generation load reduction (MW)' column.

Figure 1. Enrolled and Reduced Load Group Descriptions



Through the impact evaluation activities, Tetra Tech has identified the following recommendations for consideration by Idaho Power:

- **Continue using the current load reduction calculation methodology.** The IPR program uses the baseline of the first four of the previous five hours to compare against the actual energy consumption during the event; this approach effectively captures the load reduction achieved for the event period for irrigation pumping systems.

- **Use load reduced as a percentage of potential load reduction as an IPR metric.** Use the comparison between the measured participants' load reduced and the event load reduction potential to identify the program performance, which will provide a consistent metric across event days and dispatch groups to measure program performance. The potential load reduction is defined as the load that is on in the hours before the event is called and is therefore the maximum load reduction that can be expected. The current metric of load reduced as a percentage of the enrolled load identified the potential reduction for the day more than the program performance.

- **Continue to improve program infrastructure to reduce consumption data and communication gaps.** The improvements in program implementation infrastructure have reduced the non-measured load reduction to create a high level of confidence in the program impact results. Continue investment focused on moving devices to the AMI system, reducing the number of missing interval data points and reducing the communication errors between site devices and the IPR program. These adjustments will further improve the accuracy of the program measurement and result in the load reduction being closer to the potential for the event hour.

- **Continue streamlining the load reduction analysis process.** The increased data quality from the infrastructure improvement has created an opportunity to streamline the load reduction calculation and projections further. Creating a database that can integrate the various data sources and participant information will allow for computer code to complete a consistent and current potential load reduction with the most recent data available for each participant. In addition, the same process can be used on the event data to identify actual load reduction and automate the ability to identify nonparticipants and partial participants to cross-reference with program files. The metric of potential load reduced as a percentage of enrolled load will create a consistent identification of the impact of the load control event.

2.0 INTRODUCTION

2.1 PROGRAM OVERVIEW

The IPR program is a voluntary demand response program available to Idaho Power Company's (Idaho Power) 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). IPR is available to Idaho Power irrigation customers receiving service under Schedules 24 and 84 in Idaho and Oregon. Eligibility is based on prior participation at the pump location.

Program parameters are listed below:

- June 15 to August 15 (excluding Sundays and July 4)
- Up to four hours per day between 1:00 p.m. and 9:00 p.m.
- Event start times may vary
- 9:00 p.m. option is a self-selected extended option
- Up to 15 hours per week
- No more than 60 hours per season
- At least three events per season

2.1.1 Marketing and Outreach

Customers enroll for the IPR program in early spring. Typically, in person irrigation workshops are scheduled throughout the service area. However, due to COVID-19 restrictions, the company's agricultural representatives provided information on the program during the virtual Eastern Idaho Ag Expo and other virtual training sessions. Each eligible customer was sent a comprehensive packet containing an informational brochure, an enrollment worksheet, and a contact worksheet encouraging their participation. Idaho Power agricultural representatives continue to remind and inform customers to encourage program participation.

2.1.2 Control Groups

The load reduction event period can span a seven-hour timeframe. Idaho Power has assigned enrolled customers to one of four dispatch groups. Each group is off for four hours, starting as early as 2:00 p.m., with the last group ending as late as 9:00 p.m. The groups, shown in Figure 2, represent a mixture of regional designations and early or late shut-off option indicators.

Figure 2. Group Descriptions

Group A	Group B	Group C	Group D
• Eastern Region	• Southern Region	• Capital, Canyon, Western Regions • C1 - 2:00 p.m. shut-off • C2 - 3:00 p.m. shut-off	• Participants from all regions • Late shut-off (5:00–9:00 p.m.)

In 2021, IPC called events on eight different days. Each group was asked to participate in five or fewer events during the program season. The table below shows the event dates and timeframes for each participant group.

Table 2. Irrigation Peak Rewards Activity in 2021

Event date	Group A	Group B	Group C	Group C1	Group C2	Group D
6/18/2021		3–7 p.m.	4–8 p.m.	2–6 p.m.	3–7 p.m.	
6/28/2021	4–8 p.m.		4–8 p.m.	2–6 p.m.	3–7 p.m.	5–9 p.m.
7/12/2021	4–8 p.m.					5–9 p.m.
7/16/2021		4–8 p.m.	4–8 p.m.	2–6 p.m.	3–7 p.m.	
7/26/2021	3–7 p.m.	4–8 p.m.				5–9 p.m.
7/29/2021*		4–8 p.m.	4–8 p.m.	2–6 p.m.	3–7 p.m.	
7/30/2021**	4–8 p.m.					4–8 p.m.
8/12/2021***	4–8 p.m.	4–8 p.m.				5–9 p.m.

* Fourth event for Group B, C, C1, C2 7/29/2021
** Fourth event for Group A and D 7/30/2021
*** Fifth event for Group A, B, D 8/12/2021

2.1.3 Interruption Options

There are two options for shut-off: an automatic dispatch option and a manual dispatch option.

- **Automatic Dispatch Option.** Participating service points are automatically controlled by Idaho Power switches. All pumps at the location must be controlled with a switch. Fixed credits are paid as a bill credit and based on billed kilowatt (kW) and billed kilowatt-hour (kWh).
- **Manual Dispatch Option.** Participating service points with at least 1000 HP or limited communication availability may choose which pumps are manually turned off during a load control event. Manual participants may elect the kW reduction amount during enrollment. Credits are paid in the form of a check and based on actual load reduction during the event timeframe.

2.1.4 Metering Infrastructure

Interval metering has been deployed to nearly all the participants in the IPR program. The interval meters collect and transmit consumption data for participants to Idaho Power. Depending on the type of meter, this can take between three days and a month. This information is organized into hourly data and used to estimate the potential load reduction prior to an event and calculate the demand reduction for each hour of each event.

In 2021, less than one percent of the IPR participants (20 participants) and less than a tenth of a percent of the enrolled load did not have interval meter data.

2.1.5 Incentives

Automatic dispatch participants receive incentives in the form of a billing credit. The billing credit is made up of a demand credit (kW)and an energy credit (kWh) applied to the billing statements including season dates of June 15 through August 15. The demand and energy credits for the manual dispatch participants are paid with a check.

- The fixed incentive is $5.00/billed kW and an energy credit of $0.0076/billed kWh.
- The demand (kW) credit is calculated by multiplying the monthly billing kW by the demand-related incentive amount.
- The energy (kWh) credit is calculated by multiplying monthly billing usage by the energy-related incentive amount.
- The fixed credit is applied to monthly bills, and credits are prorated for periods when reading/billing cycles do not align with the program season dates.
- Variable credit payments are paid after the third event:
  - Standard interruption = $0.148 * event duration (4 hours) * billed kW
  - Extended interruption = $0.198 * event duration (4 hours) * billed kW

2.1.6 Opt-Outs

Program rules allow customers to opt-out of dispatch events up to five times per service point. The first three opt-outs incur a $5 per kW penalty, while the remaining two incur a $1 per kW penalty based on the current month's billing kW. The opt-out penalty is a line item on the billing statement for customers on the automatic dispatch option and is always shown after the billing cycle of the opt-out event date. Manual dispatch option participants will receive a reduced payment if any unexpected load/kW is left on during the event timeframe. The opt-out penalties will never exceed the amount of the season credits. The participants will not owe any additional amount if opting out of all events.

2.1.7 Tracking and Reporting

The IPR participants enroll irrigation pumps in the program. The device location number is interchangeable with the pump number as an identifier and used to track the enrolled service locations. For each device location, the following information is tracked:

- pump number
- pump geographic location
- service point city and state
- device type

- meter read type
- dispatch group
- dispatch option (automatic or manual)
- participant name and mailing address
- payment type (billing credit or large credit)
- kW nominated for the season:
    - automatic dispatch—maximum billed kW from the prior year
    - manual dispatch—nominated by the participant
- electric feeder and substation identification
- motor horsepower enrolled
- participant contact names and notification methods (i.e., text-only)

The device locations with an advanced metering infrastructure (AMI) meter installed have the aggregated hourly interval data provided in a spreadsheet. To track performance, the manually controlled participants without interval meter data (MV90 or AMI) may have a data logger at their service point. The data logger provides aggregated hourly interval data in a spreadsheet similar to the other advanced meter locations.

Once the interval data is collected, the demand reduction is determined by comparing usage before the event (baseline hours) and usage during the event hours. The current baseline calculation includes the following steps:

- The baseline is calculated using the average of the first four of the five hours prior to the dispatch group start time (i.e., the hour before dispatch is not used).
- The event hour reduction is calculated using the maximum hour reduction in the event time frame for each dispatch group.
- Interval meter data with errors in the base hours or event hours are not used for the measured load reduction calculation.
- Load reduction for non-measured service points without interval meter data, or with interval meter data containing errors, uses the measured percentage of enrolled load to extrapolate the load reduction.

2.2 EVALUATION OVERVIEW

The evaluation goals for the 2021 IPR program include:

- understanding the program operations and impact calculation,
- calculating the measured load reduction attributable to the 2021 summer program using Idaho Power's current average load difference between the baseline and the average load during the event,
- estimating the non-measured load reduction, and

- providing recommendations to enhance the effectiveness and accuracy of future demand response calculations.

2.2.1 Evaluation Activities

The evaluation activities for the IPR program are summarized in Table 3. Researchable issues and the sampling strategy are also discussed in this section.

Table 3. Irrigation Peak Rewards Program Evaluation Activities

Activity	Sample size	Objective
Interviews with implementation staff	1	Understand program design and delivery. Obtain program staff perspective on program successes and challenges. Identify researchable issues.
Review program materials	N/A	Review documentation as needed to provide context to savings calculations, meter data, and event data.
Integrate data sources	4 spreadsheets	Create a common data organization for participant data and consumption data from multiple existing sources.
Calculate baseline and load reduction	2,235 participants	Evaluate the load reduction for each service point, including identifying the data errors and variations in expected participation.

2.2.2 Sampling

The IPR calculations were conducted using the full set of 2021 participants with interval metering and consumption logged separately. The participants not sampled are less than one percent.

3.0 IMPACT EVALUATION RESULTS

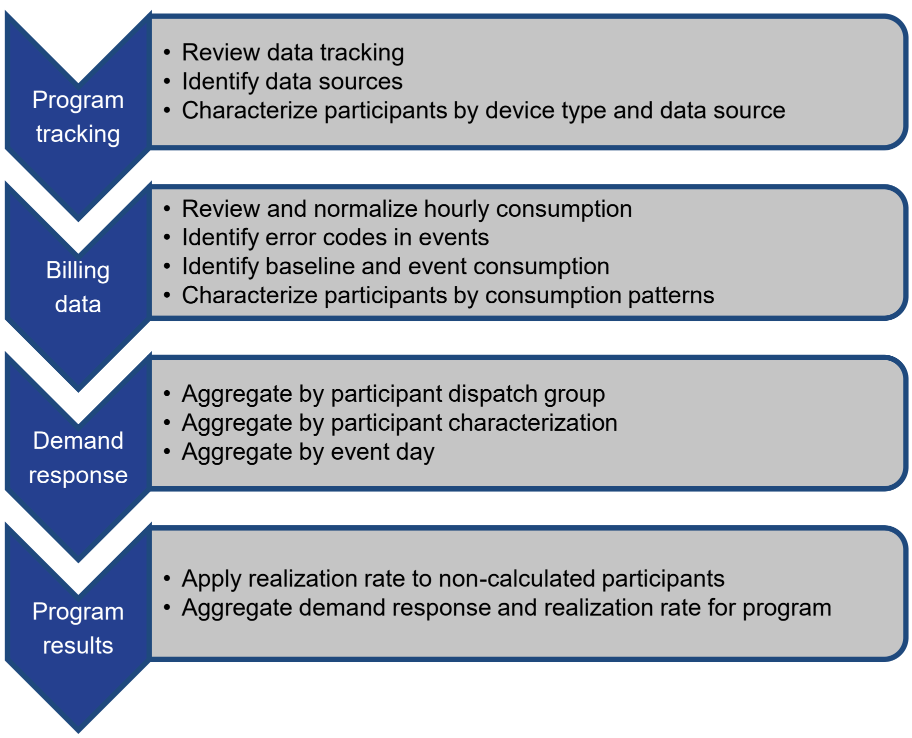
The evaluation goals for the 2021 IPR program include:

- understanding the program operations and impact calculation,
- calculating the load reduction attributable to the 2021 summer program using Idaho Power's current average load difference between the baseline and the average load during the event,
- calculating the load reduction for manual dispatch participants,
- estimating the load reduction for any participant without interval metering data, and
- providing recommendations to enhance the effectiveness and accuracy of future demand response calculations.

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.** The first step in evaluating the IPR program was to review the tracked participant data and energy consumption interval data provided by Idaho Power. The tracked participant data contained relevant information for participants to evaluate the program. Idaho Power identified the logic behind the participant data depending on the device type and meter type and identified the key data points used to connect the consumption data to the participant. Tetra Tech determined that each participant's tracking data was complete with an advanced metering infrastructure (AMI) or MV90 meter or a separate data logger.

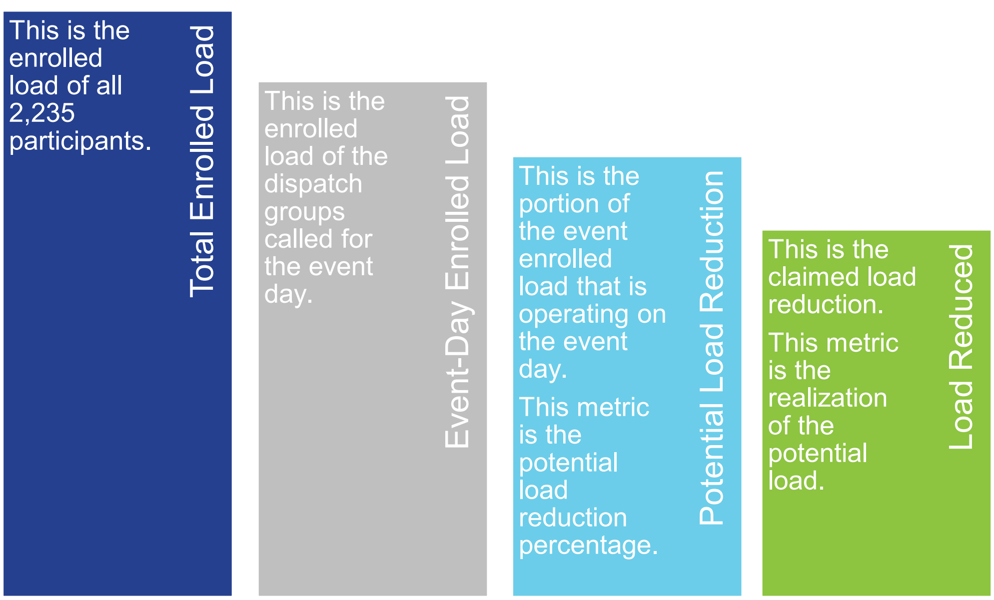
- **Billing Data.** Tetra Tech imported all the data sources into a single database with all the participant and billing data to review the consumption data. Each event period and baseline period were identified per participant. Error codes were identified, and those service points were removed from the data set for event periods. The participant baseline consumption was identified as well as the consumption of each hour of the event. Further, code was written to characterize the participant in each event. This information was exported to a spreadsheet containing the results per participant and a summary of the results can be found in Appendix B.
- **Demand Response.** The spreadsheet results aggregated the load reduction by event day, dispatch group, and participant category; this is the measured group performance.
- **Program Results.** The measured group performance was used to estimate the performance of the non-measured group. The program results are generated from the combination of the measured and non-measured groups.

3.2 IMPACT REVIEW RESULTS

The IPR program called for load reduction on eight days in 2021. Overall, there were 2,235 participating device locations with 401.4 MW enrolled. To determine the program performance, it is important to recognize that the total enrolled load cannot be reduced through the program implementation; this is true for two reasons. First, each event calls only some of the total devices through the dispatch groups. Second, at the time of the event, the irrigation systems may not be operating and therefore cannot reduce load that day.

We further describe the different groups of enrolled load and load reduction in the figure below.

Figure 4. Enrolled and Reduced Load Group Descriptions



Overall, the load reduced (either per dispatch group or event day) can be reviewed using the two metrics identified: the potential load reduction percentage and the realization of potential load reduction. The realization of enrolled load percentage identifies the difference between the enrolled load and the potential maximum load reduction, (i.e., the percentage of enrolled load that was on in the event day). The realization of the potential load reduced identifies the program performance compared to the potential load reduction for the event day. Table 4 shows the event day enrolled load, potential load reduction, and the load reduced at the meter for each event day. It also includes the realization of the potential load and the adjustment to determine the load reduced at the meter.

Table 4. Overall Program Load Control by Date[2]

Date	Load enrolled (MW)	Potential load reduction (MW)	Realization of enrolled load (MW)	Load reduced at meter (MW)	Realization of potential load reduced
18-Jun	234	184	78.6%	168	91.1%
28-Jun	299	258	86.3%	234	90.6%
12-Jul	168	111	66.1%	96	86.1%
16-Jul	234	178	76.1%	168	94.3%
26-Jul	269	125	46.5%	112	89.3%
29-Jul	234	160	68.4%	121	75.9%
30-Jul	168	74	44.0%	65	87.3%
12-Aug	269	124	46.1%	109	87.8%

The final values in Table 4 are built from the measured load control and the non-measured load control groups. The measured group contains all sites with error-free interval meter data, and the non-measured group contains all sites without interval meter data, as well as sites with interval meter data that contains any errors in the baseline or event timeframe The metrics from the measured group are used to estimate the performance of the non-measured group. The total load reduction as a percentage of enrolled load from the measured group is applied to the enrolled load of the non-measured group to obtain an estimate of the non-measured group's reduction.

The measured potential load reduction is calculated as the average of the first four hours of the five hours prior to the start of the event. The potential load reduction percentage is the comparison between aggregated potential load reduction and the enrolled load from the event participating meters; the realization of potential load is the comparison between the measured load reduction and the potential load reduction of those participants. Table 5 identifies the event day metrics of potential load reduction and realization of potential load reduced.

Table 5. Measured Program Load Control by Date

Date	Load enrolled (MW)	Potential load reduction (MW)	Potential load reduction (% of enrolled)	Maximum load reduction (MW)	Realization of potential load reduced
18-Jun	198	156	78.9%	142	91.0%
28-Jun	266	230	86.2%	208	90.5%

[2] The data and results in this report are at the meter level and do not include system losses of 9.7 percent. System losses would be added to represent results the Idaho Power system as a whole experience except in Table 1 in the Executive Summary where system losses have been added.

Date	Load enrolled (MW)	Potential load reduction (MW)	Potential load reduction (% of enrolled)	Maximum load reduction (MW)	Realization of potential load reduced
12-Jul	158	105	66.3%	90	86.1%
16-Jul	228	174	76.2%	164	94.2%
26-Jul	255	118	46.5%	106	89.4%
29-Jul	227	155	68.4%	118	76.1%
30-Jul	160	71	44.2%	62	87.3%
12-Aug	248	114	46.1%	100	87.8%

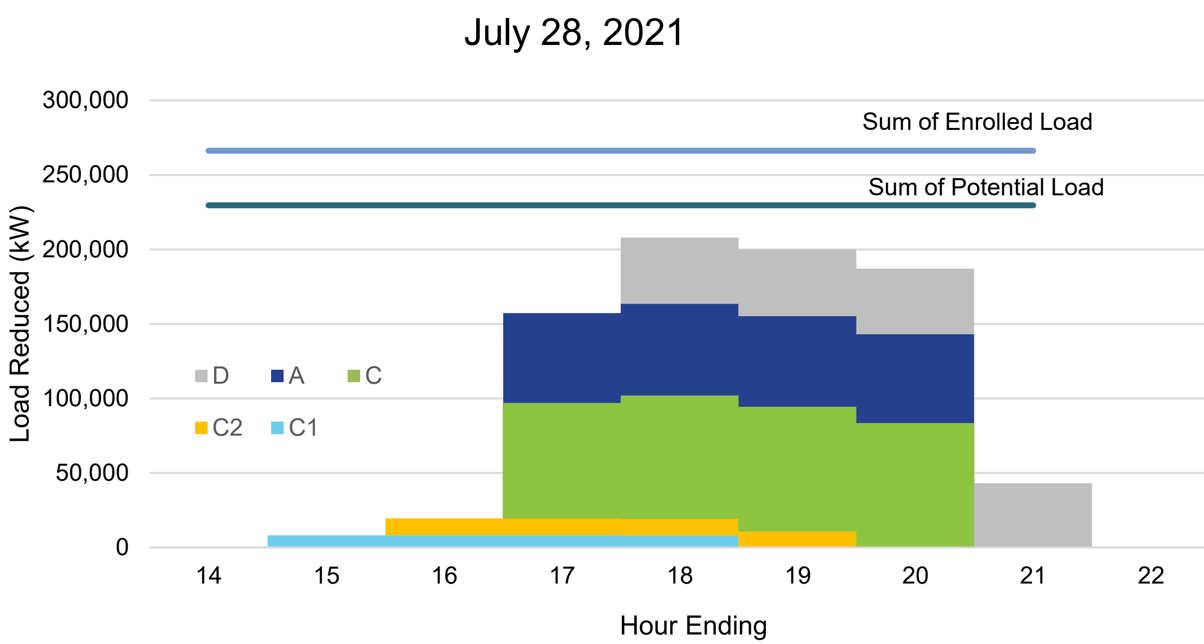
The program generally realized over 85 percent of the potential load reduction for the event days, with one adjustment of 76 percent on July 29. See Section 3.2.3 and Section 3.2.4 for discussion of the performance.

3.2.1 Event Day Operation

Each event day had different dispatch groups called to participate; therefore, the enrolled load varies by event day. Further, the start time of each dispatch group called varies across the event day; the maximum hourly load reduction for the event will likely not equal the sum of the participating dispatch group load reductions. For example, three dispatch groups could be called for an event, each with a maximum load reduction of 100 kW; but as they layer over each other at different times, there will be slight variations that show up in individual hours and the maximum event day reduction may only be 295 kW.

Figure 5 shows overlapping load reduction periods with multiple dispatch groups on an event day. Throughout the impact review results discussion, it is important to remember that the event day results will not be equal to the sum of the dispatch group results.

Figure 5. Hourly Aggregated Measured Load Reduction by Dispatch Group



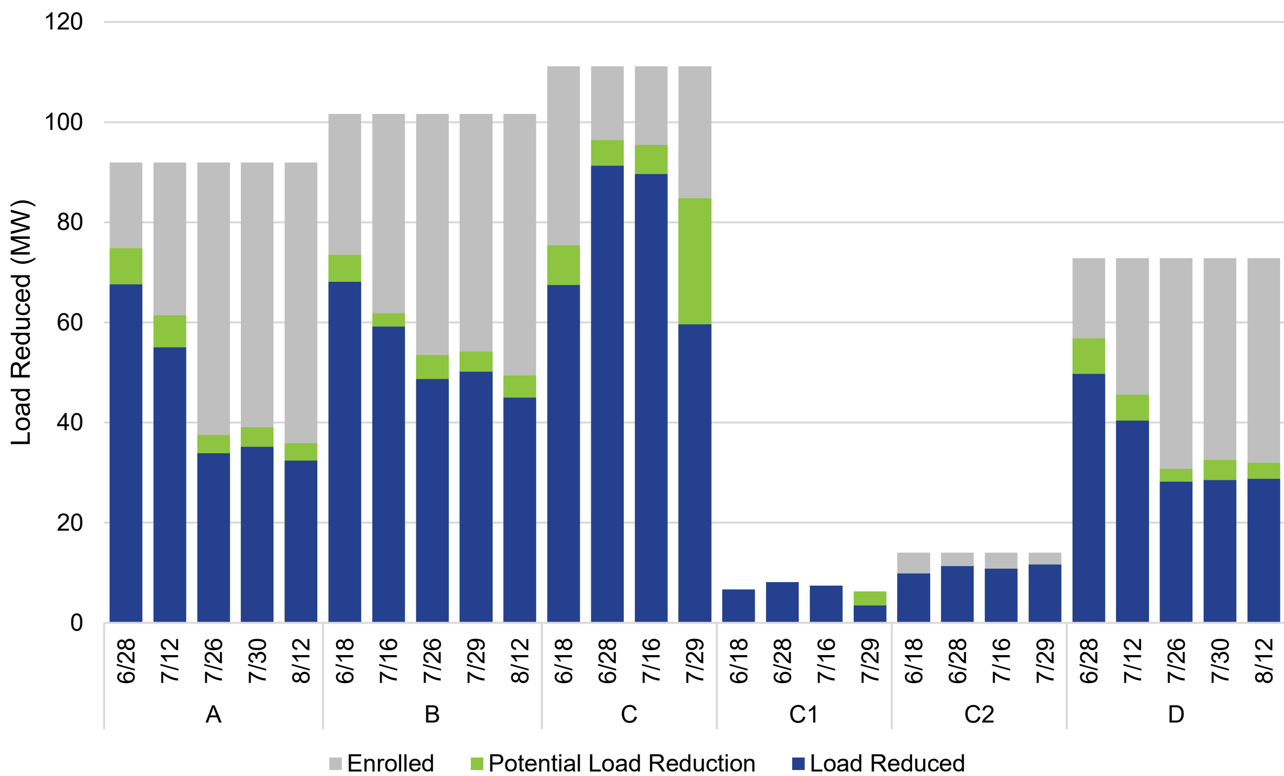
In the case of July 28, the hour ending at 18:00 (5:00 to 6:00 p.m.) has the greatest measured load reduced for the event day. The other hours have a smaller measured load reduction because dispatch groups cycle on later and off earlier during the event.

3.2.2 Dispatch Group Event Operation

Each dispatch group is called for a four-hour event starting at various times on the event day. Figure 4 identified the enrolled load, which stays consistent for each dispatch group for each event and shows how each dispatch group is performing over their individual four-hour period. Figure 6 shows the performance by dispatch group and event. The gray bar indicates total load enrolled in the group, the green shows the potential load reduction, or what was on during the event for the group, and blue indicates the load reduction for the group.

A small green bar indicates that a higher percentage of the load that was on before the event was called is reduced by the event. Larger gray bars (as we tend to see later in the season) indicate that a greater amount of the enrolled load was turned off on the day of the event and not able to be reduced.

Figure 6. Performance of Measured Meters by Dispatch Group and Event Day



The consistent characteristics between the Dispatch Groups A, B, and D show that the early-season events have significantly more potential reduction than the late-season events. This decrease in potential reduction is primarily driven by weather, crop type, and other agricultural practices and cannot be adjusted by Idaho Power. Dispatch Groups C, C1, and C2 do not show this pattern as dramatically and stay more even throughout the season. Most of the manual shut-off participants are in Group C, C1, and C2 and they have large pumping stations with multiple pumps for delivering water to large tracts of land. These large pumping stations with multiple owners and various crops create a more consistent load profile over the season than what is seen from a more typical irrigation system.

For Dispatch Group C1 on June 18, June 28, and July 16, the enrolled load is less than the potential load reduced, and the load reduced is equal to the potential load reduced; therefore, all bars are the same height, and the load reduced is the only display seen.

3.2.3 Event Day Analysis

Each event day has a unique potential load reduction based on the daily consumption properties of the dispatch groups called. Table 6 identifies the variance between the enrolled load and potential load reduction for each day.

Table 6. Potential Load Reduction as a Percentage of Enrolled Load

Dispatch group	18-Jun	28-Jun	12-Jul	16-Jul	26-Jul	29-Jul	30-Jul	12-Aug
A		84.3%	67.9%		41.7%		43.1%	41.1%

Dispatch group	18-Jun	28-Jun	12-Jul	16-Jul	26-Jul	29-Jul	30-Jul	12-Aug
B	75.5%			60.9%	53.6%	54.4%		51.6%
C	82.1%	91.5%		87.6%		77.0%		
C1	107.4%	130.7%		119.8%		100.9%		
C2	70.5%	80.8%		77.2%		83.0%		
D		78.0%	64.3%		42.5%		45.7%	44.8%
Weighted maximum realization	**78.9%**	**86.2%**	**66.3%**	**76.2%**	**46.5%**	**68.4%**	**44.2%**	**46.1%**

These values provide context so that the IPR program staff can estimate the potential load reduction on event days. Currently, Idaho Power staff are reviewing these values—as available within three days of a potential event—to identify the potential load control delivered by each dispatch group. The AMI interval meter data support this effort because it is available within days of consumption. This practice provides a good representation of the potential load reduction.

Table 7 shows the performance of each dispatch group as a percentage of the potential for that event day. These values are much more consistent across the dispatch group events and a better indicator of the program performance.

Table 7. Event Load Reduction as a Percentage of Potential Load Reduction

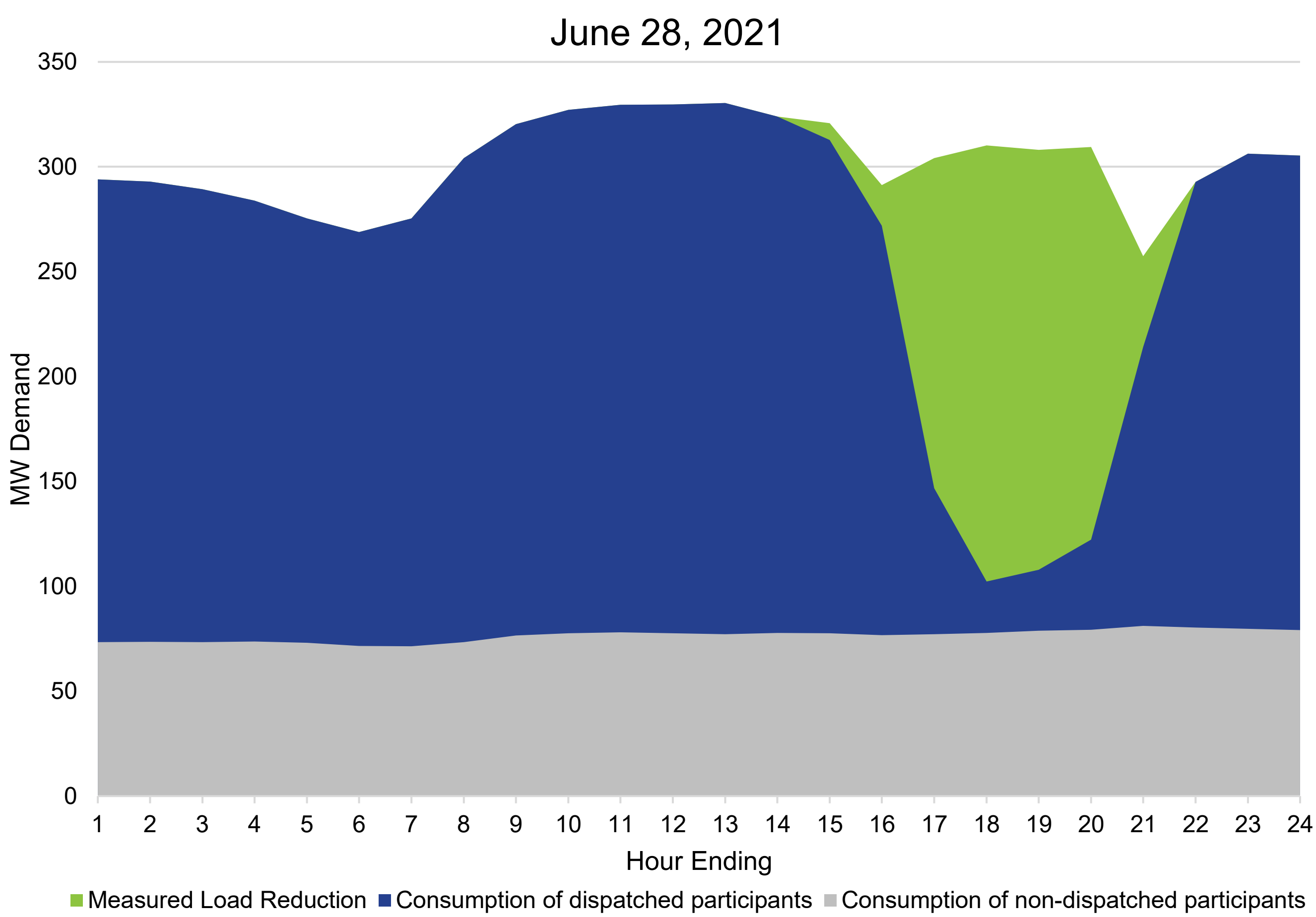
Dispatch group	18-Jun	28-Jun	12-Jul	16-Jul	26-Jul	29-Jul	30-Jul	12-Aug
A		89.7%	87.1%		89.3%		88.9%	87.0%
B	91.3%			94.2%	90.0%	88.8%		89.2%
C	89.0%	93.7%		93.7%		66.6%		
C1	100.0%	100.0%		100.0%		55.2%		
C2	100.0%	100.0%		100.0%		100.0%		
D		85.1%	85.4%		90.4%		85.5%	87.6%
Weighted maximum realization	**91.0%**	**90.5%**	**86.1%**	**94.2%**	**89.4%**	**76.1%**	**87.3%**	**87.8%**

Two components factor into these values being lower than 100 percent:

- **Event-day opt-outs.** The program allows individual service points to opt out of any events.
- **Equipment failures.** The equipment used to deliver the program does not always operate as expected. Some non-responses to the program are a result of commands on the AMI system not being heard by the device or the device not turning off the irrigation system as anticipated.

Beyond each event day's individual dispatch group performance, the dispatch groups are called for various four-hour event periods between 2:00 p.m. and 9:00 p.m. The offset event hours mean that the results of an individual dispatch group are not directly additive. Figure 7 graphs the entire event day for all participants. It shows the energy consumption of all dispatch groups whether they were called that day or not. Only the dispatch groups called that day are expected to participate in the event (Blue in Figure 7), which shows a large reduction in load for the event period. The calculated hourly load reduction is displayed and fills the gap (Green in Figure 7).

Figure 7. Measured Event-Day Consumption—June 28



The figure shows the actual energy consumption of all IPR program participants, and the hourly load reduction as calculated for each measured service point that was part of the event. The hourly load reduction does not completely fill the gap left by the reduction in energy use, which actually indicates the program is not claiming the full demand reduction for each hour. The small valleys near the beginning and end of the event are locations where the program is claiming less reduction than may be possible. However, Idaho Power does not include the reduction in these areas in the calculation.

A similar figure for each event day is included in Appendix A.

3.2.4 Program Performance

The overall program performance for each event day includes both the measured and non-measured participants. The analysis is completed on the measured participant groups to determine the percentage of enrolled load that has the potential to be reduced and the realization rate of the potential. The non-measured participants include the participants with non-interval consumption data and the participants with interval data that had an error in their relevant consumption data. The potential load reduction percentage and the realization of potential from the measured groups are applied to the non-measured group to determine IPR program performance.

$$\text{Event Day Load Reduction} = \text{Measured Load Reduction} + \sum_{dispatch=A}^{D} \text{NonMeasured Enrolled Load} \times \text{Potential Load Reduction} \times \text{Realization of Potential \%}$$

Table 8 shows the level of measured load reduction compared to the non-measured load. The high level of measured participants and load for all event days creates high confidence in the results presented at the program level.

Table 8. Measured and Non-Measured Participant Groups

Date	Dispatched participants	Measured participant	Non-measured participants	Enrolled load (MW)	Measured load enrolled	Non-measured load enrolled
18-Jun	974	81%	19%	227	84%	16%
28-Jun	1,688	91%	9%	292	89%	11%
12-Jul	1,237	94%	6%	167	94%	6%
16-Jul	974	98%	2%	227	98%	2%
26-Jul	1,761	95%	5%	269	95%	5%
29-Jul	974	95%	5%	227	97%	3%
30-Jul	1,237	97%	3%	167	96%	4%
12-Aug	1,761	93%	7%	269	92%	8%

The program staff have made significant progress in reducing the amount of non-measured load since the last evaluation. This progress has been made possible due to automated metering substation upgrades made as part of Idaho Powers efforts to have more meters converted to the AMI system and the exchange of cell devices to AMI demand response unit switches. The result of this investment is the non-interval meter data participants range between 0.3 percent to 1.6 percent of the enrolled load on an event day. That effectively eliminates the impact of meters which provide non-interval data. Now, most of the non-measured load results from data errors in the interval meters, which are being investigated by Idaho Power staff. The interval meter data error may happen at the individual meter level or may occur at a substation level. The substation level errors cause higher percentages of non-measured load.

3.2.4.1 Results

The program's overall results are reported as the maximum-hour load reduced during the day of the event. The maximum-hour load reduction is determined by the participating meter load reduction calculated for each hour of the event day. The result is that the program performance is not the sum of the performance of each dispatch group for the event day; each group may participate at different hours throughout the event window, and the program performance takes that hourly variation into account. As identified in Section 3.2.1, each dispatch group has a variable potential load reduction (as a fraction of the enrolled load) on the event day and a variable realization rate of the potential load reduction. The non-measured load reduction is calculated using these variables for each dispatch group to estimate the reduced load using the enrolled load. The results in Table 9 show the maximum load reduction for each event day at the participant meter, with a maximum of 234 MW.

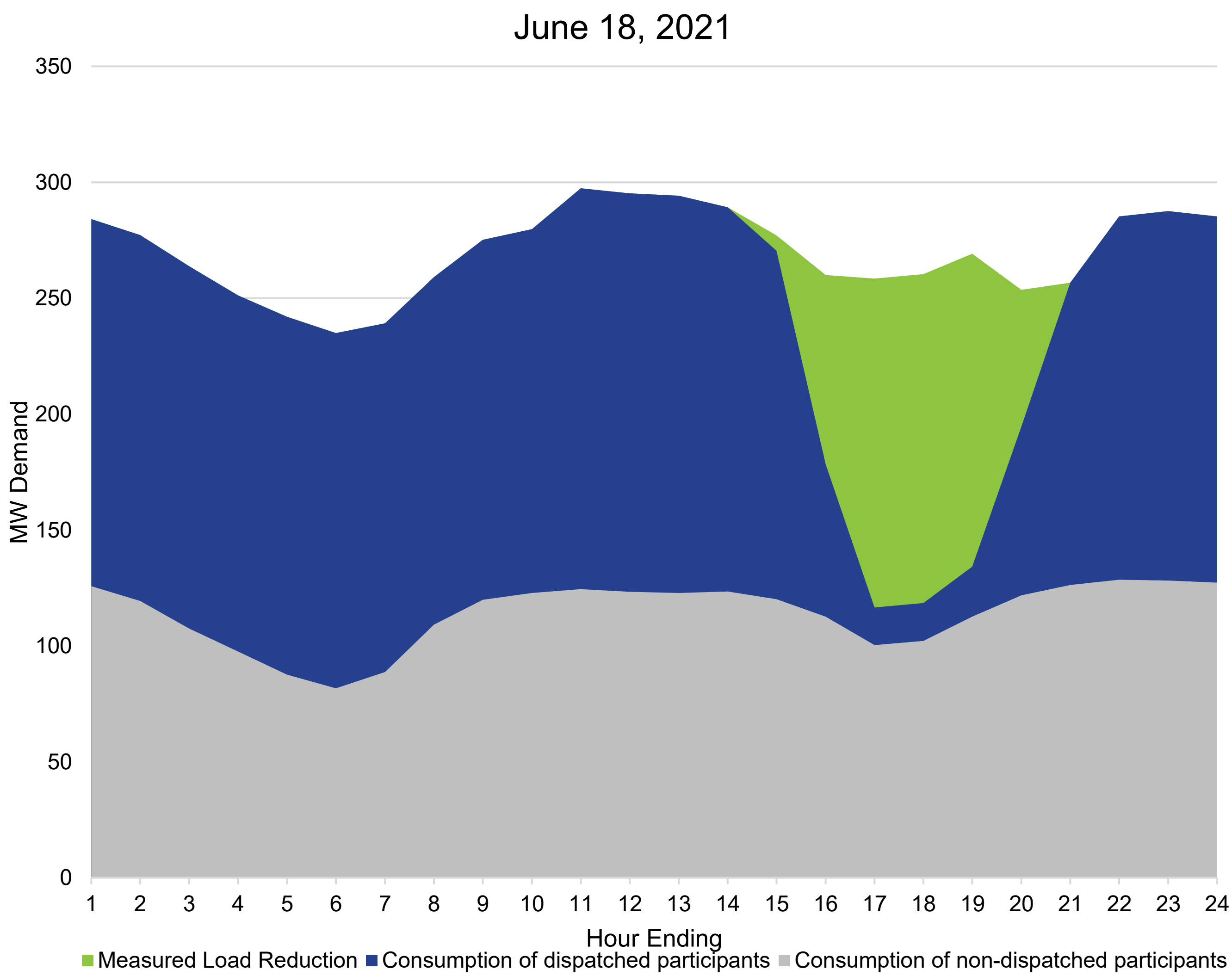
Table 9. Evaluated Program Load Reduced Results (MW at Meter)

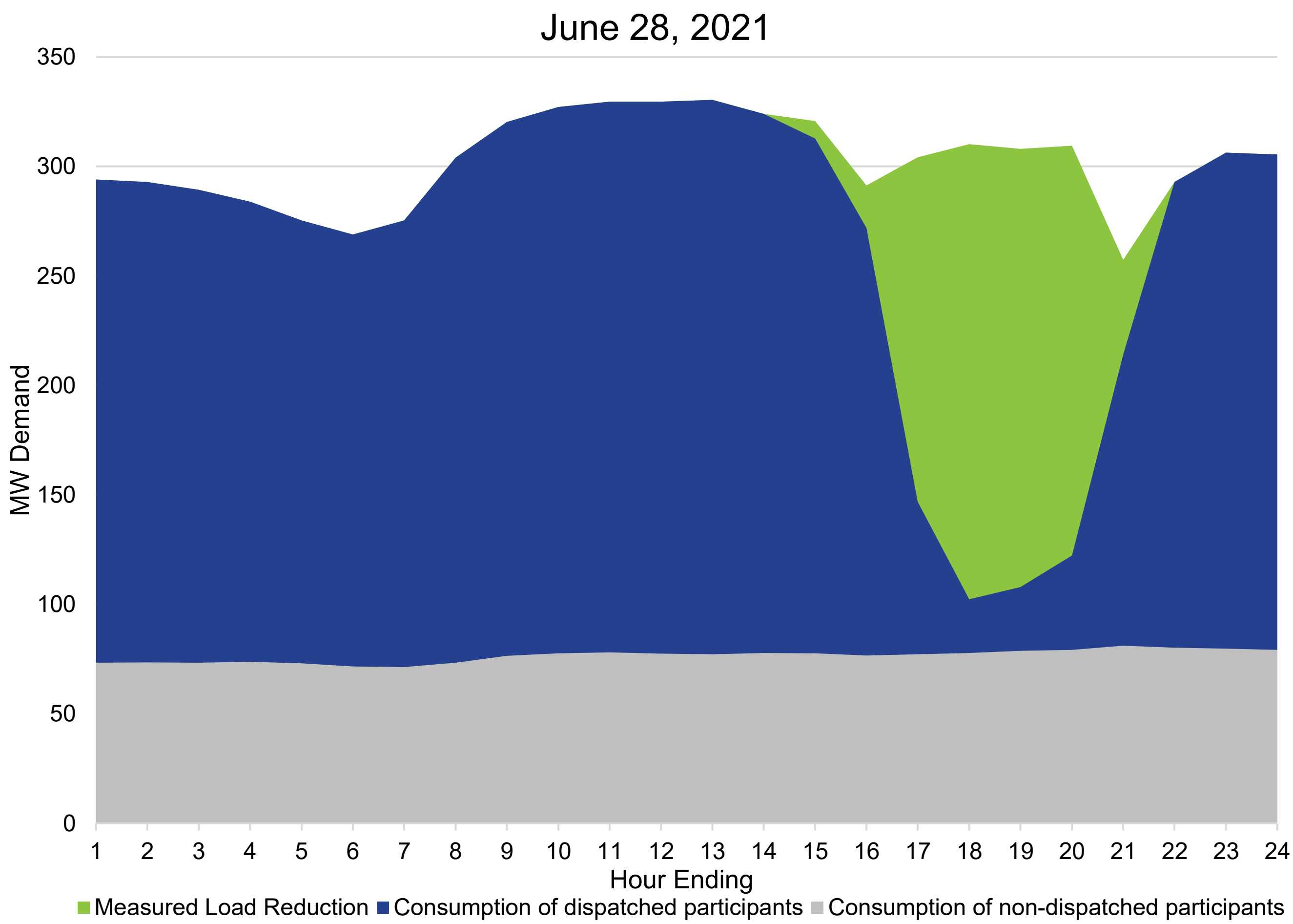
Date	Measured	Not measured	Total event
18-Jun	142	26	168
28-Jun	208	26	234
12-Jul	90	6	96
16-Jul	164	4	168
26-Jul	106	6	112
29-Jul	118	3	121
30-Jul	62	3	65
12-Aug	100	9	109

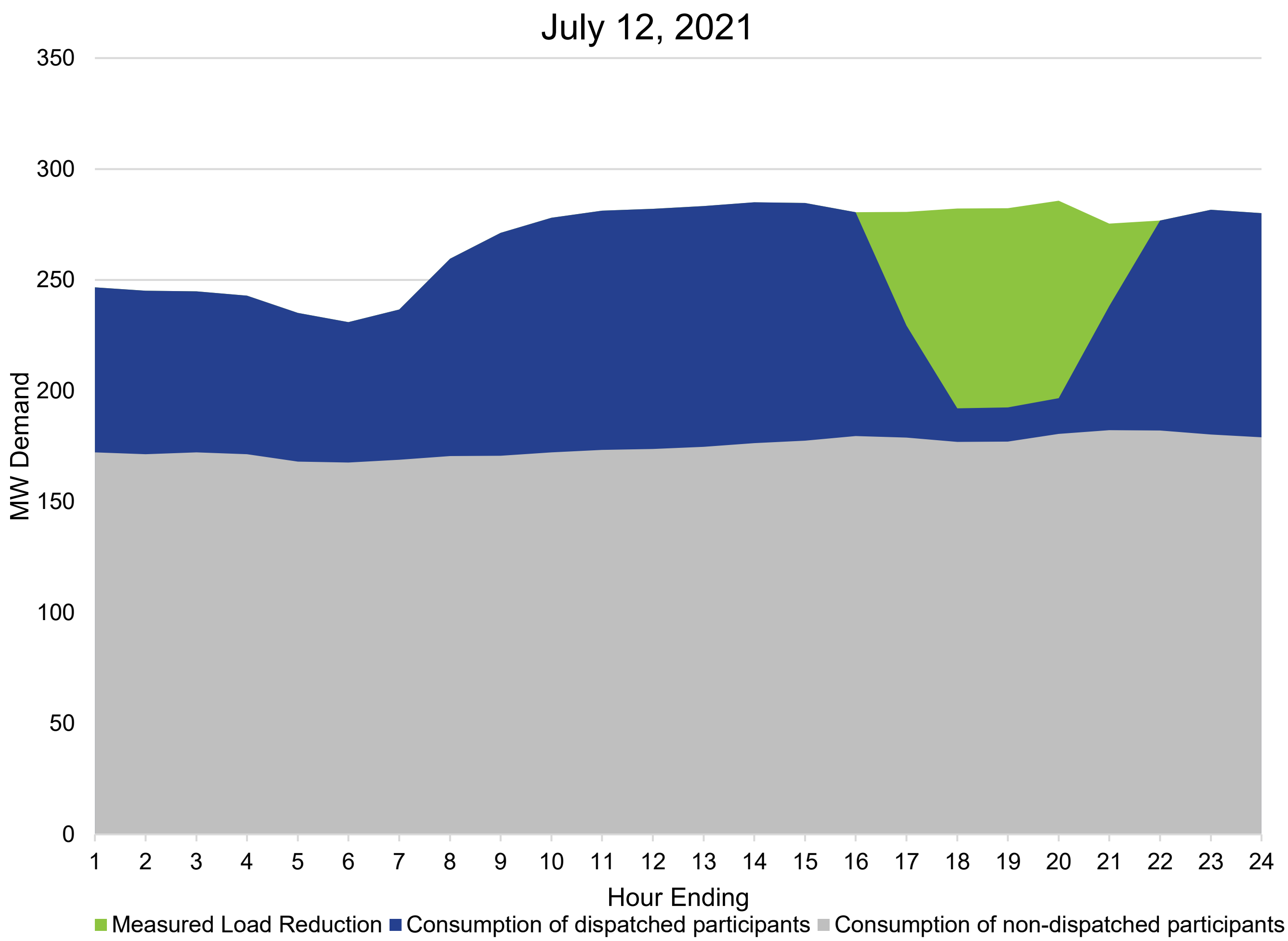
APPENDIX A: MEASURED EVENT-DAY CONSUMPTION GRAPHS

As discussed in Section 3.2.3 of the report, beyond each event day's individual dispatch group performance, the dispatch groups are called for various four-hour event periods between 2:00 p.m. and 9:00 p.m. The offset event hours mean that the results of an individual dispatch group are not directly additive.

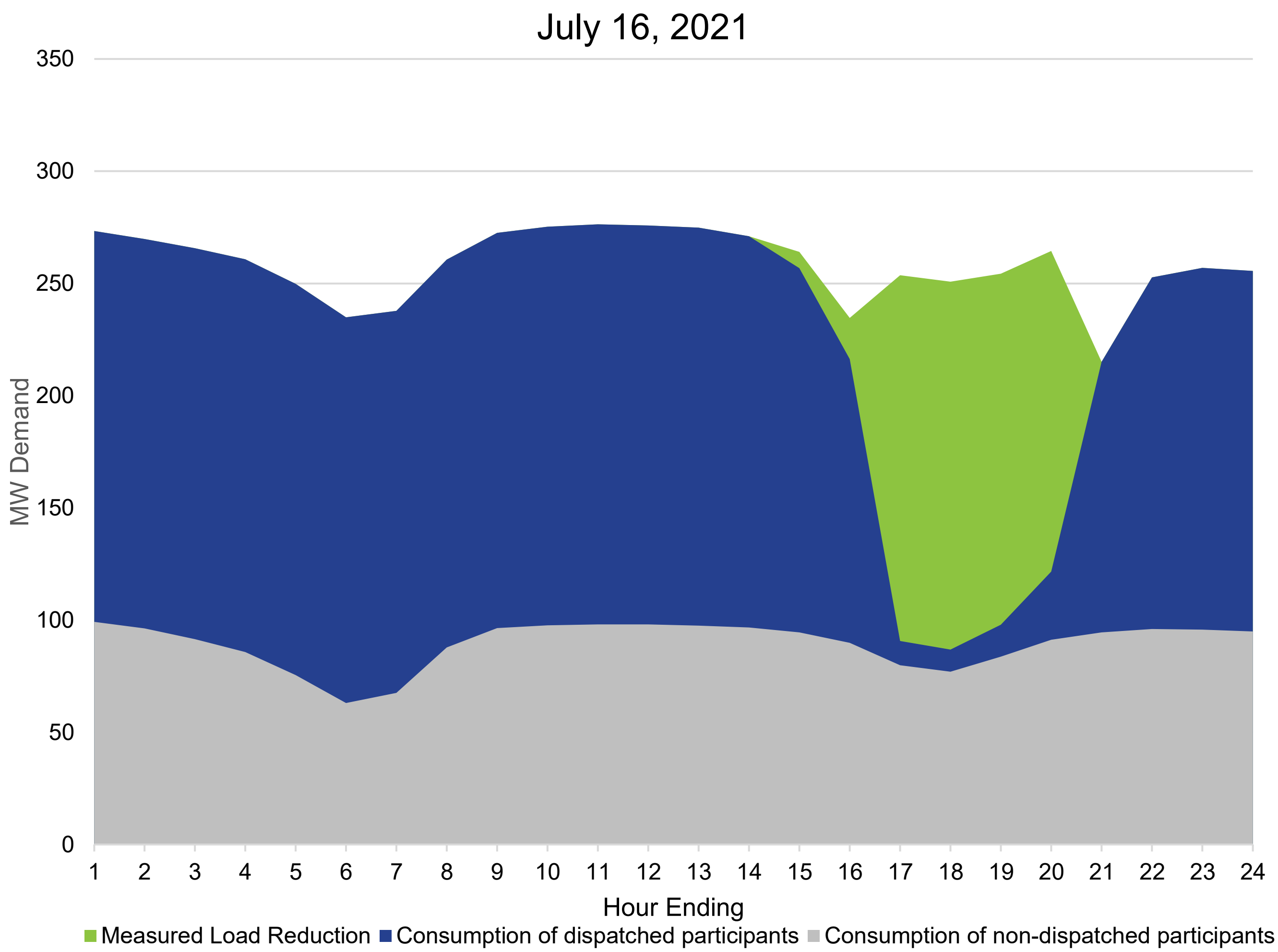
The graphs in this section plot the entire event day for all participants; they show the energy consumption of all dispatch groups whether they were called that day or not. Only the dispatch groups called that day are expected to participate in the event, which shows a large reduction in load for the event period and are displayed in blue. The calculated hourly load reduction is displayed in green and generally fills the gap. The irrigation load enrolled in the program, but not called on the event days are shown in gray.



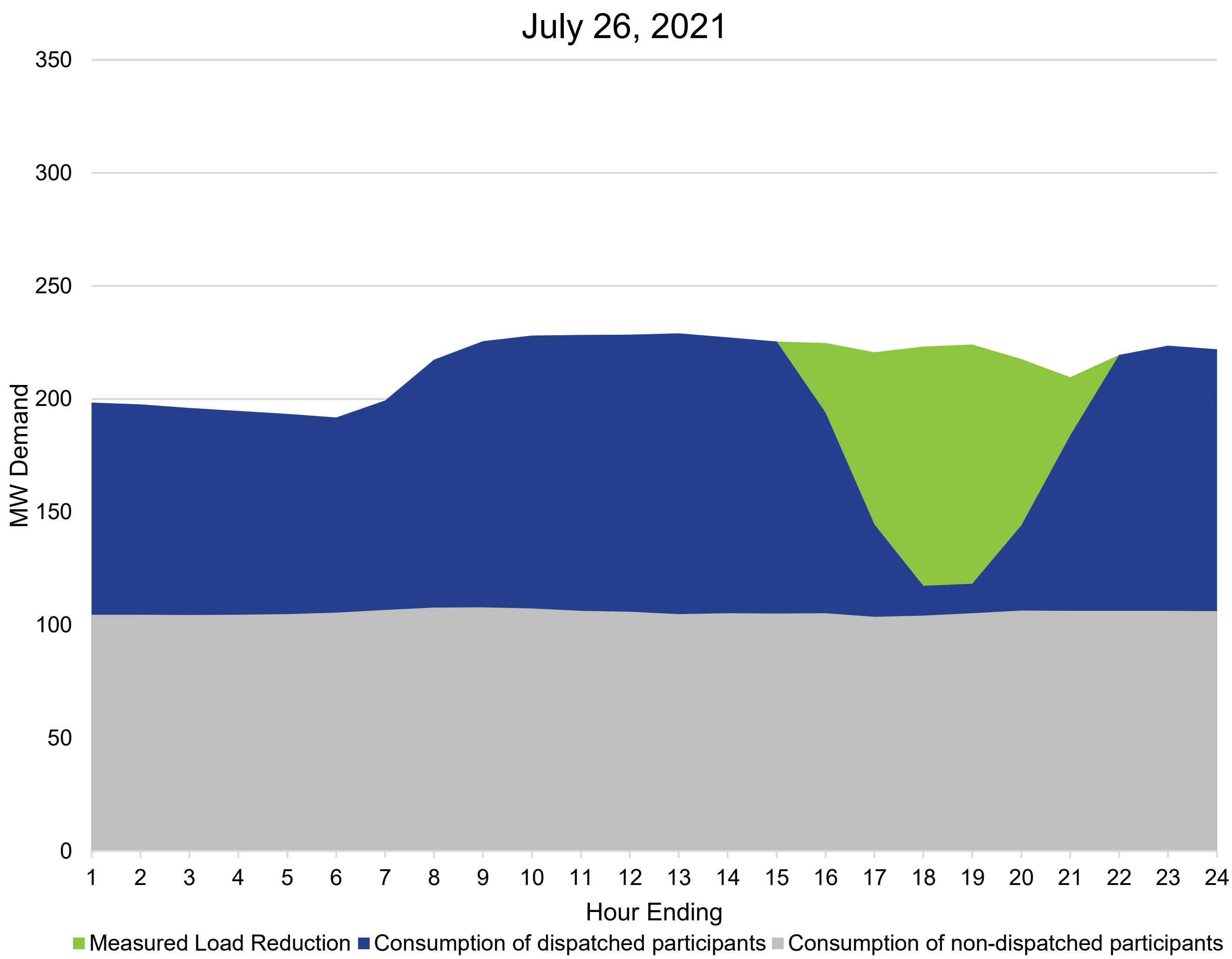

June 28, 2021
350
300
250
200
150
100
50
0
MW Demand
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour Ending
Measured Load Reduction
Consumption of dispatched participants
Consumption of non-dispatched participants

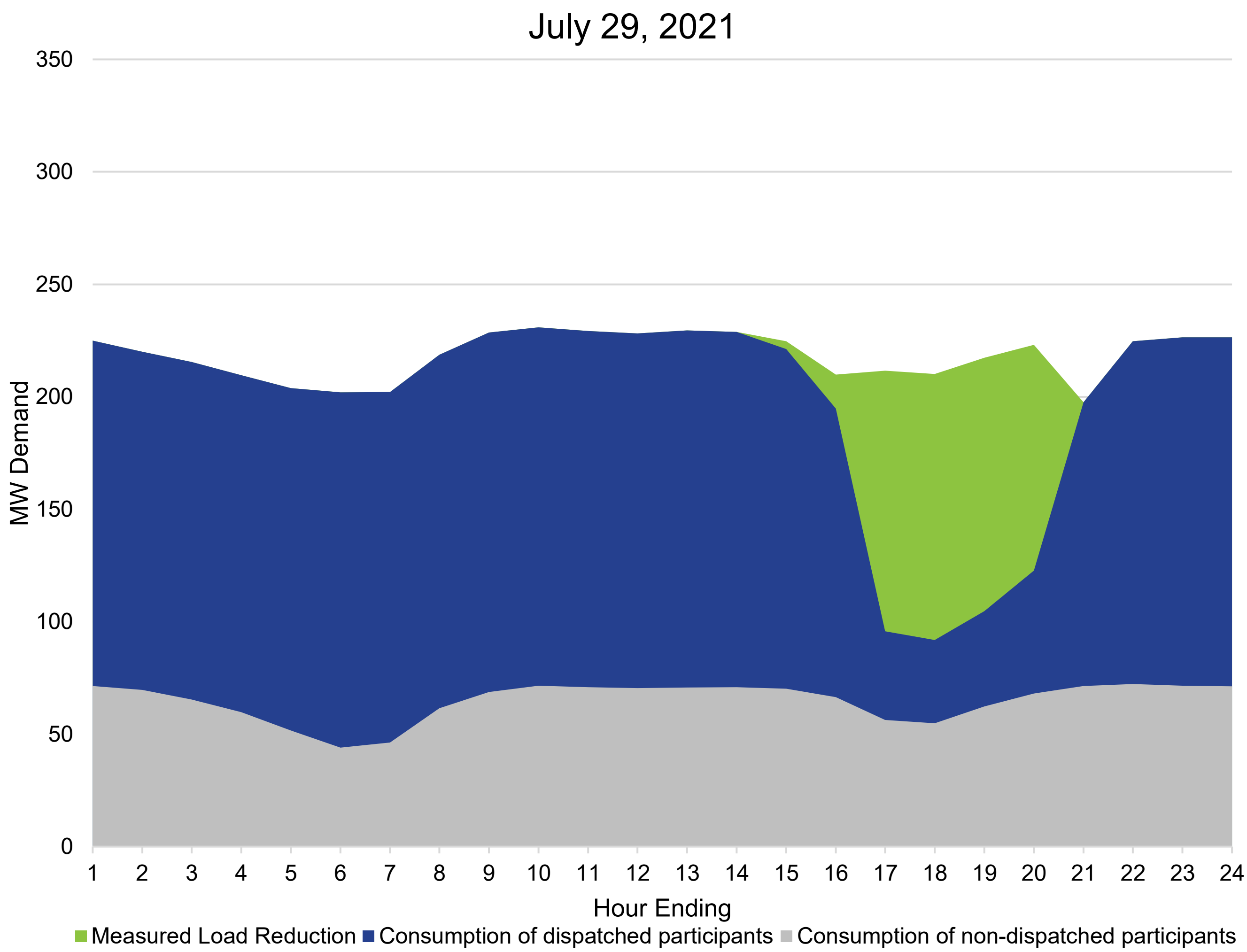


July 12, 2021
350
300
250
200
150
100
50
0
MW Demand
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Hour Ending
Measured Load Reduction
Consumption of dispatched participants
Consumption of non-dispatched participants

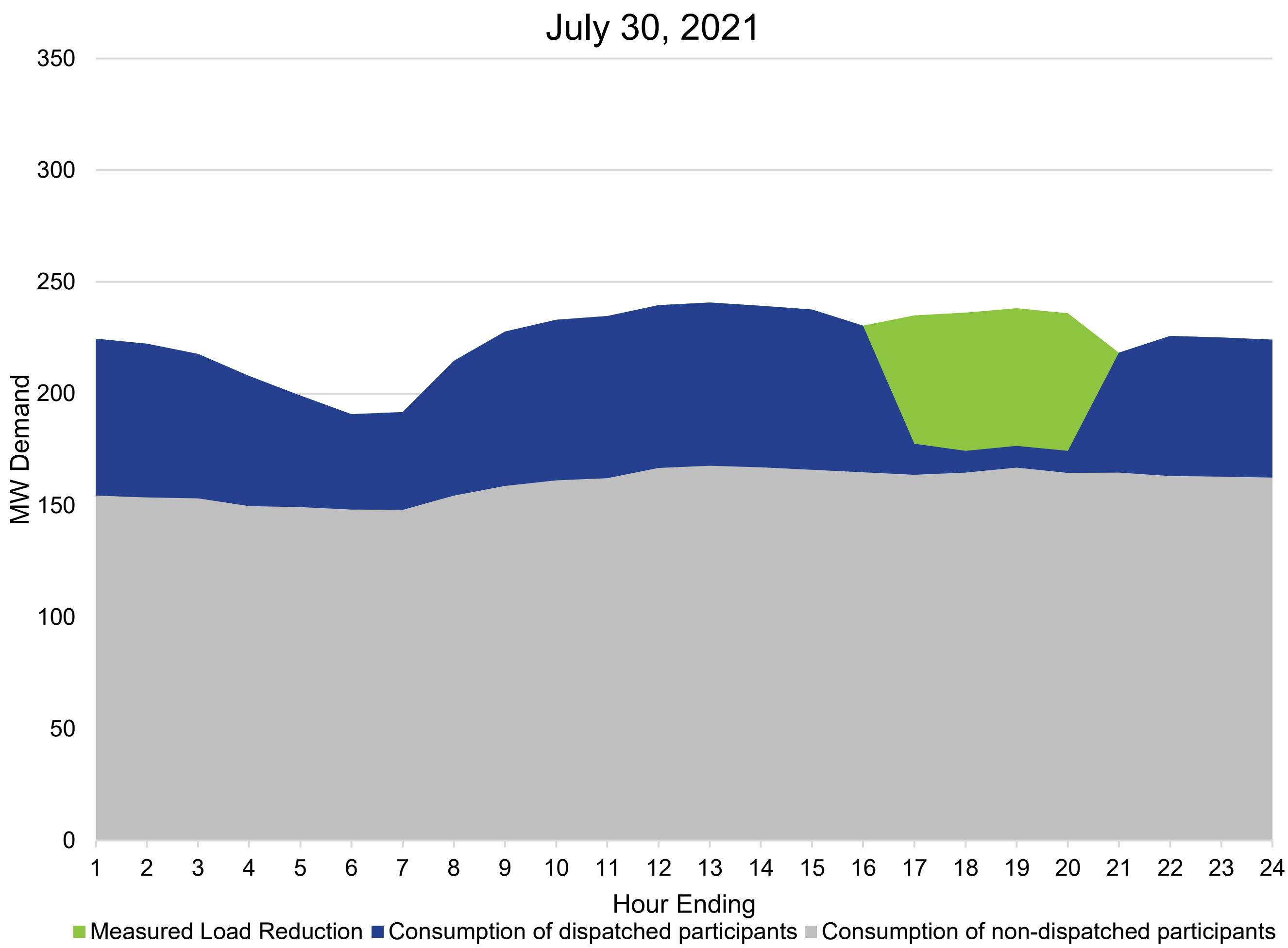


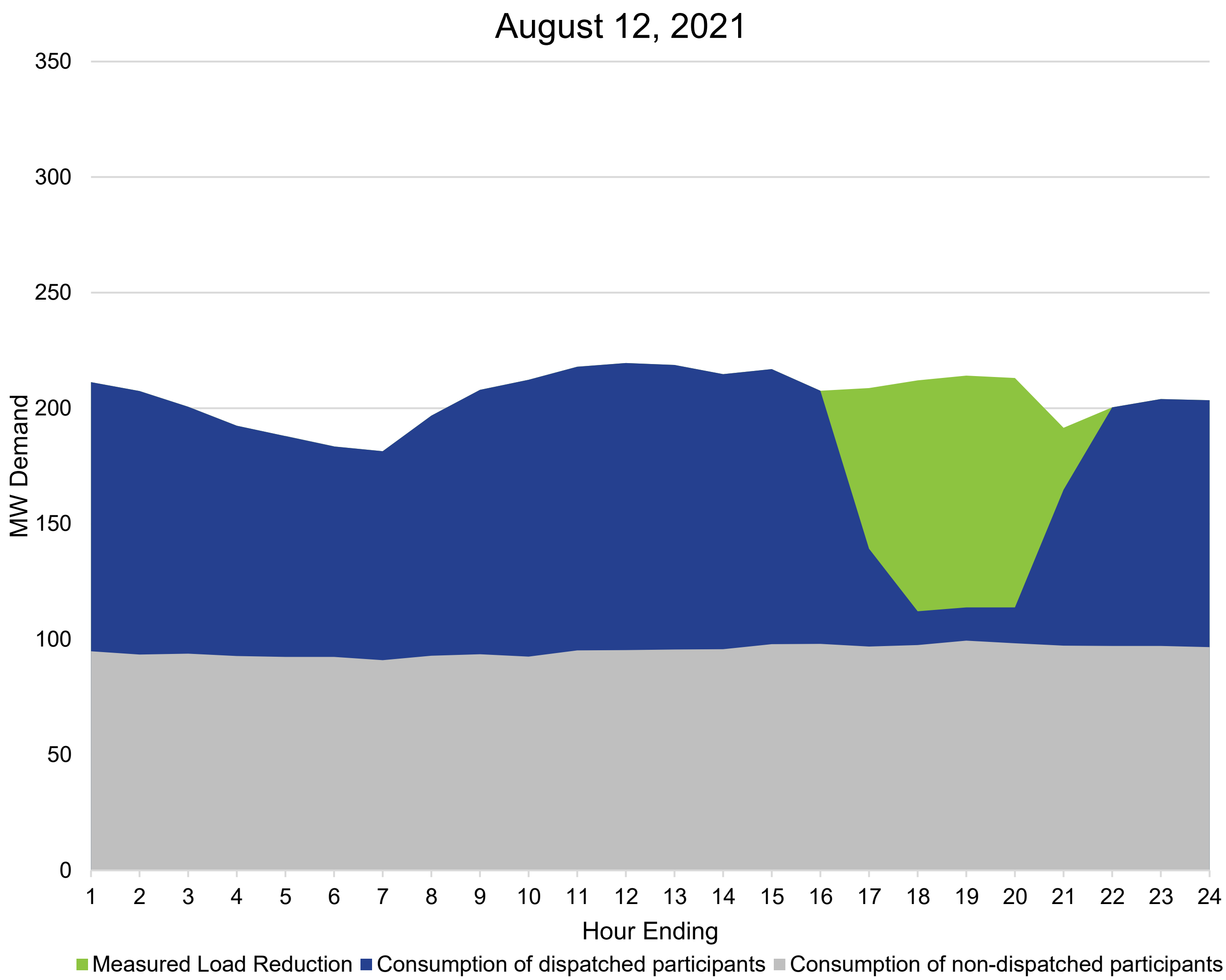
July 16, 2021
MW Demand
350
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour Ending
Measured Load Reduction
Consumption of dispatched participants
Consumption of non-dispatched participants


July 26, 2021
MW Demand
0
50
100
150
200
250
300
350
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour Ending
Measured Load Reduction
Consumption of dispatched participants
Consumption of non-dispatched participants



July 29, 2021
350
300
250
200
150
100
50
0
MW Demand
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour Ending
Measured Load Reduction
Consumption of dispatched participants
Consumption of non-dispatched participants


July 30, 2021
350
300
250
200
150
100
50
0
MW Demand
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Hour Ending
Measured Load Reduction
Consumption of dispatched participants
Consumption of non-dispatched participants



August 12, 2021
350
300
250
200
150
100
50
0
MW Demand
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Hour Ending
Measured Load Reduction
Consumption of dispatched participants
Consumption of non-dispatched participants

APPENDIX B: PARTICIPANT CATEGORIZATION

In addition to developing the evaluated results, Tetra Tech wrote analysis code to characterize participants to better understand their participation in events and identify risks to the evaluated program performance. Table 10 shows the participant categorization developed by the evaluation team.

Table 10. Participant Categorization Numbering and Description

Category	Category name	Category description
1	CELL Control Devices	Non-measured participants that do not have interval meter data
2	Interval Meter Data Error	Non-measured participants that have an interval meter data error in baseline or event period
3	Nonparticipant—Low Potential Load	Measured potential load reduced for the event is below 9 kW
4	Nonparticipant—Low Load Reduced	Measured load reduced during the event is below 9 kW, including opt-outs and device failures
5	Partial Participant—Ended Early	Measured load reduction in hour one of the event, but the load reduction in hour four was below 9 kW
6	Partial Participant—Started Late	Measured maximum load reduction is greater than 9 kW, but hour one load reduction is below 9 kW
7	Partial Participant—Partial Load Reduction	Measured maximum load reduction is less than 90 percent of the potential load reduction
8	Participants	Measured reduction is consistent and complete for the event

The categorization is completed for each event day based on the participants dispatched. Across different events, participants may be in different categories. For each event, each participant is only assigned to one category.

- *Category 1* is developed by comparing the participant list to the data provided.
- *Categories 1 and 2* are the meters that are not measured.
- *Category 3* identifies the participating locations that are not operating during the event; therefore, the adjustment reduces the potential savings to near zero.
- *Categories 4, 5, 6,* and *7* identify the participating locations that are not meeting the expected load reduction for the event. However, *Categories 5* and *6* may show the maximum savings during one or more hours of the event and would be included when reviewing the maximum demand reduction per meter. Category 7 identifies the participants that are not reducing their full potential load over the event.

- *Category 8* includes the participants that responded to the whole four-hour event. This category contains the majority of participants for all events and dispatch groups.

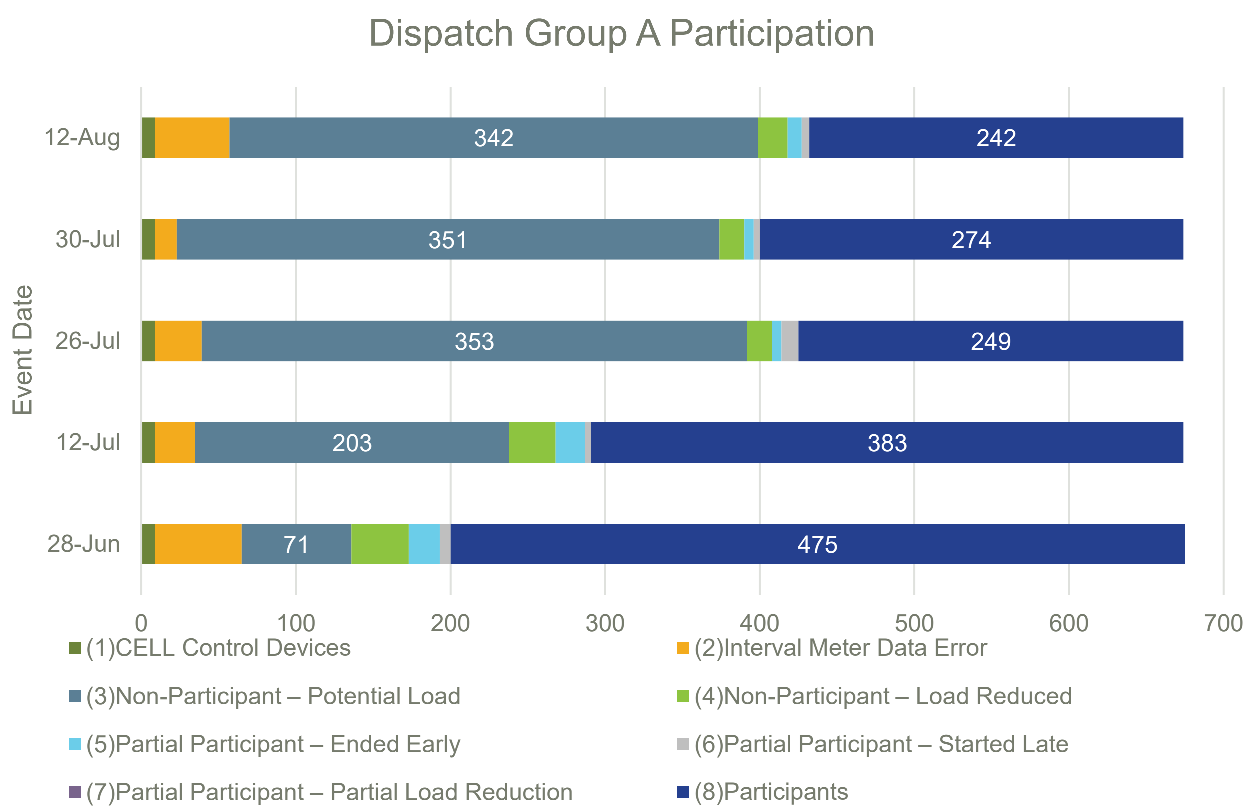
B.1 PARTICIPANT CATEGORIZATION ANALYSIS

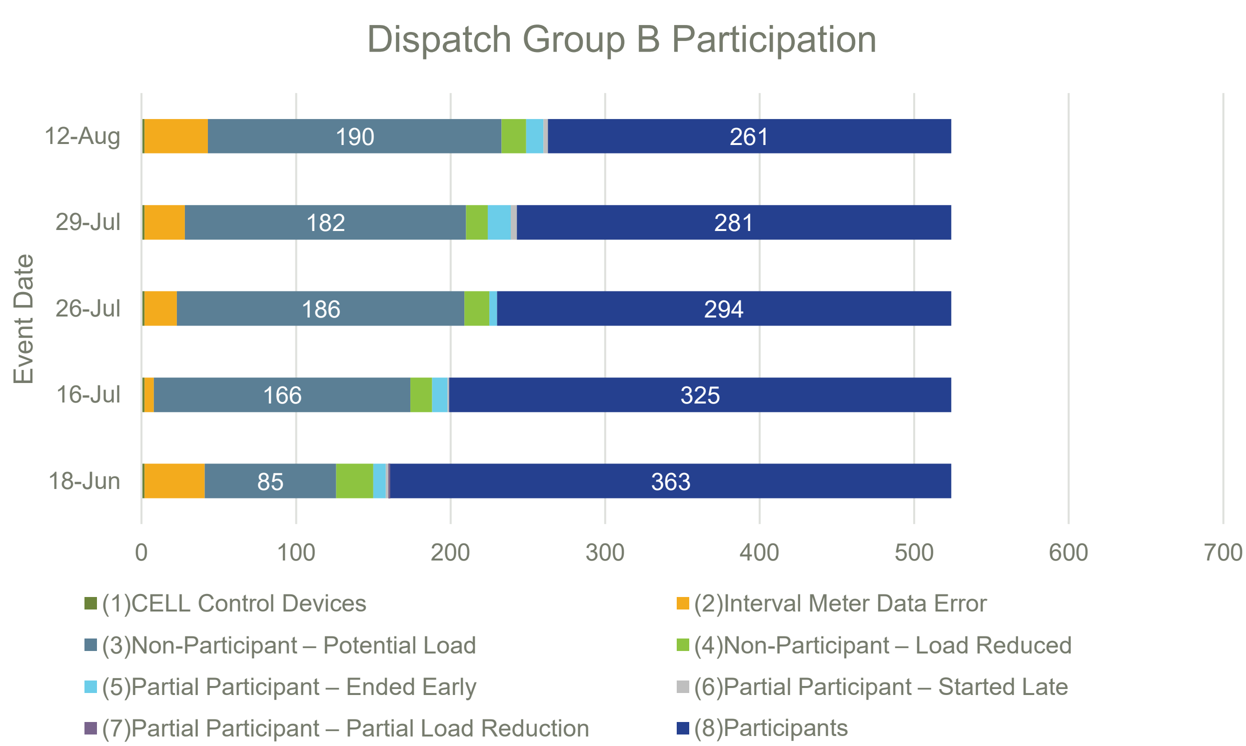
The evaluation team created an automated categorization of participants based on baseline and performance period consumption. The meter categorization varies for each participant for each event as the consumption patterns change. For example, the agricultural practices may identify that irrigation is not needed in August but is needed in June and July. Or a meter may have not responded to a call during one event, but others operated as expected. This recategorization at each event is expected for the IPR program.

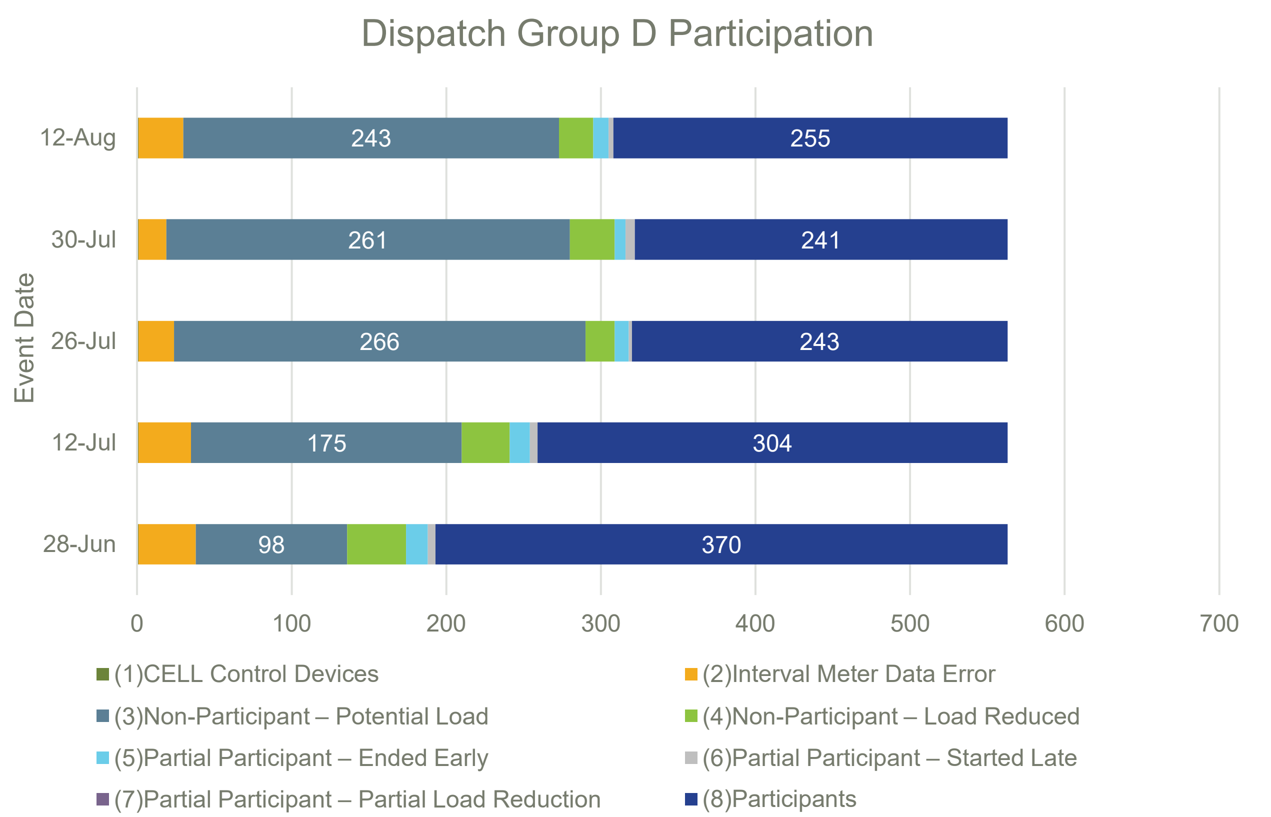
A minimal number of meters do not have interval data, which is an opportunity to improve infrastructure. Still, it is so small that it is not expected to impact the program's overall results. The larger opportunity for infrastructure improvement is to reduce the number of meter data errors. This group varies across events and sometimes has larger group failures. The large group data errors on June 18 and 28 are most obvious across all groups.

The remainder of the groups indicate non-participation or partial participation; these groups are automatically identified in the data and need to be coordinated with participant opt-out data and information collected through communication to identify which participants are coordinated with the program and which are an opportunity to improve performance.

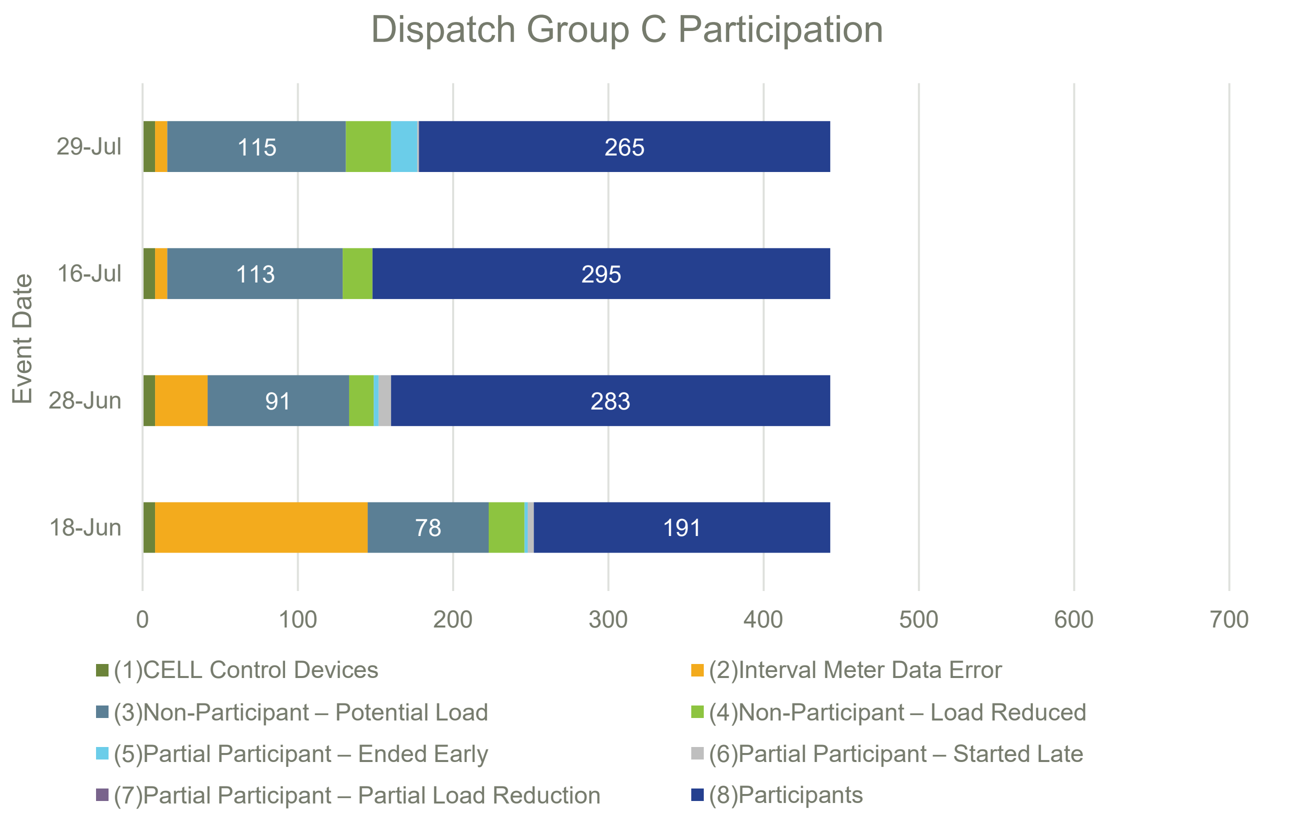
The patterns of the operation within dispatch groups are interesting. Dispatch groups A, B, and D show similar patterns of participation. Each group shows an increasing number of participants that are not operating at the time of the event as the events move later in the season. This pattern indicates that the agricultural practices of these dispatch groups will lead to similar results each year. The load control and pump operation will not be adjusted to participate. However, these three dispatch groups show a consistent proportion of participants that have the potential to reduce load but did not participate. The program should correlate with known participant actions to determine if any of the participants in this group can be consistently adjusted into *Category 8* participants.


Dispatch Group A Participation
Event Date
12-Aug
30-Jul
26-Jul
12-Jul
28-Jun
342
242
351
274
353
249
203
383
71
475
0
100
200
300
400
500
600
700
(1)CELL Control Devices
(2)Interval Meter Data Error
(3)Non-Participant – Potential Load
(4)Non-Participant – Load Reduced
(5)Partial Participant – Ended Early
(6)Partial Participant – Started Late
(7)Partial Participant – Partial Load Reduction
(8)Participants


Dispatch Group B Participation
Event Date
12-Aug
29-Jul
26-Jul
16-Jul
18-Jun
190
261
182
281
186
294
166
325
85
363
0
100
200
300
400
500
600
700
(1)CELL Control Devices
(2)Interval Meter Data Error
(3)Non-Participant – Potential Load
(4)Non-Participant – Load Reduced
(5)Partial Participant – Ended Early
(6)Partial Participant – Started Late
(7)Partial Participant – Partial Load Reduction
(8)Participants


Dispatch Group D Participation
Event Date
12-Aug
30-Jul
26-Jul
12-Jul
28-Jun
243
255
261
241
266
243
175
304
98
370
0
100
200
300
400
500
600
700
(1)CELL Control Devices
(2)Interval Meter Data Error
(3)Non-Participant – Potential Load
(4)Non-Participant – Load Reduced
(5)Partial Participant – Ended Early
(6)Partial Participant – Started Late
(7)Partial Participant – Partial Load Reduction
(8)Participants

Dispatch Group C is unique compared to the other groups as explained above in section 3.2.2. The first event on June 18 had a high number of data errors, attributed to a substation level error corrected before the third event. This dispatch group had less variation in participant operations over the season resulting in the baseline staying more constant throughout the season.



Dispatch Groups C1 and C2 include three and four meters, respectively. Four participant locations of the seven have an AMI meter with AMI interval metering data available. The other three locations, have data logger packages installed with the meter to collect participant hourly data. Idaho Power installed these data loggers to provide detailed information to analyze the performance during the event and credit the customer accurately. The only variation in expected participation was one in dispatch group C2 that was not operating until after July 29.

Idaho Power Company

Idaho Power Company Small Business Direct Install Program

2020 Process Evaluation Results

TETRA TECH

October 22, 2021

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ACKNOWLEDGEMENTS

We would like to acknowledge the many individuals who contributed to the 2020 process evaluation of the Idaho Power Small Business Direct Install program; this evaluation effort would not have been possible without their help and support.

We would like to thank Chad Severson, Shelley Martin, and Kathy Yi 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. DNV and FSG also assisted with documentation, contact information and provided feedback and clarifications as needed.

The Tetra Tech evaluation team was made up of the following individuals: Kimberly Bakalars, Kathryn Shirley, and Laura Meyer.

1.0 EXECUTIVE SUMMARY

Tetra Tech is pleased to provide Idaho Power Company (Idaho Power or IPC) with this report covering the evaluation of the first phase of the 2020 Small Business Direct Install (SBDI) program, as well as current processes. This report section consists of an introduction describing the program, evaluation activities, and key findings and recommendations. The program's process evaluation is detailed in a separate section.

1.1 PROGRAM DESCRIPTION

Idaho Power launched an SBDI program in November 2019, targeting hard-to-reach small business customers using between 500–24,999 kWh annually. The program provides eligible customers a free lighting assessment with recommendations for energy-saving lighting measures as applicable. With customer agreement, free direct installation of qualifying lighting equipment is scheduled and completed.

SBDI is offered to eligible customers in a strategic geo-targeted approach. In 2020, Idaho Power rolled out SBDI to customers in Eastern Idaho. Three cities were targeted for the soft launch: Aberdeen, American Falls, and Blackfoot.

While the COVID-19 pandemic affected outreach and access to customer sites in 2020—with a suspension from March 30 to October 4, 2020—the program conducted 207 assessments. There were 193 customers who enrolled and139 project installations for 780,260 kWh savings. Program costs were $339,830 with a UCT[1] of 1.04 and a TRC[2] of 1.61.

Idaho Power pays 100 percent of the cost for a lighting assessment and installation of eligible measures for customers. SBDI is implemented by a third-party contractor that provides turn-key services. The program is delivered through collaboration between Idaho Power staff, implementing firms DNV and FSG, and local installation contractors. FSG is responsible for (1) program outreach, (2) customer assessments, (3) recruiting installation contractors, (4) supplying and managing all lighting materials, (5) and assigning customer projects to installation contractors. DNV follows up installations with quality checks on ten percent of the projects.

1.2 METHODOLOGY

The evaluation team conducted a few targeted process evaluation activities (including a manual review), interviews with the implementers, and interviews with installation contractors. Because the implementer already surveys program participants, we did not interview them directly but reviewed the survey results.

[1] UCT = Utility Cost Test
[2] TRC = Total Resource Cost Test

Figure 1. SBDI Process Evaluation Activities

Process Activities

- Program specialist interview
- Documentation review
- Implementer interviews (2)
- Installation contractor interviews (8)
- Secondary participant feedback review

1.3 FINDINGS AND RECOMMENDATIONS

Idaho Power's vision was to create a very focused program that targeted its smallest business customers. With any new program, it is important to develop strategies prior to program launch and thoroughly document those strategies to manage a successful launch. IPC has achieved this in conjunction with the program implementers. SBDI program materials are informative and educational; a Program Operations Manual and an Outreach Plan detail program roles, expectations, and procedures while providing a firm foundation for the program. With the effort put into the Outreach Plan and Program Operations Manual, all parties are aware of their roles, schedules, and objectives of the program. Along with the operations manual, supplemental forms have been produced to support workflows outlined in the manual.

All program roles and responsibilities have been clearly defined through the program flow and specific task workflows. Quality control and customer satisfaction processes have been implemented to measure program quality. Contractors are trained on program requirements, and progress reporting is provided frequently.

The SBDI program team worked collaboratively to make the necessary adjustments for an effective rollout in the Eastern region. Overall satisfaction, measured by DNV's customer satisfaction surveys, was high and indicated no major issues with the first wave of assessments and installations. FSG has worked out some initial uncertainty with program logistics, and contractors have a clearer picture of program expectations and processes. However, contractors are still struggling with increased insurance requirements and low margins with little room for logistical uncertainty. Both could continue to create issues recruiting and retaining contractors

1.3.1 Recommendations

Tetra Tech has a few process recommendations for Idaho Power's consideration:

Continue to monitor how lessons learned in each region affect the contents of the Outreach Plan and Program Operations Manual. As the program continues to roll out to other regions, additional lessons will be learned. The Outreach Plan is updated annually, and should include revisions to scripts, task workflows, and eventually, the overall program flow and logic model as interactions adjust. Additional formatting and editing could also be applied during these updates.

Consider additional customer satisfaction follow-up with nonresponding customers. With a 27 percent response rate to the implementer's customer satisfaction survey, there may be customers who are not responding due to dissatisfaction, even though current customer satisfaction results are high. Additional research with nonresponding customers may be beneficial, given what we heard from contractors during our evaluation. Contractors indicated hearing some dissatisfaction or misunderstanding of what the program offered from customers. While the program staff already follow up with customers indicating concerns, enhanced program tracking of customers who may have experienced installation reschedules, quality control (QC) issues, complaints, or warranty issues may provide an opportunity to follow up with additional customers who did not complete a customer satisfaction survey.

Review insurance requirements from FSG. While a few contractors mentioned that the need for additional insurance was a minor inconvenience, others have declined participation because of the requirements. All of the contractors approached for the SBDI program have also completed installations through other Idaho Power programs. A couple of the contractors wondered why the FSG requested insurance requirements were higher than what is necessary elsewhere.

Work with FSG to ensure a streamlined and efficient process for contractors if reimbursement amounts cannot be increased. Three of the Eastern region contractors declined upfront to participate in the program due to their view of the compensation provided. Two more Eastern region contractors withdrew from the program after completing some installations, and one other would likely not return to the program if the compensation is not increased. Contractors we spoke with indicated that although they appreciate the steady work and exposure to additional customers, they are barely breaking even on SBDI project work and run a high risk of losing money if the projects do not proceed perfectly. FSG will need to continue improvements they have made to stocking equipment, providing the correct equipment, and indicating any additional equipment needed to improve installation efficiency and keep costs low.

Continue to improve the process for preparing the customer for the installation. One way to mitigate the risk for contractors is to ensure customers are better prepared for the lighting installations. Multiple contractors explained that it is disruptive to their schedules and the amount of time required at a location if customers are not ready for the installation. FSG and contractors can brainstorm ways to improve customer preparedness so that rescheduling is minimized. Rescheduling impacts other projects contractors can complete and leaves their staff unutilized when they could be working.

2.0 PROCESS EVALUATION RESULTS

The process evaluation served as an early check on the program design compared with industry best practices. Areas reviewed included (1) program documentation, (2) marketing and outreach, (3) the implementation process, (4) contractor 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, both the prime and subcontracting implementers, customers, and installation contractors; and
- collect qualitative information on program experience and any areas for improvement.

2.1 PROGRAM OVERVIEW

Idaho Power launched a Small Business Direct Install (SBDI) program in November 2019, targeting hard-to-reach small business customers using between 500–24,999 kWh annually. The program provides eligible customers a free lighting assessment with recommendations for energy-saving lighting measures as applicable. With customer agreement, free direct installation of qualifying lighting equipment is scheduled and completed.

SBDI is offered to eligible customers in a strategic geo-targeted approach, as seen in Table 1. In late 2019, Idaho Power rolled out SBDI to customers in Eastern Idaho. Three cities were targeted for the soft launch: Aberdeen, American Falls, and Blackfoot. The plan at the outset of 2021was to roll out the program to each region on the following schedule, although adjustments will be made depending on program needs.

Table 1. Regional Rollout Schedule

SBDI region schedules[3]	
Eastern	November 2019–June 2021*
Southern	June 2021–January 2022
Capital	January 2022–August 2022
Canyon	August 2022–February 2023
Western	February 2023–March 2023

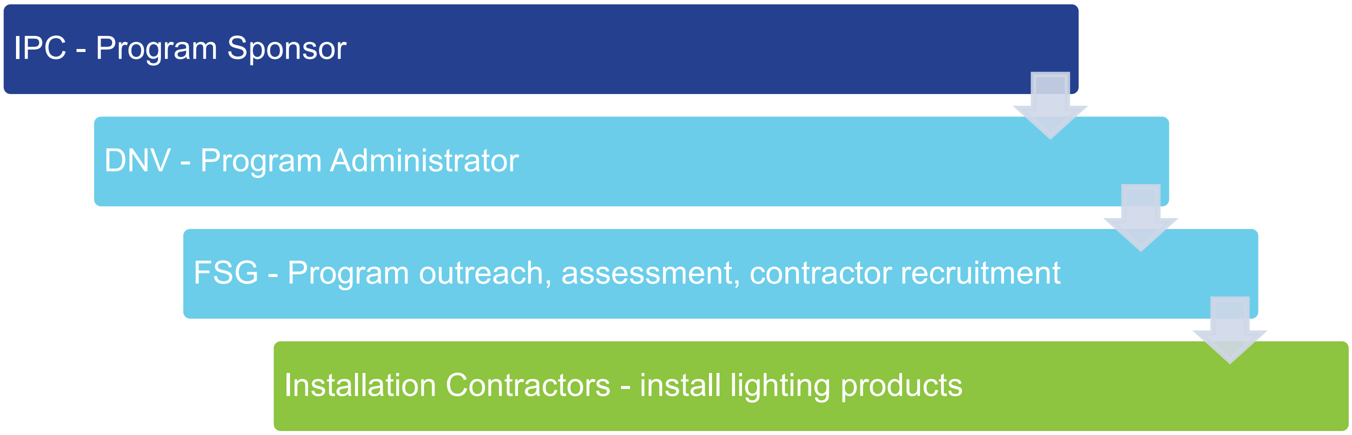
*Includes a six-month COVID-19 suspension from March 30, 2020, to October 4, 2020

Outreach began with a list of 1054 eligible small businesses. While COVID-19 affected outreach and access to customer sites in 2020, the program conducted 207 assessments. There were 193 customers who enrolled and139 project installations for 780,260 kWh savings.

Idaho Power pays 100 percent of the cost for a lighting assessment and installation of eligible measures for customers. SBDI is implemented by a third-party contractor that provides turn-key services. The current program delivery team includes DNV as the prime contractor and FSG as the subcontractor. FSG is responsible for program outreach, customer assessments, recruiting installation contractors, and managing all materials. FSG assigns customer projects to installation contractors and supplies all lighting materials.

[3] Schedule as listed in the DNV UPDATED SBDI - Operations Manual Revised v2.

Figure 2. SBDI Program Delivery Team



Electrical contractors, recruited to install lighting for the customers following the FSG assessment, work with FSG to schedule installations and equipment pick-up and drop-off.

DNV's program implementation process includes the development of documents to establish the guidelines for the program. A basic outline of activities that DNV and FSG conduct for the SBDI program include, but are not limited to:

- development of program documentation and outreach materials,
- recruitment of customers and contractors,
- implementation of assessments,
- procurement and storage of qualified equipment for installation,
- customer warranty on product and installation,
- coordination of installation schedules and installer supervision,
- installation management and quality control,
- reporting of project status and pipeline, and
- measurement and management of customer satisfaction.

2.2 METHODOLOGY

The goals for the process evaluation of the 2020 SBDI program included:

- 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;
- investigate opportunities to increase contractor engagement with the program through recruitment and retention for continued expansion of the program; and
- report findings, observations, and recommendations to enhance program effectiveness.

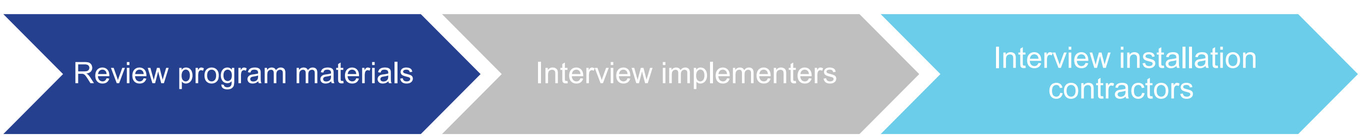
The evaluation activities for the Small Business Direct Install program are summarized in the table below.

Table 2. SBDI Program Evaluation Activities

Activity	Sample size	Objective
Interview program specialists	N/A	Understand key delivery options, how savings are claimed, and how the program is tracked. Updates and clarifications will be communicated during progress reporting calls.
Review marketing materials	N/A	Assess the Outreach Plan and associated documentation.
Review program documentation	N/A	Assess the Program Operations Manual and associated documentation, including process flows, logic model, and all forms.
Review other research efforts already completed	N/A	Examine results available from DNV's participant survey included in the Annual Status Report Supplement 2.
Interview implementation staff	Up to 4	Determine outreach methods, participation barriers, and identify communication methods that work best when reaching out to participants. Talk with DNV as prime. Talk with FSG staff in various roles.
Interview installation contractors	Up to 10	Investigate program awareness and understanding, interactions with customers, barriers to working with the program, and their typical markets.
Analyze the reporting process and tracking systems	N/A	Review program tracking system and reporting outlined in the Program Operations Manual to assess whether Idaho Power is receiving enough information to understand the project pipeline and implementer progress.

The process methodology consisted of the three primary evaluation activities shown in Figure 3. Each activity is explained in more detail below.

Figure 3. Process Review Steps



Review program materials. Program materials (in electronic format) provided by Idaho Power were reviewed, including the Program Operations Manual, Outreach Plan, and various supplemental materials mentioned in the Program Operations Manual and Outreach Plan.

Interview implementers. We spoke with a representative from DNV, the firm responsible for implementing the SBDI program. DNV contracts with FSG for contractor recruitment and training, assessments, supply management, and local management. We were able to talk with staff from both DNV and FSG about the processes outlined in the program operations manual and outreach efforts highlighted in the outreach plan. The implementer interview guide can be found in Appendix A.

Interview installation contractors. Installation contractors working in the Eastern region were contacted during the program's initial launch as part of the process review. The launch period was a time of adjustment as FSG set up in Idaho, and we were interested in what contractors had to say about how the process progressed for them.

We talked with four contractors that had installed equipment through the program. The installation contractor interview guide can be found in Appendix B. We also spoke with four contractors that initially expressed interest to FSG but never returned their paperwork to proceed with installations. The list of questions can be found in Appendix C.

2.3 PROCESS REVIEW RESULTS

We reviewed program documentation and spoke with program staff, implementers, and installation contractors to get feedback from all program stakeholder perspectives. We present process results in the areas of program documentation, marketing and outreach, implementation, and reporting.

2.3.1 Program Documentation

Idaho Power, DNV, and FSG all provided useful program documentation for evaluation review.

Table 3. SBDI Program Documentation

Documentation	Examples
Outreach Plan	• Outreach objective, processes, and roles • Mailer and email text • Outbound call script • Walk-in script • Outreach schedule by region
Program Operations Manual	• SBDI program flow o Sub-step flow charts also included • SBDI logic model • CRM tracking system status definitions
SBDI program forms	• Assessment report and proposal example • Customer participation agreement example • Customer satisfaction survey • Quality control (QC) inspection form • Project completion form
Annual Report Supplement 2: Evaluation	• Customer satisfaction results
Reporting	• Overview of reporting from DNV to Idaho Power • Example of customer journey tracking

Program Operations Manual. The Program Operations Manual covers everything from a high-level program overview and objectives to definitions and detailed workflows. The SBDI program forms were all listed in the Program Operations Manual and were provided separately for review.

DNV follows industry best practices with a Program Operations Manual that is thorough in discussing all aspects of the SBDI program delivery. Examples of topics covered in the manual are:

- customer and measure eligibility;
- lead generation process;
- regional schedules with targets for assessments and installations;
- field safety protocols, risk assessment, and safe job analysis checklist;
- installer training outline;
- CRM status definitions;
- reporting requirements (weekly, monthly, quarterly, and annual); and
- program accounting processes.

We also found a well-developed program flow and logic model in the Program Operations Manual.

A program logic model is a visual representation of the program's theory that illustrates a set of interrelated program activities that combine to produce various outputs that lead to short-, mid- and long-term outcomes. The program's logic model serves as a roadmap to develop and inform various audiences on program design and guide the systematic approach of EM&V activities. A program logic model can lead to a cost-effective plan to determine program effectiveness in meeting its goals and objectives by linking to performance indicators to provide ongoing feedback to program managers.

The models flow top to bottom through each activity, then left to right, and are typically organized according to the four primary categories below.

- **Inputs or resources.** Identify the key financial, staffing, and infrastructure resources that support each activity. When possible, identify specific budgets or systems required.
- **Program activities.** The overarching activities describe the major components of the program. Examples may include developing program infrastructure, recruiting program allies, marketing to customers, energy assessments, measure installation, and quality control.
- **Outputs**. Metrics resulting from the activities. These tend to be measurable "bean counting" results (e.g., provide outreach events at five community fairs). The outputs can be tracked or measured to ensure the activities occur as expected.
- **Outcomes.** Expected outcomes that result from the program activities beginning in the first year. When possible, specific goals are attached to those outcomes and can be split to reflect short-term and long-term outcomes. Examples of short-term include annual energy savings, participating customers, and trade allies. Long-term outcomes are the stretch goals or sustainable outcomes resulting from program activities, such as "establish an energy-efficient industry" and "the measure becomes standard practice." These may be associated with a full program plan cycle.

Based on the reviewed logic model, the basic activities for the SBDI program are (1) program outreach, (2) assessments, (3) proposals, (4) project installs, (5) QC inspections, and (6) customer satisfaction. The inputs and resources all seem to be reasonable, given how the program was launched. Based on feedback we heard during the evaluation, it also appears that DNV and FSG have accomplished most of or all the output targets.

Outcomes also appear to be reasonable expectations for the SBDI program. However, there may be one customer satisfaction outcome that is a "stretch" goal: Idaho Power gains a deeper insight into customer needs that could be used to tailor future C&I Retrofit programs. We are not sure how this will be accomplished, given the current communication processes and level of feedback collected.

The overall program flow shows the interaction between customers, DNV, FSG, and Idaho Power at each stage of the program process. It is a nice visual representation of which firm is responsible for each activity. In addition to the overall program process flow, specific task workflows are included for multiple activities:

- call routing situations,
- email responses,
- assessment workflow,
- installation workflow,
- customer satisfaction survey workflow,
- QC inspection workflow,
- complaint resolution, and
- customer list scrubbing.

Outreach Plan. The Outreach Plan thoroughly documents DNV’s and FSG's strategies to meet the SBDI program objectives. It repeats some of the information in the Program Operations Manual.

It outlines staff roles and responsibilities and defines expectations, such as key performance indicators. Engagement steps detail how the implementers will target customers and the regional rollout.

The manual includes scripts for staff calling customers, visiting customers, and reaching out to contractors. Customer satisfaction survey questions are included as well. Installers were also provided with scripts for setting appointments with customers.

Like the Program Operations Manual, the Outreach Plan contains flowcharts for customer engagement, SBDI assessments, and project installations. It also outlines the contractor onboarding and training process and risk mitigation procedures.

Detailed outreach results are discussed in Section 2.3.2. The results of the Customer Satisfaction Survey we reviewed are discussed in Section 2.3.3. Reporting documents reviewed are covered in Section 2.3.4.

2.3.2 Marketing and Outreach

Outreach for the SBDI program involves a two-pronged approach. Customers must be recruited to participate in the program, and contractors are needed to install the lighting equipment.

Customers. DNV was responsible for marketing and outreach to customers based on a list provided by Idaho Power. Outreach began in November 2019, using several methods to inform targeted customers.

Figure 4. Outreach to Customers

A key challenge for the program has been the eligibility requirements. Idaho Power's objective with this program is to focus on very small businesses, using less than 25,000 kWh annually. This requirement makes it more of a targeted program than the typical FSG model for SBDI programs, which have higher savings thresholds, and FSG has adjusted.

Throughout the Eastern region rollout, the SBDI team established a scrubbing process to identify customers most likely to meet the eligibility requirements of the SBDI program. Idaho Power sent direct-mail letters to customers inviting them to participate in the program. Email outreach in March of 2021 was found to be less effective than direct mail letters and follow-up calls. FSG made follow-up calls to customers who received letters, offering another opportunity to hear about the program and to confirm their interest in participating. Call scripts are available to staff conducting outbound calls. Customers can also call a number on mailers and emails to request more information about the program. In-person visits were also used as outreach, as needed, but were suspended once COVID-19 impacted the safety of walk-in appointments.

As customers responded to the letters and follow-up calls, lighting assessments were scheduled. Customers who agreed to have LEDs installed at their facility were scheduled for project installation beginning in January 2020. DNV reported that approximately 60 percent of the assessments came from outbound calling, another 10 to 15 percent from FSG staff visits to customers, and roughly 10 percent resulted from Idaho Power energy advisor outreach.

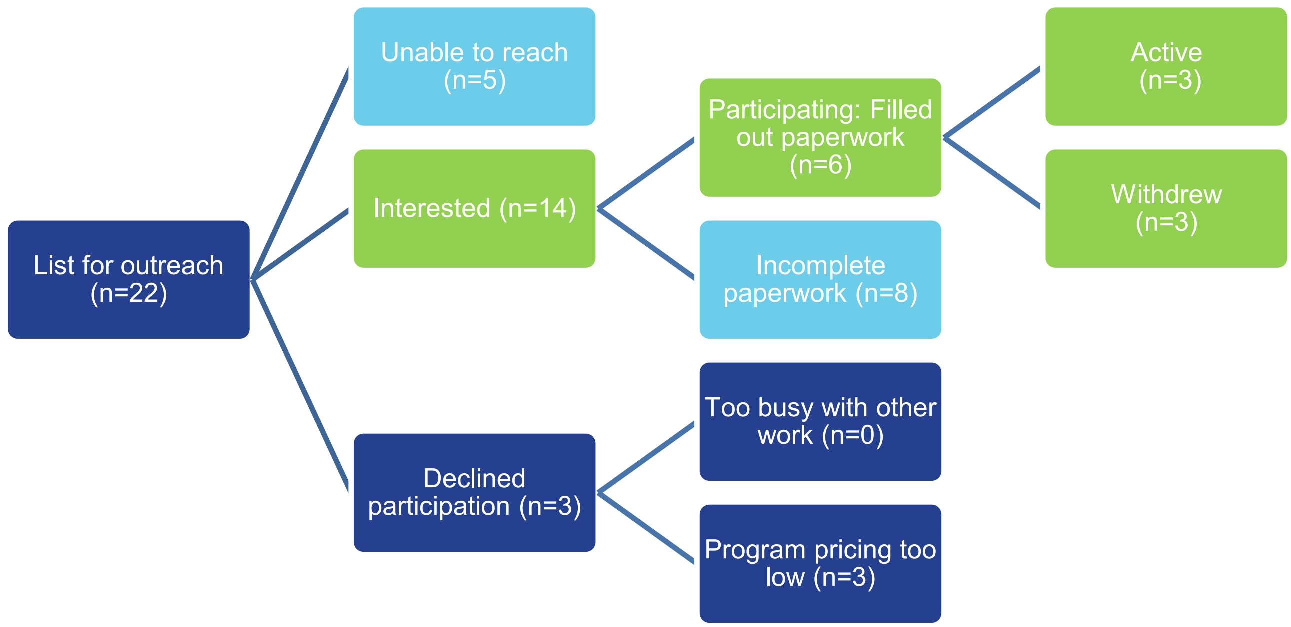
Customer interest in SBDI was on the rise when the COVID-19 pandemic occurred. Idaho Power suspended on-site customer activity for the SBDI program offering end of March and removed the suspension early in October 2020, with on-site activity adhering to COVID-19 safety protocols. When on-site activity resumed in the fall, the company's third-party program implementer worked to reinstate equipment installers and reconnect with eligible customers who had signed up for a lighting assessment or project installation before COVID-19 restrictions. There were 139 project installations performed in 2020, along with 11 post-installation inspections.

Contractors. Recruitment of contractors begins about four months in advance of the launch date for the region to ensure contractors are trained and ready once customers are contacted. The process begins with Idaho Power identifying electrical contractors who have participated in other Idaho Power programs, then additional contractors are added to the list if needed. An Idaho Power representative reaches out to gauge interest in the program; those leads are forwarded to FSG for additional outreach and training. Once contractors indicate interest, FSG sends them paperwork and discusses the detailed program requirements.

Figure 5. Outreach to Contractors

The figure below outlines the outcomes of the outreach conducted by FSG during the first phase of the SBDI program in Idaho Power's Eastern region. All six contractors that filled out paperwork are considered "participating" contractors and completed at least a few projects. Three contractors installed projects throughout the entire Eastern region timeframe, while three withdrew, asking FSG not to allocate them any more projects.

Figure 6. Overview of Contractor Participation in the Eastern Region



Although no contractors in the Eastern region declined participation at the initial stages of contact due to heavy workload, it has been mentioned in the Southern region as a reason for not participating.

2.3.3 Implementation

We received feedback from the program implementers (DNV and FSG), installation contractors, and contractors missing paperwork and reviewed customer feedback collected by DNV to understand how the implementation of the SBDI program has progressed in the Eastern region. Overall, implementation has gone well for a first-phase rollout. All groups indicate there were lessons learned along the way, with many adjustments made within the Eastern phase and applied in the Southern region as it begins.

Implementer feedback. Implementers reported a collaborative working relationship between all parties and that communication was working well. Many lessons were learned during the Eastern region rollout, and adjustments were made in Eastern and for subsequent regions as they are learned.

Initial challenges in the Eastern region that have been overcome include lack of customer trust in non-local companies, recruiting contractors and managing their workload, and adjusting to the four to six week installation timeframe.

DNV and FSG found that customers in Idaho prefer to support local businesses. While local contractors would be used for installations, DNV and FSG are responsible for outreach and assessments. Both firms were able to provide local staff, and a local phone number was assigned to FSG.

As outreach to customers became more productive, and assessments were scheduled, DNV developed a *customer journey tracker* to track customers through stages of participation from outreach to QC. The results of the tracker are provided to Idaho Power monthly for progress reporting.

FSG reports that approximately 95 percent of customers that decide they will proceed with the installation of recommended lighting do so at their assessment. The others take anywhere from a day or two to months to get approvals from landlords or corporate offices. For customers that decide not to move forward with lighting installations after the assessments, FSG provided the following as common reasons they have been given:

- moving in the future,
- may not continue the business,
- corporate requirements conflict, and
- unable to get permission from their landlord.

FSG also learned how to balance SBDI projects with contractors' existing workload. To respect their time and existing clients, FSG tries to give contractors a batch of SBDI customers in an area with a two-week window for scheduling so they can reasonably fit the projects in around other work and keep a steady pace. This process has worked out well for the three contractors completing the bulk of the projects in the Eastern region.

Participant satisfaction. As the prime contractor administering the program, DNV sends surveys to all customers that receive assessments and new lighting through the SBDI program. After installations are completed, DNV sends each customer an invitation to complete an online survey about their program experience.

We reviewed the results of the Customer Satisfaction Survey reported by DNV to Idaho Power. To avoid overburdening customers, we did not survey customers again for this evaluation effort.

DNV sent customer satisfaction surveys to 98 program participants in 2020, of which 27 surveys were returned, for a 27 percent response rate, which is in line with DNV's 25 percent suggested minimum. Overall satisfaction from respondents was high and indicated no major issues.

Key highlights include the following:

- Nearly 89 percent of respondents said they were *very satisfied* with the program
- All respondents reported they were *very satisfied* with the equipment installed.
- All respondents found the program easy to participate in, with nearly 93 percent indicating the program was *very easy*.
- All respondents reported they would likely recommend the program to other small businesses, with nearly 93 percent saying they were *very likely* to recommend it.
- When asked how their opinion of Idaho Power has changed since participating in the program, just over 48 percent of respondents reported having a more favorable opinion of Idaho Power. Nearly 52 percent of respondents reported no change in opinion.

Active installers. We talked with four contractors, all small businesses, who completed at least one installation in the Eastern region. Three of them installed between 40 and 150 projects; the other withdrew after installations in one city before COVID-19 restrictions were put in place.

Three participating contractors thought communication with FSG worked well once the initial bugs were worked out. They thought FSG was good about getting projects set up and getting information out about projects, including breaking down projects so the contractor knew what to expect and how long it might take.

As part of the recruitment process with installation contractors, FSG discusses the features of the program, the compensation, and added benefits. Two of the installation contractors shared benefits they had realized from working with customers through the SBDI program.

It was good exposure and teaching for the apprentices who experienced different projects and ways to wire lights.

The program kept us busy and the money flowing in.

It spread my business name to bring in more work.

I'm happy they were able to recycle so many CFL and metal halide bulbs, so they didn't go in the trash.

SBDI participation did not require any major modifications to contractors' overall business practices. Contractors adapted to the SBDI program requirements and processes as they were developed in the Eastern region.

Contractors reported that customers were typically very happy to be getting new equipment for free from Idaho Power. The few customer questions or concerns usually involved (1) the lighting color of the LEDs they would receive, (2) misunderstanding that they were only getting new bulbs but not new fixtures, (3) that not all fixtures would be upgraded, and (4) a couple of cases of property damage that were resolved.

We asked contractors to rate their overall satisfaction with the SBDI program on a scale of 1 to 5, where 1 is *not satisfied*, and 5 is *very satisfied*. Three of the four responding contractors provided ratings of 3, 4, and 5. The fourth did not rate the program. Some of the challenges shared by contractors included increased insurance needs, incorrect material counts, and customers not ready for installations.

One contractor said it took them a few tries to get the required paperwork correct. Three of the contractors also mentioned having to increase their insurance to be able to participate. A few times, the contractors got the wrong materials for jobs. In those instances, FSG would get it resolved; local staff would even run new materials to the job site. One contractor had issues with customers not being ready for installations when they arrived, even with notice of what they needed to do. FSG suggested it was alright to reschedule those appointments, but that affected the contractor's work schedule and staffing.

All four of the contractors we spoke with had previous experience with other Idaho Power energy efficiency programs and highly praised those experiences. While the participating contractors found some benefit to having the SBDI projects identified, they also admitted that it reduced some of the customer interaction and ability to customize systems or projects for customers. It also put them in a difficult spot when customers had questions or concerns.

Compared with other Idaho Power programs, contractors felt the compensation for the SBDI installations was marginal and made it difficult to break even if there were unanticipated problems.

It didn't really leave me any margin - it was awfully tight. Any extra travel blew any margin.

The process worked well, but I would decline future work if FSG could not find a way to provide money for a pre-visit.

Some projects lost money, and some made money. I think I came out about even in the end, but I had to closely watch projects to cover costs.

One selling point to overcome the conservative reimbursement was the possibility of additional work with customers where they installed new lighting. This benefit was realized for one of the four responding contractors, but not the other three. Two contractors have experienced no additional work, and one has had less than $500 in additional business from the SBDI customers.

When asked what worked best for them with the SBDI program, contractors mentioned how well the process worked with FSG. They generally liked that jobs were set up for them, and they had a steady workflow. Contractors appreciated that FSG was pleasant to work with, had good administrative policies, and provided prompt payment. Even the contractor that withdrew from the program noted that the overall experience with FSG was good.

However, even with positive experiences with the SBDI program, all four contractors had suggestions for some minor improvements to the program.

I would like to see better internal communication at FSG. There were a few times we had issues getting the right parts for the installations. The person at FSG's material storage could be more knowledgeable about what is needed.

We think there could be a better way of prepping the job. Maybe giving the contractors an extra $65-$75 per job to inspect and get it ready. This would help avoid issues with furniture not moved or incorrect materials for the job.

I think it would be nice to have a recycling bin at the materials warehouse for more of the removed equipment. It would be one more step in recycling more material.

FSG could provide better descriptions of the installation project. We ended up needing lifts that were not mentioned when we were assigned the project.

Installers missing paperwork. Eight contractors FSG talked with expressed interest in providing installation services through the SBDI program, but they never completed the required paperwork. We reached four of those contractors to ask them a few brief questions about why they did not proceed with the program. All four have worked on other Idaho Power programs in the past and enjoy working with those programs and Idaho Power.

Two of the contractors do not remember receiving the paperwork at all, but COVID-19 also made things hectic during the timeframe when the program launched. The other two contractors received the paperwork; one early in the program launch, the other learned of it after the October restart.

The two contractors who remembered receiving the paperwork provided a few reasons for not completing the paperwork and participating in the SBDI program. The primary issue mentioned by a couple of the contractors was the amount of insurance required. One contractor was curious why they needed more insurance for SBDI than they needed for other Idaho Power programs or what the state already requires.

One contractor did not feel comfortable with how FSG handled their questions about participation logistics. They felt there was a lack of direction or plan on things like storage of materials or what would happen if there were damaged materials or customers made warranty claims. With that uncertainty, the contractor felt that the compensation was insufficient for them to absorb potential unforeseen costs.

When we asked the contractors what could be done to attract more contractors to install lighting through the program, they provided a few ideas that Idaho Power and FSG are aware of:

- Adopt more reasonable insurance requirements for the SBDI program.
- Increase the compensation to contractors for installations. Contractors mentioned barely covering their labor costs for most projects and situations where poor communication, missing parts, or unprepared customers caused them to lose money.
- FSG could communicate better about individual projects and answer questions more thoroughly about the overall process. Increased comfort with the logistics would ease contractor concerns.

Based on conversations with participating contractors, FSG communication may have improved over the course of execution in the Eastern region.

2.3.4 Reporting

We reviewed an April 2021 monthly report and the SBDI Program Annual Report PY1 from DNV to Idaho Power. Every month, DNV reports field activity (calls, assessments, installations, savings, etc.), installations completed per installer, the average installation time, and quality control summaries.

Based on a review of the summaries for the field activity and installations by contractor, the timeframe for reporting was unclear. We assume it was for the month before the report, but it would be nice to have that stated in the reporting. In addition, it would have been interesting to see the build-up each month compared to prior months.

For example, a table showing contractors on each row and months across the top (or transpose them) would be clear when contractors began installations, their progress over time, and if they drop off. A "total" column could be added at the end of the region timeframe to see the level of effort from each contractor. If process feedback is sought from installation contractors in subsequent regions, knowing their level of effort and delivery timeframe is useful.

Table 4. Example of Cumulative Installations by Contractor

Installer	"Month 1"	"Month 2"	"Month 3"	"Month…"	Total
AAA Electric	8	15	20	4	47
BBB Electric	12	2	0	0	14
CCC Electric			1	6	7
DDD Electric			1	15	16

A similar process could be used for the field activity summary to provide a "rolling history" of the outbound calls, assessments, installations, kilowatt-hours saved, etc.

APPENDIX A: IMPLEMENTER INTERVIEW GUIDE

IMPLEMENTER INTERVIEW GUIDE Idaho Power SBDI Evaluation	
Interviewee(s)	
Interviewer(s)	
Program/Area of responsibility	
Date(s):	

In-depth interviews will be conducted by senior Tetra Tech staff via telephone. The interviews 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 and flow of conversation.

We will attempt to schedule interviews with respondents in advance to accommodate each implementer's schedule. Interviewers will adjust the probing to limit interview time to 45 minutes.

Introduction

Hello, may I speak to ______? My name is _______, with Tetra Tech. Idaho Power has hired us to evaluate their Small Business Direct Install program. I would like to ask you some questions about your experience delivering the SBDI program since it launched. The information you provide will assist us in assessing the program and finding ways for the program to serve the nonresidential market most effectively.

The interview should less than an hour. Before we begin, is it okay to record our call? This is for note-taking purposes to make sure we accurately represent your responses.

A. Program Role

Provide brief overview of the roles and responsibilities as the evaluator understands them.
(IPC, DNV prime, FSG subcontractor, installation contractors)

1) Is our understanding of your current role in Idaho Power's SBDI program correct? How have your responsibilities with the program changed since it was launched?

2) How has the interaction between the parties (IPC, DNV, FSG, and installation contractors) been working?
   - How does current documentation (e.g. program operations manual, outreach plan, reporting) facilitate the interaction and communication between parties?
   - What have been some of the successes of these interactions; do you have suggestions for improvements?

B. Program Design and Marketing

3) How were the target numbers of assessments and installations determined?

4) Outreach Plan (reviewed)

- What have been the more effective outreach methods to generate interest in the assessments? What has not worked as you expected?
  - Direct mailers, outbound calls, walk-ins
  - When will street sweeps pick up again

- What types of challenges have you encountered with the customer lists and eligibility requirements?
- What steps have been taken to overcome them?

C. Program Delivery (Program Operations Manual Reviewed)

6) What is the scheduling process for the Assessments? What is the typical timeframe from customer call to assessment visit?

7) What are the most common upgrades identified during an assessment? What else are you reviewing?

8) What proportion of assessment customers sign the project proposal immediately?
How long can it take others to consider the projects?
When do you typically follow-up with them to prompt them to move ahead (30 day suggestion)?

9) What are the most common reasons customers go ahead with projects?
Why don't others move forward? (Selling, moving, suspicious, no benefit, etc)
Is this information tracked against customers that have been contacted?

10) Who is responsible for getting customer status updates into CRM? How is the data entry checked for accuracy?

11) How is the installation timeframe of 4-6 weeks working so far?

12) Have you had any issues procuring materials? How has that been resolved?

13) What challenges have there been…
   a. reaching installation contractors? What methods have been most effective?
   b. recruiting installation contractors? How have they been overcome?
   c. retaining installation contractors? What else can the program do? How much is on the contractor?

14) Who has been completing the QC Inspections?
What percent of the projects have been checked? What is the selection process?
What are the typical findings from the inspections?

15) How long does it usually take participants to return their satisfaction survey? What proportion are you getting back?

16) The results of the customer satisfaction survey look pretty good. What are some of the issues reported through the survey?

17) Have there been any complaints throughout the process in the first region? At what stage are they most likely to occur? How were they resolved?

18) Tracking appears to be managed through the CRM system. At what point do you provide the tracking data to Idaho Power? How is the data checked for accuracy?

D. Regional Rollout

19) Can you talk a little bit about how you are doing the geographic rollout?

20) What lessons have you learned from the rollout of the first region?

21) What changes will be made as you roll out additional regions?

E. Evaluation

22) What do you see as future challenges for the program?

23) What do you hope to learn from the evaluation?

24) Are there specific topics we should investigate with installation contractors?

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

APPENDIX B: INSTALLATION CONTRACTOR INTERVIEW GUIDE

Idaho Power - SBDI Program Evaluation
Installation Contractor Interview Protocol

Note: Because senior staff will be conducting interviews, contractor interviews 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 circumstances.

NAME: ____

COMPANY: ____

PHONE: ____

INTERVIEWER: ____

DATE COMPLETED: __________________ **LENGTH:** ______________

My name is _______, with Tetra Tech. Idaho Power has hired us to evaluate their Small Business Direct Install program. I would like to ask you some questions about your experience with the Small Business program. You would have completed work for this program as a subcontractor to FSG. The information you provide will assist us in assessing this program and finding ways for the program to serve the small business market most effectively. This interview should take approximately 30 minutes of your time. Before we begin, is it okay to record our call? This is for note taking purposes to make sure we accurately represent your responses.

Firmographics

F1. To get us started, could you briefly tell me a little bit about your business (or position)? What types of services do you offer?
Probe for approximate number of projects completed or equipment installed by type in 2020 (or for a more typical year).

F2. How many employees (full-time equivalents) does your company employ?

Program Involvement

P1. How did you become involved with the SBDI program? Were you already working with Idaho Power or did FSG reach out to you?

P2. How are you currently receiving information about the SBDI program? Are you receiving enough notice about the projects you are assigned to get them completed within the expected timeframe? Is there any other information you would like to receive in order to make the process more effective or efficient?

P3. What is the process for completing work through the SBDI program? How many projects have you completed?

P4. How often do you interact with FSG staff? How would you characterize that interaction?

P5. Has your involvement with FSG and the SBDI program affected your general business practices?
How? (Probe for adjustments to quality of installs, equipment stocked, recommendations to other customers)

P6. Have you completed any follow-on or additional work for any of the customers where you initially installed equipment under the Small Business Program? What was the nature of that work?

Customer Interactions

C1. Who are you typically working with at the client site when you install equipment (e.g., owner, manager, etc.)?

C2. What questions do customers typically have when you install equipment through the program?

C3. Do customers ever talk to you about why they decided to install equipment? If so, what are some of the typical reasons? What benefits do they mention from participating in the program?

General Wrap-Up (All)

G1. How would you rate your overall satisfaction with the program on a five-point scale, where 1 is not at all satisfied and 5 is very satisfied?

G2. What is working best, in your opinion, with the SBDI program? What is the primary benefit to your company from participating in the SBDI program?

G3. Are there any suggestions you have regarding the Small Business program and your work with FSG?

G4. (If not already mentioned) Are you aware of other Idaho Power energy efficiency programs? Which ones? Do you have any involvement with these programs – why or why not?

G5. Are there any additional comments you would like to share? Anything I should have asked about but haven't?

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

APPENDIX C: MISSING PAPERWORK QUESTIONS

Idaho Power - SBDI Program Evaluation
Questions for Contractors Missing Paperwork

We sent the eight contractors that expressed interest in the SBDI program—but did not finish their paperwork—an email for feedback. We ended up calling these contractors and asking them the three questions over the phone.

Hello [name],

We have been hired by Idaho Power to review their Small Business Direct Install (SBDI) program. We would like to get your feedback about your experience, which will help Idaho Power improve the program.

I understand from discussions with FSG that your company talked with FSG and began paperwork to participate but did not complete any installations through the program. In order to respect your time, I was hoping you could respond by email to the three short questions below:

1) Did you receive the SBDI paperwork before the program suspended due to COVID-19, or after it relaunched in October 2020?

2) Can you please tell me about the paperwork you received from FSG and why you did not complete it?

3) What could FSG or Idaho Power have done to increase the likelihood of your company participating in the program?

As a third-party evaluator, we can keep your responses confidential. If you would rather discuss your feedback on the program by phone, please reach out to me and I will set up a call at a time convenient for you.

I greatly appreciate your attention to this request!

Regards,

Kimberly

FINAL REPORT

Idaho Power Home Energy Reports

Process Evaluation

Date: June 9, 2021

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DNV

1 EXECUTIVE SUMMARY

Idaho Power works with a third-party vendor, Aclara Technologies LLC (Aclara), to run the Home Energy Reports (HER) Program. The primary objective of the HER Program is to encourage customer engagement with electricity use to produce average annual behavioral savings of 1 to 3%. Secondary objectives are to maintain or increase customer satisfaction with Idaho Power and encourage customer engagement with electric usage, including utilization of online tools and increased participation in other energy efficiency programs.

The periodic reports provide customers with information about how their home's energy use compares with similar homes. The home energy reports also give a breakdown of household energy use and offer suggestions to help customers change their energy-related behaviors. The vendor estimates energy savings that result from customers receiving the report by statistically comparing the energy use of the report recipients against the energy use of a similar control group.

From August 2018 to December 2019, 24,976 customers received HERs with savings of 8,444,746 kWh; this evaluation covers that time frame. The program expanded to approximately another 108,000 customers in 2020 and switched to calendar-year reporting. In addition to adding more participants, the expansion included an option to choose between email and paper reports.

1.1 Evaluation overview

DNV conducted a process evaluation for this program. The key evaluation tasks were:

- Program and vendor staff interviews
- Program theory review
- Program materials review
- Randomization check
- Reporting

1.2 Key findings

1. **The reports are well-designed and easy to understand.** The reports include utility branding, convey industry-standard information, and include contact numbers and methods to find further information.
2. **The program periodically reviews and updates the reports.** The program staff and vendor review and update tips in the reports at the beginning of each heating/cooling season. They also adjusted the tips during the pandemic to eliminate the ones that would involve in-person contractor interaction or require customers to enter public spaces. Those tips were replaced with more general energy-saving tips.
3. **The randomization checks confirmed that the treatment and control groups are sufficiently balanced.** Ten out of the 11 variables we tested showed balance across the treatment and control groups. The one variable that didn't (whether the record has a non-missing floor size) is of limited importance.
4. **The overall program opt-out rate is lower than the industry average.** In year one, the program had a 0.64% opt-out rate. In year two, it was 0.22%. The industry average is approximately 1%.
5. **Savings are estimated using a difference in difference approach that follows industry standard practices**. Opt-outs remain in the savings calculations and homes that have undeliverable or returned mail remain in the energy saving calculations. Move-outs are removed.
6. **The program has a complex set of treatment and control groups.** In year one, there were four treatment "waves." Each wave was split into a treatment group and a control group. In year two, one new wave was added and the remaining waves were split so that half of the wave received bi-monthly reports and the other half received quarterly reports (B/Q split). In year two, the vendor also optimized the treatment groups by removing households predicted to

have low savings from both the treatment and control groups. In year three, the program added another treatment wave that consisted of customers that were recycled from the original control groups along with new customers that had never been in any of the previous treatment waves.

7. **The vendor's optimization of the treatment group may underestimate savings for IPC.** DNV identified two anomalies. First, the time period used for the optimization process included some of the treatment period. This would cause treatment group customers who reduced their consumption below the optimization threshold, due to the Home Energy Reports, to be dropped from the design. Comparable customers in the control group would not be removed. Second, the households that stopped receiving reports due to optimization were removed from the savings calculations. Typical practice is to leave those homes in the calculations because savings persist for some time after reports stop.
8. **The vendor did not provide dates when households moved out or stopped receiving reports for other reasons such as optimization.** The lack of dates did not hinder the process evaluation, but a future impact evaluation will likely require them.
9. **Joint savings are not accounted for in the savings calculations.** Excluding joint savings from the monthly calculations is standard practice and should not be connoted as a negative. Idaho Power should be aware that impact evaluations typically do identify savings from treatment households that are claimed by other programs and remove them from the savings attributed to the HER program to avoid double counting of those savings.
10. **DNV identified minor non-compliances with industry best practices.** There were some minor errors in the annual report provided by the vendor. Data was also left on an FTP site for longer than necessary.
11. **The most common reason cited for opting out was that information in the reports was inaccurate.** This is a common response to home energy reports.

1.3 Recommendations

1. **DNV recommends that the vendor update its data tracking to reflect additional treatments and conduct tests that include the original and additional treatments.** Best practice when making changes such as the B/Q split or the optimization step is to keep all original customers in the data set and denote the changes as an additional treatment. Savings for baseline treatment and the updated treatment should be estimated each against the entire original data set. These different savings estimates can then also be tested for statistically significant differences to assess whether the change affected the outcomes. It is even more important to follow this practice when there are activities such as the optimization that the vendor described.
2. **Before an impact evaluation, the vendor should append dates that households went inactive and/or moved out.** If these dates are not available in the vendor's databases, they can be determined based on Idaho Power billing data. The inactive dates can be set to the date when the customer stopped receiving service from Idaho Power.
3. **Ask the vendor to remove old data from its FTP folders and implement a process to remove data from such locations as soon as possible after the data transfer is complete. Then confirm the deletion.** Any data left accessible through FTP is vulnerable to theft. While the likelihood of any such theft is very low, removing the data entirely removes the risk altogether. Note, this recommendation also applies to the data IPC has shared with DNV as a part of the current evaluation.

2 INTRODUCTION

2.1 Program overview

Idaho Power works with a third-party vendor, Aclara Technologies LLC (Aclara), to run the Home Energy Reports (HER) Program. The primary objective of the HER Program is to encourage customer engagement with electricity use to produce average annual behavioral savings of 1 to 3%. Secondary objectives are to maintain or increase customer satisfaction with Idaho Power and encourage customer engagement with electric usage, including utilization of online tools and increased participation in other energy efficiency programs.

The periodic reports provide customers with information about how their home's energy use compares with similar homes. The Home Energy Reports also give a breakdown of household energy use and offer suggestions to help customers change their energy-related behaviors. The vendor estimates energy savings that result from customers receiving the report by completing a statistical comparison of the energy use of the report recipients against the energy use of a similar control group.

From August 2018 to December 2019, 24,976 customers received HERs with savings of 8,444,746 kWh; this evaluation covers that time frame. The program expanded to approximately another 108,000 customers in 2020 and switched to calendar year tracking. In addition to adding more participants, the expansion included an option to choose between email and paper reports.

2.2 Evaluation overview

DNV conducted a process evaluation for this program. The key evaluation tasks were:

- Program and vendor staff interviews
- Program theory review
- Program materials review
- Randomization check
- Reporting

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, Process findings, reports findings relevant to program processes and materials.

Section 5, Conclusions and recommendations, lays out the key findings and provides recommendations for program improvement.

3 METHODS

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

3.1 Data collection

3.1.1 In-depth Interviews

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

Our process for developing and fielding the in-depth interviews was similar to that of the surveys. We first designed instruments and provided them to Idaho Power for review. After revising the instruments, we 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. We conducted an in-depth interview and several follow-ups to resolve questions based on initial analyses with the HER program vendor. We also completed several conversations with the IPC program manager. The interview guide can be found in APPENDIX AB.

3.2 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 is well thought out, reasonably designed to achieve its goals given reasonable assumptions, and has considered short- and long-term consequences of the program. Questions we 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 considered?

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

3.3 Program materials review

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

Sample HER reports: DNV reviewed numerous sample reports to evaluate program design and use of industry best practices.

CSA Call Log: DNV read the CSA call log from September 17, 2018, to February 20, 2020, to help analyze common questions and reasons for participant opt-out.

Home Energy Report Year 1 Final Program Summary by Aclara ACE: Aclara implemented the program and prepared this report on the final year one program outcomes (covering July 2017-July 2018). DNV reviewed the report for accuracy, correctness, and best practices.

3.4 Randomization check

DNV received several data files from IPC and Aclara. These data files included service point ids, account ids, treatment wave, treatment/control group, number of bedrooms, floor space, household members, tenure, construction year, and average monthly consumption. DNV loaded these files into a statistical program and checked:

- Assignment to treatment or control group and wave
- Within wave, mean differences in each of the available demographic variables using a simple t-test. We used a p-value of 0.05 as indicating statistically significant differences. These checks examined differences of the entire treatment group versus the entire control group for each wave.[1]

[1] In other words, they collapsed the quarterly and bi-monthly reporting split that Aclara made in year 2 to test the entire treatment group rather than each sub-group.

4 PROCESS FINDINGS AND TARGETED RECOMMENDATIONS

This section provides detailed findings on program operations and materials. The evaluation included in-depth interviews, a review of program logic, and a review of program materials.

4.1 Vendor and program staff interviews

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

- Monthly and aggregate savings are calculated using the difference in difference approach with no covariates.
- Home Energy Reports that are undeliverable and returned are included in savings calculations, as are any participants who voluntarily opt-out. Households that move out of the home are excluded from both the treatment and control groups and stop receiving reports if they are in the treatment group. These are all accepted standard industry practices for HER programs.
- The vendor excludes any homes with insufficient data, negative usage, and/or missing data from the analysis.
- Idaho Power does not send Aclara tracking information about participation in other programs. As such, Aclara cannot estimate the amount of savings from HER program participants that are accounted for and claimed by the other programs ("joint" savings). This will likely result in double-counting of these savings until the HER program receives an impact evaluation. If the other programs have already claimed those savings, standard impact evaluation practice is to remove them from the HER program savings to avoid double-counting.
- Custom tips are revised during each season and updated at the beginning of each statement-of-work period. Program staff and the vendor collaborate during the content review to revise any tips, as needed.
- The program made slight adjustments because of the COVID-19 pandemic, including eliminating tips that suggest contractor interaction in the home or require customers to enter public spaces. Typically, the final tip has been related to another IPC program, but has shifted to present a more general energy efficiency tip.

Key process findings

1. *The reports are well-designed and easy to understand.*
2. *The program periodically reviews and updates the reports.*
3. *The randomization checks confirmed that the treatment and control groups are sufficiently balanced.*
4. *The overall program opt-out rate is lower than the industry average.*
5. *Savings are estimated using a difference in difference approach that follows industry standard practices.*
6. *The program has a complex set of treatment and control groups.*
7. *The vendor's optimization of the treatment group may underestimate savings for IPC*
8. *The vendor did not provide dates when households moved out or stopped receiving reports.*
9. *Joint savings are not accounted for.*
10. *DNV identified several minor non-compliances with industry best practices.*
11. *The most common reason cited for opting out was that information in the reports was inaccurate.*

The pilot program was divided into five treatment segments:

- **T1:** customers with high electric heating use in the winter
- **T2:** customers added in year 2, who were originally removed from T1 due to insufficient data on the household heating source for a comparison group
- **T3:** customers with high year-round energy use, >12,000 kWh/year

- **T4:** customers with medium year-round energy use, 9,000-12,000 kWh/year
- **T5**: customers with low year-round energy use. <9,000 kWh/year

In year 2, the vendor made two changes:

- Members of T1, T3, T4, and T5 were split so that one group in each treatment received a quarterly report (Q) and the other received a bi-monthly report (B).
- After splitting, Aclara continued to test each split treatment group to the entire pre-split control group. For example, T1Q treatments were tested against all controls in both T1Q and T1B. This is not an industry standard practice though it does not undermine the design. The two treatments can be tested in a single model.
- In August of 2018, Aclara optimized the treatment groups and removed customers who had low savings at that point. The two factors were a) an always-on percentage of less than 10% (T3, T4, and T5) and b) T5 group: rounded usage of less than 7,300 kWh from August 2017 through July 2018. Aclara stopped sending reports to this group and removed them from both the treatment and control groups in the calculations.

DNV has two concerns related to the optimization process. First, the savings period used in the optimization process overlapped with the treatment period. This violates the experimental design and would cause later savings calculations to be slightly lower than they otherwise should be. This occurs because some of the treatment group with pre-treatment usage above the threshold would have reduced consumption because of the treatments to the point where they were below the threshold consumption used by the optimization process. The comparable control group customers would remain in the study. This is likely a small number of households.

Second, best practice in this situation is to stop sending reports but leave the original experimental design intact. This would negatively impact average treatment per household savings, but not total savings as the smaller savings represent “intent to treat” savings of the whole treatment group. There is also evidence that savings persist for some time after a household stops receiving reports which would be captured if all original households remained in the experimental design. A more conservative approach of removing the discontinued households from the savings computations was utilized.

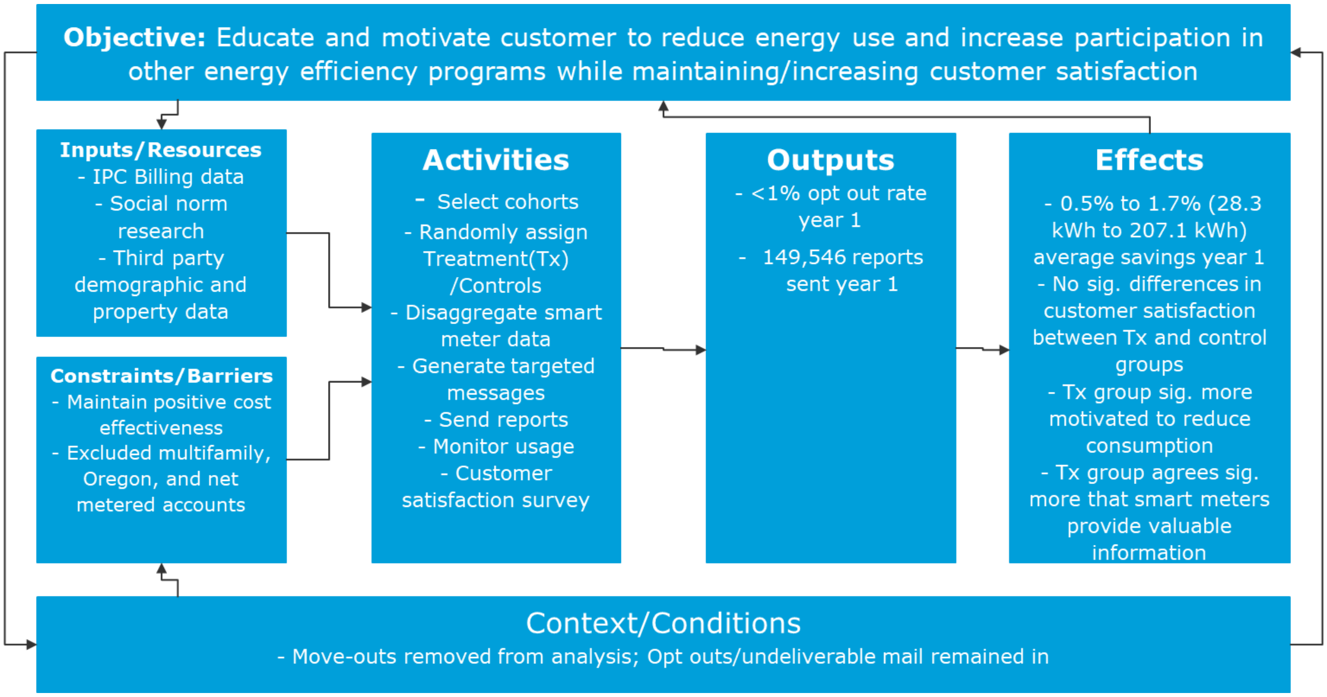
In year 3, additional changes were made based on learnings from the pilot:

- The T5 group was dropped from the program because savings were not high enough to be statistically significant.
- All pilot treatment groups will receive quarterly reports going forward, including those that had been receiving bi-monthly reports in year 2.
- Idaho Power added a new treatment group (T6) consisting of customers that had not yet participated. This included customers that had never been in any of the previous (T1 through T5) treatment or control groups. It also included customers that were in the original (T1 through T5) control groups and were “recycled” into the new treatment group. Before random assignment to the T6 treatment and control, a minimum annual consumption threshold of 7,000 kWh was applied.

4.2 Program logic review

To support the process evaluation, DNV developed a logic model for the HER program using program materials and information gathered during the in-depth interviews. The logic model is shown in Figure 4-1. This program logic is typical for this sort of program.

Figure 4-1. HER Program Logic Model



4.3 Program materials review

4.3.1 Sample HER Reports

A sample HER report is included in Appendix A. The report design consists of two pages. The first page includes a home comparison figure, contact and account information, and an electricity use breakdown graph. The second page includes a list of three tips, featuring pictures and approximate savings for following each provided tip. Each report contains three major tips and each tip can have up to four sub-tips. The first two tips are based on the topic that is being addressed in the analysis provided on the first page of the report. Typically, the third tip focused on an IPC program, but has now shifted to provide customers with a more general energy-efficient tip because of challenges to IPC programs resulting from the COVID-19 pandemic.

IPC provided DNV with sample HER reports. The reports are well-designed and easy to understand. The report pages display utility branding and convey the appropriate and relevant information for program participants, including contact numbers and places to find further information. The vendor and program staff interview revealed that the reports went through testing before the 2020 expansion began based on participant feedback.

4.3.2 Opt-Out CSA Call Log

Idaho Power's HER Program provides customers with customized information on their home electric energy usage. The reports provide a comparison of their home's usage to other similar homes. In 2019, 24,976 participants were sent reports and because customers are automatically enrolled in the HER program, they must call to opt-out if they no longer wish to participate at any time.

The opt-out telephone number is provided to customers on at least one page of their home energy report. Between September 17, 2018, and February 20, 2020, eighty-eight customers called to request that they no longer receive a home energy report. In year two, the opt-out rate was 0.22%, a decrease from the 0.64% opt-out rate in year one. The opt-out rate among report frequency was 0.22% for quarterly report recipients and 0.20% for bi-monthly report recipients. The overall program opt-out rate is lower than the industry average of 1%.[2]

DNV analyzed 85 customer service call records of customers who requested to opt out of Idaho Power's HER program. The IPC Customer Solutions Advisors record the date and note the reason for opt-out with every call. Of the 88 calls received, 85 included a reason for customer opt-out. Each of the 85 opt-out records was analyzed to understand reoccurring themes. Calls were then categorized into one of six groups: inaccurate information, extenuating circumstance, already energy-efficient, wasteful, no longer at residence, and other (Table 4-1).

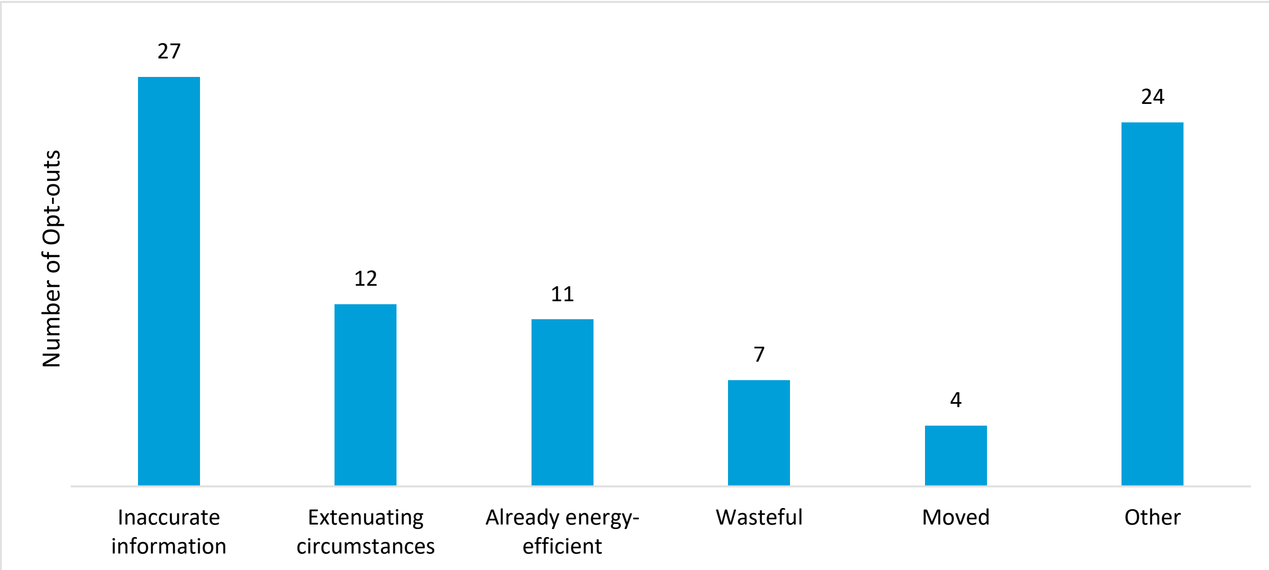
Table 4-1. HER Participant Reasons for Opt-out

Opt-Out Category	Definition	Customer Example
Inaccurate Information	Information on report is not accurate (i.e., home size, usage statistics)	*"Customer felt the information wasn't useful and there are too many variables to accurately compare homes."*
Extenuating Circumstances	Extra equipment that increases energy usage is necessary (i.e., medical equipment, business-related equipment	*"Customer has medical need for climate control and is on oxygen 24 hours a day. They know where the usage is going."*
Already energy efficient	Energy efficient upgrades have already been done in the home or the home is all-electric and more energy savings may not seem possible	*"Customer lives in remote town and is all-electric, feels they are unable to lower their consumption or be more Energy Efficient than they currently are."*
Waste	Reports are a waste of paper, Idaho Power money, and/or time	*"[Customer] would like to not receive the HER REPORT feels it is wasting paper and saving the environment is important to her. She would stay on it if there was an email option."*
Moved	No longer at residence	*"Contract ended as the [customer] moved out in July. Customer ended her service in July and concerned she was receiving the HER report. She felt it would be better served to the current customer of record."*

Figure 4-2 below displays the frequencies of opt-out reasons for the program year 2019. Inaccurate information represented the largest reason for opt-outs (32%) followed by extenuating circumstances (14%) and customers who felt they were already energy efficient enough (13%). The 28% who had another reason for opting out varied from general disinterest in the report to feelings of privacy invasion. Nearly 60% of those who opted out for waste reasons stated they felt the report was a waste of paper. Beginning in program year three, participants will have the option to switch to paperless reports via an email request.

[2] Sussman, R., & Chikumbo, M. (2016). Behavior Change Programs: Status and Impact, 12.

Figure 4-2. Reason for HER Opt-out



4.3.3 HER Year 1 Program Summary Report

The program year 1 report by Aclara provided a thorough description of the program. DNV reviewed the report to assess and verify findings and program information.

Aclara's test of the savings for bi-monthly versus quarterly reports did not follow industry standard practice. Best practice when making changes such as this is to keep all original customers in the data set and denote the changes as an additional treatment. Savings for original (unsplit) treatment should be estimated each against the entire original control group. Then the differences between the two new treatment groups can be tested against each other to assess whether the change affected the savings outcomes. Additionally, the difference between the quarterly and bi-monthly reports was only two reports. Idaho Power was aware that this is a very small difference in treatment “dosage” and did not expect significant savings differences. It was more concerned with the qualitative responses to the different report schedules.

DNV identified what appears to be minor errors in some of the tables in the report related to marking statistically significant results in cases where reported confidence intervals include zero. The result is technically correct because the significance test is one-sided, but the confidence interval is two-sided. However, this does cause confusion. A table from the second-year report is included below that illustrates this discrepancy. Note that T5B and T5Q appear to have opposite conclusions despite a margin of error that is greater than the mean in both cases.

Table 13. Cumulative Savings by Bimonthly Vs. Quarterly Cohort (Treatment Period: Dec 1, 2018 –

	Average kWh Savings per Customer	Average Savings Percent	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?
T1-B	300	1.9	138	0.000011	Yes
T1-Q	253	1.6	140	0.000201	Yes
T2 (bimonthly)	155	1.0	97	0.000886	Yes
T3-B	192	1.9	84	0.000004	Yes
T3-Q	192	1.9	79	0.000001	Yes
T4-B	144	2.1	78	0.000178	Yes
T4-Q	156	2.3	78	0.000045	Yes
T5-B	-25	-0.4	98	0.692583	No
T5-Q	90	1.5	93	0.028654	Yes

4.3.4 Randomization check

DNV attempted to validate the balance of the randomization of the HER program randomized control trials (RCT). The vendor provided a data set containing treatment and control households that was sufficient for the process evaluation.

Table 4-2 provides the balance checks on all available variables for the original assignments of the T1 through T4 segments. The T5 segment is excluded because of the previously described decision to drop that segment from the program.

All four segments appear to be well-balanced. T1, T3, and T4 balance results are identical to the available original balance tests provided with the original randomization. The original balance tests were limited to HHsize, HomeTenure, and kWh_mean.

Most of the additional data elements also indicate a balanced design. Additional data elements included floor size, bedrooms, year built, and home type. Where variables had substantial numbers of missing information, DNV also checked that the proportion missing were similar across the two groups. Unexpectedly, one variable is statistically different across all 4 segments—the missing floor size proportion. In every case, the proportion of missing data is higher for the treatment group. A handful (roughly 1 out of 20, in this case) of data elements proving statistically different is an expected level of statistical anomaly given the nature of the test. However, it is extremely unlikely to be a statistical anomaly that the missing floor size proportion is consistently statistically different across all four segments. Despite a lack of a credible explanation for this finding, DNV does not consider this a substantial enough issue to invalidate the experimental design.

Table 4-2. Randomization checks: Original assignments

Segment	Variable	Treatment		Control		Difference	P-value
		N	Mean	N	Mean		
T1	FloorSize	5,836	1,922.60	12,825	1,898.07	-24.53	0.103
T1	HHSize	7,897	3.07	16,548	3.05	-0.02	0.476
T1	HomeTenure	7,897	8.62	16,548	8.59	-0.03	0.685
T1	Year_blt	4,764	1,973.17	9,971	1,973.04	-0.13	0.782
T1	bdrms	4,134	3.29	8,560	3.28	-0.01	0.586
T1	bdrms missing binary	7,900	0.48	16,558	0.48	0.01	0.355
T1	year_blt missing binary	7,900	0.40	16,558	0.40	0.00	0.899
T1	Floorsize missing binary	7,900	0.26	16,558	0.23	-0.04	0.000
T1	Home type 1 binary	7,900	0.96	16,558	0.96	0.00	0.772
T1	Home type 4 binary	7,900	0.04	16,558	0.04	0.00	0.647
T1	kwh_mean	7,900	1,757.92	16,558	1,754.30	-3.63	0.662
T2	FloorSize	3,950	1,918.26	4,240	1,916.08	-2.18	0.917
T2	HHSize	5,815	2.92	5,819	2.94	0.02	0.562
T2	HomeTenure	5,815	9.32	5,819	9.38	0.07	0.506
T2	Year_blt	3,738	1,973.35	3,674	1,973.07	-0.28	0.607
T2	bdrms	3,506	3.32	3,463	3.34	0.02	0.475
T2	bdrms missing binary	5,826	0.40	5,826	0.41	0.01	0.417
T2	year_blt missing binary	5,826	0.36	5,826	0.37	0.01	0.218
T2	Floorsize missing binary	5,826	0.32	5,826	0.27	-0.05	0.000
T2	Home type 1 binary	5,826	0.99	5,826	0.99	0.00	0.799
T2	Home type 4 binary	5,826	0.00	5,826	0.00	0.00	0.555
T2	kwh_mean	5,826	1,792.36	5,826	1,794.29	1.94	0.863
T3	FloorSize	7,525	1,952.22	45,277	1,967.02	14.80	0.185
T3	HHSize	8,498	3.25	49,714	3.27	0.01	0.542
T3	HomeTenure	8,498	7.97	49,714	8.02	0.05	0.477
T3	Year_blt	6,625	1,981.83	38,853	1,981.87	0.04	0.902
T3	bdrms	6,111	3.41	35,892	3.43	0.02	0.088
T3	bdrms missing binary	8,501	0.28	49,727	0.28	0.00	0.578
T3	year_blt missing binary	8,501	0.22	49,727	0.22	0.00	0.679
T3	Floorsize missing binary	8,501	0.11	49,727	0.09	-0.03	0.000
T3	Home type 1 binary	8,501	0.99	49,727	0.99	0.00	0.447
T3	Home type 4 binary	8,501	0.00	49,727	0.00	0.00	0.325
T3	kwh_mean	8,501	1,272.24	49,727	1,269.58	-2.66	0.652
T4	FloorSize	3,518	1,856.59	41,265	1,866.01	9.42	0.504
T4	HHSize	4,098	2.99	46,169	3.00	0.01	0.772
T4	HomeTenure	4,098	7.79	46,169	7.73	-0.06	0.503
T4	Year_blt	3,087	1,982.72	35,443	1,983.48	0.76	0.111
T4	bdrms	2,861	3.33	32,688	3.35	0.03	0.089
T4	bdrms missing binary	4,101	0.30	46,191	0.29	-0.01	0.176
T4	year_blt missing binary	4,101	0.25	46,191	0.23	-0.01	0.035
T4	Floorsize missing binary	4,101	0.14	46,191	0.11	-0.04	0.000
T4	Home type 1 binary	4,101	0.99	46,191	0.99	0.00	0.037
T4	Home type 4 binary	4,101	0.01	46,191	0.01	0.00	0.088
T4	kwh_mean	4,101	860.34	46,191	860.51	0.17	0.959

Highlighted cells in the last column denote statistically significant differences

Table 4-3 provides the same statistics for T1-T4 and T6. The customer counts reflect active customers in their current segment and group. Treatment group 6 was composed of new homes and homes randomly removed from the control groups of segments T1-T4. In addition, customer counts for T1-T4 are also reduced due to the “optimization” process applied by the program vendor. While it is not possible to check the balance of each segment immediately post-optimization due to the lack of inactive dates, any non-random differences caused by the optimization process should still be evident in these data.

Table 4-3 has a few statistically significant differences, but nothing systemic. This indicates that the samples as they currently stand are reasonably balanced. It is puzzling that the consistent differences in the missing floor size variable are no longer present.

Table 4-3. Randomization checks: Current assignments

Segment	Variable	Treatment		Control		Difference	P-value
		N	Mean	N	Mean		
T1	FloorSize	4,052	1,943.98	1,026	1,906.31	-37.67	0.252
T1	HHSize	5,398	3.16	1,355	3.19	0.02	0.622
T1	HomeTenure	5,398	9.00	1,355	9.12	0.12	0.448
T1	Year_blt	3,784	1,972.81	958	1,971.80	-1.01	0.301
T1	bdrms	3,293	3.30	827	3.27	-0.03	0.343
T1	bdrms missing binary	5,400	0.39	1,356	0.39	0.00	0.996
T1	year_blt missing binary	5,400	0.30	1,356	0.29	-0.01	0.679
T1	Floorsize missing binary	5,400	0.25	1,356	0.24	-0.01	0.633
T1	Home type 1 binary	5,400	0.99	1,356	0.99	0.00	0.931
T1	Home type 4 binary	5,400	0.01	1,356	0.01	0.00	0.804
T1	kwh_mean	5,400	1,767.29	1,356	1,766.13	-1.15	0.949
T2	FloorSize	3,245	1,947.79	531	1,990.14	42.35	0.348
T2	HHSize	4,766	2.98	757	2.92	-0.06	0.316
T2	HomeTenure	4,766	9.67	757	9.69	0.02	0.933
T2	Year_blt	3,399	1,973.44	552	1,970.97	-2.47	0.022
T2	bdrms	3,185	3.33	526	3.35	0.02	0.595
T2	bdrms missing binary	4,775	0.33	758	0.31	-0.03	0.143
T2	year_blt missing binary	4,775	0.29	758	0.27	-0.02	0.353
T2	Floorsize missing binary	4,775	0.32	758	0.30	-0.02	0.250
T2	Home type 1 binary	4,775	1.00	758	1.00	0.00	0.174
T2	Home type 4 binary	4,775	0.00	758	0.00	0.00	0.100
T2	kwh_mean	4,775	1,802.75	758	1,797.87	-4.88	0.837
T3	FloorSize	4,931	2,025.51	2,938	2,027.62	2.11	0.923
T3	HHSize	5,537	3.40	3,299	3.37	-0.03	0.460
T3	HomeTenure	5,537	8.58	3,299	8.82	0.25	0.036
T3	Year_blt	4,944	1,982.64	2,952	1,981.86	-0.77	0.170
T3	bdrms	4,547	3.45	2,722	3.47	0.03	0.180
T3	bdrms missing binary	5,539	0.18	3,301	0.18	0.00	0.661
T3	year_blt missing binary	5,539	0.11	3,301	0.11	0.00	0.803
T3	Floorsize missing binary	5,539	0.11	3,301	0.11	0.00	0.977
T3	Home type 1 binary	5,539	0.99	3,301	1.00	0.00	0.033
T3	Home type 4 binary	5,539	0.00	3,301	0.00	0.00	0.666
T3	kwh_mean	5,539	1,299.51	3,301	1,291.43	-8.08	0.494
T4	FloorSize	2,246	1,906.30	2,135	1,916.63	10.33	0.684
T4	HHSize	2,594	3.13	2,420	3.16	0.03	0.575
T4	HomeTenure	2,594	8.53	2,420	8.37	-0.17	0.279
T4	Year_blt	2,287	1,983.70	2,154	1,984.14	0.45	0.545
T4	bdrms	2,120	3.35	1,978	3.38	0.03	0.246
T4	bdrms missing binary	2,594	0.18	2,420	0.18	0.00	0.994
T4	year_blt missing binary	2,594	0.12	2,420	0.11	-0.01	0.348
T4	Floorsize missing binary	2,594	0.13	2,420	0.12	-0.02	0.081
T4	Home type 1 binary	2,594	0.99	2,420	1.00	0.01	0.001
T4	Home type 4 binary	2,594	0.01	2,420	0.00	0.00	0.073
T4	kwh_mean	2,594	864.78	2,420	866.76	1.99	0.735
T6	FloorSize	60,248	1,967.58	8,120	1,957.56	-10.02	0.304
T6	HHSize	65,151	3.24	8,754	3.23	-0.01	0.601
T6	HomeTenure	65,151	8.35	8,754	8.35	0.00	0.952
T6	Year_blt	59,622	1,981.33	8,032	1,981.07	-0.26	0.385
T6	bdrms	0	0.00	0	0.00	0.00	
T6	bdrms missing binary	65,152	1.00	8,755	1.00	0.00	

Segment	Variable	Treatment		Control		Difference	P-value
		N	Mean	N	Mean		
T6	year_blt missing binary	65,152	0.08	8,755	0.08	0.00	0.468
T6	Floorsize missing binary	65,152	0.08	8,755	0.07	0.00	0.361
T6	Home type 1 binary	65,152	1.00	8,755	1.00	0.00	0.459
T6	Home type 4 binary	65,152	0.00	8,755	0.00	0.00	0.715
T6	kwh_mean	65,152	1,212.23	8,755	1,213.40	1.17	0.838

Highlighted cells in the last column denote statistically significant differences

One additional finding related to the data provided by the vendor is that it provided variables that allowed DNV to understand which original and current group each household was in, but it did not provide dates associated with "inactive" (no longer receiving reports) and moved flags. This lack of dates makes it impossible to definitively identify a snapshot of the programs immediately post-optimization.

While the process evaluation did not require these dates, an impact evaluation likely will. If these dates are not available in the vendor's database, they could be determined based on billing data. In this case, the date to use is when a customer stops receiving service from IPC at a given address.

4.3.5 Other findings

During the evaluation, DNV discovered that customer usage data from 2017 is still available on Aclara's FTP site. This means these data were available for approximately two years longer than necessary to implement the original transfer. It is unlikely anyone other than IPC or Aclara accessed these data, however, best practice for information security is to remove data from transfer points as soon as practical after the transfer is fully executed.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Key findings

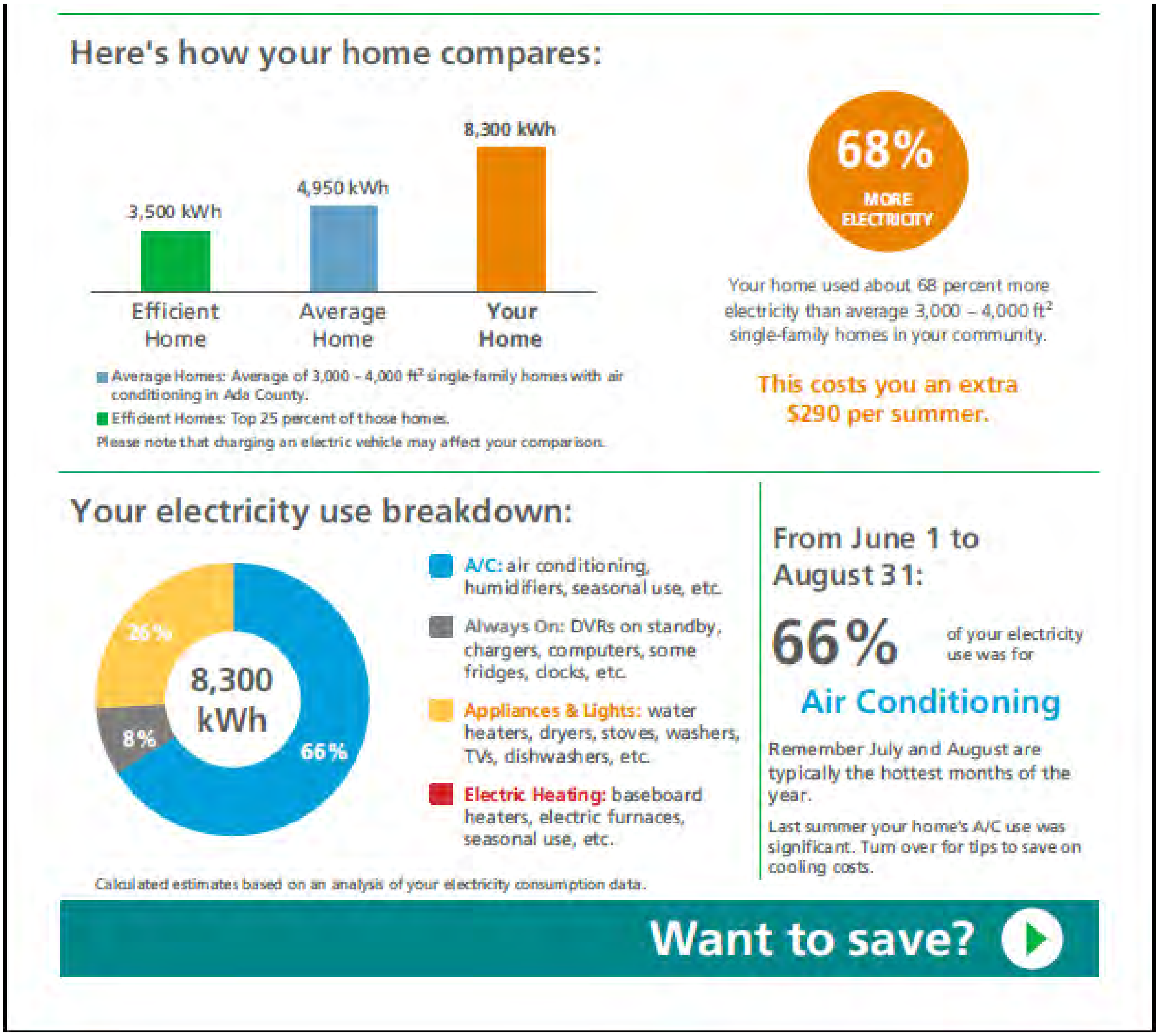
4. **The reports are well-designed and easy to understand.** The reports include utility branding, convey industry-standard information, and include contact numbers and methods to find further information.
5. **The program periodically reviews and updates the reports.** The program staff and vendor review and update tips in the reports at the beginning of each heating/cooling season. They also adjusted the tips during the pandemic to eliminate the ones that would involve in-person contractor interaction or require customers to enter public spaces. Those tips were replaced with more general energy-saving tips.
6. **The randomization checks confirmed that the treatment and control groups are sufficiently balanced.** Ten out of the 11 variables we tested showed balance across the treatment and control groups. The one variable that didn't (whether the record has a non-missing floor size) is of limited importance.
7. **The overall program opt-out rate is lower than the industry average.** In year one, the program had a 0.64% opt-out rate. In year two, it was 0.22%. The industry average is approximately 1%.
8. **Savings are estimated using a difference in difference approach that follows industry standard practices**. Opt-outs remain in the savings calculations and homes that have undeliverable or returned mail remain in the energy saving calculations. Move-outs are removed.
9. **The program has a complex set of treatment and control groups.** In year one, there were four treatment "waves." Each wave was split into a treatment group and a control group. In year two, one new wave was added and the remaining waves were split so that half of the wave received bi-monthly reports and the other half received quarterly reports (B/Q split). In year two, the vendor also optimized the treatment groups by removing households predicted to have low savings from both the treatment and control groups. In year three, the program added another treatment wave that consisted of customers that were recycled from the original control groups along with new customers that had never been in any of the previous treatment waves.
10. **The vendor's optimization of the treatment group may underestimate savings for IPC.** DNV identified two anomalies. First, the time period used for the optimization process included some of the treatment period. This would cause treatment group customers who reduced their consumption below the optimization threshold, due to the Home Energy Reports, to be dropped from the design. Comparable customers in the control group would not be removed. Second, the households that stopped receiving reports due to optimization were removed from the savings calculations. Typical practice is to leave those homes in the calculations because savings persist for some time after reports stop.
11. **The vendor did not provide dates when households moved out or stopped receiving reports for other reasons such as optimization.** The lack of dates did not hinder the process evaluation, but a future impact evaluation will likely require them.
12. **Joint savings are not accounted for in the savings calculations.** Excluding joint savings from the monthly calculations is standard practice and should not be connoted as a negative. Idaho Power should be aware that impact evaluations typically do identify savings from treatment households that are claimed by other programs and remove them from the savings attributed to the HER program to avoid double counting of those savings.
13. **DNV identified minor non-compliances with industry best practices.** There were some minor errors in the annual report provided by the vendor. Data was also left on an FTP site for longer than necessary.
14. **The most common reason cited for opting out was that information in the reports was inaccurate.** This is a common response to home energy reports.

5.2 Recommendations

1. **DNV recommends that the vendor update its data tracking to reflect additional treatments and conduct tests that include the original and additional treatments.** Best practice when making changes such as the B/Q split or the optimization step is to keep all original customers in the data set and denote the changes as an additional treatment. Savings for baseline treatment and the updated treatment should be estimated each against the entire original data set. These different savings estimates can then also be tested for statistically significant differences to assess whether the change affected the outcomes. It is even more important to follow his practice when there are activities such as the optimization that the vendor described.
2. **Before an impact evaluation, the vendor should append dates that households went inactive and/or moved out.** If these dates are not available in the vendor's databases, they can be determined based on Idaho Power billing data. The inactive dates can be set to the date when the customer stopped receiving service from Idaho Power.
3. **Ask the vendor to remove old data from its FTP folders and implement a process to remove data from such locations as soon as possible after the data transfer is complete. Then confirm the deletion.** Any data left accessible through FTP is vulnerable to theft. While the likelihood of any such theft is very low, removing the data entirely removes the risk altogether. Note, this recommendation also applies to the data IPC has shared with DNV as a part of the current evaluation.

APPENDIX A. EXAMPLE HER REPORT

This appendix contains an example home energy report. The top of the first page is cropped to protect personally identifying information. That section contained Idaho Power branding and the recipient's name and address.



Here's how your home compares:

3,500 kWh
4,950 kWh
8,300 kWh

Efficient Home
Average Home
Your Home

Average Homes: Average of 3,000 – 4,000 ft² single-family homes with air conditioning in Ada County.
Efficient Homes: Top 25 percent of those homes.
Please note that charging an electric vehicle may affect your comparison.

68% MORE ELECTRICITY

Your home used about 68 percent more electricity than average 3,000 – 4,000 ft² single-family homes in your community.

This costs you an extra $290 per summer.

Your electricity use breakdown:

26%
8%
8,300 kWh
66%

A/C: air conditioning, humidifiers, seasonal use, etc.

Always On: DVRs on standby, chargers, computers, some fridges, clocks, etc.

Appliances & Lights: water heaters, dryers, stoves, washers, TVs, dishwashers, etc.

Electric Heating: baseboard heaters, electric furnaces, seasonal use, etc.

Calculated estimates based on an analysis of your electricity consumption data.

From June 1 to August 31:

66% of your electricity use was for

Air Conditioning

Remember July and August are typically the hottest months of the year.

Last summer your home's A/C use was significant. Turn over for tips to save on cooling costs.

Want to save?

Stay cool and save money with these energy-saving tips.

Set and forget your programmable thermostat!

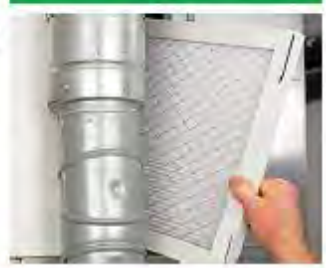
SAVE UP TO **$290** PER YEAR

Programmable thermostats help you save by raising your thermostat setting automatically at night and while you're away. Spend a couple of minutes now setting your programmable thermostats, then save effortlessly all summer! Most people can be comfortable at 78° F in the summer when they are at home during the day and need cooling, and can comfortably set their thermostat higher by 4° F or more during the night.

At Home: 78° F or as high as comfort and safety allow
Away/Asleep: 4 to 7 degrees higher

Clean or replace your A/C filter at least twice each year.

SAVE UP TO **$60** PER YEAR



Save on cooling costs! Replacing the dirty filter in your air handler with a clean one can improve your air conditioner's energy efficiency by 5 to 15 percent. If your filter is the reusable kind, clean it to improve efficiency.

You will get more efficient cooling in the summer and ensure a longer life for your air system.

Looking to install a smart thermostat? We have an incentive for that!

$75 CASH INCENTIVE

Up to 50 percent of your home's energy costs may be going to heating and cooling. Energy-efficient heating and cooling equipment can keep your home more comfortable and save you money.

Idaho Power offers a $75 cash incentive when you install an internet-enabled smart thermostat in a home with an electric furnace or heat pump.

Visit idahopower.com/heatingcooling for details.

This report is based on estimates and projections and is provided for informational purposes only with no warranty. Actual results will vary.

DNV

APPENDIX B. PROGRAM STAFF INTERVIEW GUIDE

INTRODUCTION

Hi, I'm calling from DNV on behalf of Idaho Power. We are conducting an evaluation of their home energy reports program, and we'd like to ask you a few questions about how it runs.

PARTICIPANT SELECTION

BASED ON THE 2019 REPORT, PARTICIPANT SELECTION WORKS LIKE THIS:

In year one, customers were selected to participate in the HER program based on their historical energy usage. Of customers selected for the program, four treatment groups were created:

- T1: customers with high electric heating in the winter,
- T3: customers with high year-round energy use, >12,000 kWh/year
- T4: customers with medium year-round energy use, and 9000-12000/yr
- T5: customers with low year-round heating use. <9000 kWh/yr

In year two, the treatment groups were adapted from the groups that had been used in year one. The following changes were made:

- The T2 group was added to the program.

The T2 group was added to the HER program in year two. This group had previously been created in year one. Its members were initially part of the T1 group but were removed due to insufficient data on household heating source for sufficient benchmarking, and labeled T2. After year one, aclara acquired additional data for this group that allowed for the addition of T2 to the HER program in year two.
T2 had its own control group apart from T1. They added in the T2 and C2 group in year 2. All of T2 was on bi-monthly. No optimization applied to T1 group.

T2 group did not come partially from T1 group. T2 group is also electric winter heat. They were started a year later because Aclara didn't have the data on electric source heating until 2nd year. Comparisons to similar homes are based on property data – they had insufficient property data to provide reliable benchmark groups. IPC was able to provide property data that included those customers and Aclara was able to reevaluate the group that they originally excluded and bring them in.

Relatively early on in the eligibility process, the T1 and T2 group were split out – they realized there was a group of customers that they had sufficient property data for and a group they didn't.

the T3, T4, and T5 groups were optimized prior to the start of the year two program by removing customers with factors correlated with low savings.

P1. IS THAT STILL ACCURATE? (IF NO: PROBE FOR DIFFERENCES).

P2. WHAT IS THE PROCESS FOR OPTIMIZING THE T3, T4, AND T5 GROUPS IN Y2 BY REMOVING CUSTOMERS WITH FACTORS CORRELATED WITH LOW SAVINGS?

P3. Did you verify the randomization of cohort participants?
Probes: *What characteristics did you look at? How did you do it? What were the results? Can we see them?*

SAVINGS

S1. **How do you calculate the savings you report to Idaho Power Company?** *(includes calculation*

S2. **How do you account for opt outs in the calculated savings?**

S3. How do you account for people who move away when calculating savings?

S4. How do you account for undeliverable reports when calculating savings?

S5. Are there any other homes you exclude from analysis? Why?

S6. What, if any, covariates are considered when calculating savings?

S7. Originally, there were 4 cohorts, then in the second year, Idaho Power added a fifth cohort and reassigned some of the control households from the original four cohorts. How do you take these changes into account when you compute the savings?

S8. (PROBE) How do you weight the (now) 5 different cohorts?

S9. (PROBE) Is there another dimension for quarterly vs. bimonthly reports? Does that result in 10 groups?

S10. How do you account for potential double counting regarding treatment group uplift in other rebate programs?

REPORT DESIGN

R1. Each report contains a page with a list of tips. How many tips are included in the report?

R2. Does the number of tips included vary by method used?

By method used, we mean these two methods described in the 2018-2019 report 1. Send a seasonal report at the beginning of the season with suggested actions/tips based on behavior last season (winter heating customers in Y1 and Y@) 2. Send a report that combines two reporting windows, with the front page reporting on the previous quarter or two months, and the back page suggesting tips based on the same season the previous year (high AC customers)

R3. Does each bimonthly/quarterly report include the same number of tips?

R4. Are the tips the same for every participant within that method group?

R5. [IF CUSTOMIZED BY HOUSE] How do you determine which custom tips each house gets?

R6. Is there a library of tips to choose from?

R7. Can a participant receive the same tip more in more than one report throughout the program year?

R8. [IF REPEATS POSSIBLE] Why do you include the same tip more than once?

R9. Can a tip include participating in an Idaho Power Company program?

R10. If the report does contain a program participation tip and the customer participates, do you receive that information so that you can exclude it from future tips?

R11. What are the groups used for home classification? For benchmarking the factors are home size, known to have AC or not, electric space heating or not, location (county), and home type (sf vs. manuf home).

R12. The electricity use breakdown chart is broken down into four categories: A/C, Always On, Appliances & Lighting, and Electric Heating. How did you come up with this breakdown? A

R13. Next to the electricity use breakdown chart there is a box with information on use during a specific time period and the approximate cost of that use to the homeowner. How do you choose what category to highlight in this box?

R14. Does this box determine which tips are chosen?

R15. Has the report design changed throughout the program year?

R16. Was there internal testing of different report content prior to the first report? (PROBE: Please describe how you tested it.)

COVID-19

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

C2. Has the COVID-19 pandemic resulted in any changes to the content of the HER reports? *Verbiage, tips, etc.*

C3. 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 C. TRADE ALLY INTERVIEW GUIDE

INTRODUCTION

Hi, I'm calling from DNV on behalf of Idaho Power. We are conducting an evaluation of their home energy reports program, and we'd like to ask you a few questions about how it runs.

PARTICIPANT SELECTION

BASED ON THE 2019 REPORT, PARTICIPANT SELECTION WORKS LIKE THIS:

In year one, customers were selected to participate in the HER program based on their historical energy usage. Of customers selected for the program, four treatment groups were created:

- T1: customers with high electric heating in the winter,
- T3: customers with high year-round energy use,
- T4: customers with medium year-round energy use, and
- T5: customers with low year-round heating use.

In year two, the treatment groups were adapted from the groups that had been used in year one. The following changes were made:

- The T2 group was added to the program.

The T2 group was added to the HER program in year two. This group had previously been created in year one. Its members were initially part of the T1 group but were removed due to insufficient data on household heating source for sufficient benchmarking, and labeled T2. After year one, IPC provided data that allowed for the addition of T2 to the HER program in year two.

the T3, T4, and T5 groups were optimized prior to the start of the year two program by removing customers with factors correlated with low savings.

P1. IS THAT STILL ACCURATE? (IF NO: PROBE FOR DIFFERENCES).

P2. WHAT IS THE PROCESS FOR OPTIMIZING THE T3, T4, AND T5 GROUPS IN Y2 BY REMOVING CUSTOMERS WITH FACTORS CORRELATED WITH LOW SAVINGS?

P3. Did you verify the randomization of cohort participants, both for the pilot program and the expansion?
Probes: *What characteristics did you look at? How did you do it? What were the results? Can we see them?*

SAVINGS

S1. How do you calculate the savings you report to Idaho Power Company? *(includes calculation of monthly and annual estimates and associated standard errors at individual wave level and across multiple waves and the multiple waves weighting scheme)*

S2. How do you account for opt outs in the calculated savings?

S3. How do you account for people who move away when calculating savings?

S4. How do you account for undeliverable reports when calculating savings?

S5. Are there any other homes you exclude from analysis? Why?

S6. What, if any, covariates are considered when calculating savings?

S7. Originally, there were 4 cohorts, then in the second year, Idaho Power added a fifth cohort and reassigned some of the control households from the original four cohorts. How do you take these changes into account when you compute the savings?

S8. (PROBE) How do you weight the (now) 5 different cohorts?

S9. (PROBE) Is there another dimension for quarterly vs. bimonthly reports? Does that result in 10 groups?

S10. How do you account for potential double counting regarding treatment group uplift in other rebate programs?

REPORT DESIGN

R1. Each report contains a page with a list of tips. How many tips are included in the report?

R2. Does the number of tips included vary by method used?

By method used, we mean these two methods described in the 2018-2019 report
1. Send a seasonal report at the beginning of the season with suggested actions/tips based on behavior last season (winter heating customers in Y1 and Y2)
2. Send a report that combines two reporting windows, with the front page reporting on the previous quarter or two months, and the back page suggesting tips based on the same season the previous year (high AC customers)

R3. Does each bimonthly/quarterly report include the same number of tips?

R4. Are the tips the same for every participant within that method group?

R5. [IF CUSTOMIZED BY HOUSE] How do you determine which custom tips each house gets?

R6. Is there a library of tips to choose from?

R7. Can a participant receive the same tip more in more than one report throughout the program year?

R8. [IF REPEATS POSSIBLE] Why do you include the same tip more than once?

R9. Can a tip include participating in an Idaho Power Company program?

R10. If the report does contain a program participation tip and the customer participates, do you receive that information so that you can exclude it from future tips?

R11. What are the groups used for home classification?

R12. The electricity use breakdown chart is broken down into four categories: A/C, Always On, Appliances & Lighting, and Electric Heating. How did you come up with this breakdown?

R13. Next to the electricity use breakdown chart there is a box with information on use during a specific time period and the approximate cost of that use to the homeowner. How do you choose what category to highlight in this box?

R14. Does this box determine which tips are chosen?

R15. Has the report design changed throughout the program year?

R16. Was there internal testing of different report content prior to the first report? (PROBE: Please describe how you tested it.)

COVID-19

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

C2. Has the COVID-19 pandemic resulted in any changes to the content of the HER reports? *Verbiage, tips, etc.*

C3. 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.

About DNV

Impact & Process Evaluation of Idaho Power Company PY2020 Heating & Cooling Efficiency Program

SUBMITTED TO: IDAHO POWER COMPANY

SUBMITTED ON: MARCH 2, 2022

SUBMITTED BY: ADM ASSOCIATES, INC.

ADM

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List of Tables

1. Executive Summary

This report is a summary of the 2020 program year (PY2020) Heating & Cooling Efficiency Program Impact and Process Evaluation for Idaho Power Company (IPC) in the Idaho and Oregon service territory. The evaluation was administered by ADM Associates, Inc. (herein referred to as the "Evaluators").

The Evaluators found the impact and process evaluation results for the Heating & Cooling Efficiency Program to align with similar electric HVAC programs offered in the Pacific Northwest region. The impact evaluation resulted in 96% realization rate, which meets the typical realization for HVAC programs, between 90% and 110%. The Evaluators provide recommendations for improving a small number of program documentation, savings algorithm applications, and incentive changes to improve opportunities to estimate accurate savings through the program.

In addition, the Evaluators found the vast majority of responding customers were satisfied or very satisfied with the program (88.8%) and more than half recommended the program to people they know (61.9%). The Evaluators conclude that the program is running smoothly and delivers sufficient energy efficiency options to Idaho Power customers. The Evaluators provide recommendations for improving opportunities to increase reach and lower customer and contractor barriers for participation.

1.1 Savings Results

The Evaluators conducted an impact and process evaluation for IPC's Heating & Cooling Efficiency Program during PY2020. The Heating & Cooling Efficiency Program savings amounted to 1,779,679 kWh with a 96.77% realization rate. The Evaluators summarize the program verified savings in Table 1-1.

Table 1-1: Heating & Cooling Efficiency Program Verified Impact Savings by Measure

Measure	Number of Rebates	Expected Savings (kWh)	Verified Savings (kWh)	Realization Rate
Air-Source Heat Pump: 8.5 HSPF	14	10,432	6,780	65.00%
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	88	658,487	590,769	89.72%
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	51	27,359	64,413	235.44%
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	8	56,381	53,558	94.99%
Ductless Heat Pump	244	556,279	553,529	99.51%
Duct Sealing	1	848	848	100.03%
Evaporative Cooler	9	13,239	5,878	44.40%
Electronically Commutated Motor	51	145,921	165,074	113.13%
Heat Pump Water Heater	26	40,768	32,456	79.61%
Open Loop Water Source Heat Pump: 3.5 COP	3	23,444	23,442	99.99%
Electric Heating System to Open Loop Water Source Heat Pump: 3.5 COP	1	7,054	7,054	100.00%
Oil/Propane Heating System to Open Loop Water Source Heat Pump: 3.5 COP	2	14,108	15,622	110.73%
Smart Thermostat - Self Installed	240	127,114	106,073	83.45%
Smart Thermostat - Contractor Installed	152	100,152	92,382	92.24%
Whole House Fan	129	57,482	61,800	107.51%
Total	**1,019**	**1,839,068**	**1,779,679**	**96.77%**

The Evaluators conducted the following evaluation tasks for the PY2020 Heating & Cooling Efficiency Program impact and process evaluation:

- Impact Evaluation
  - Database review
  - Survey verification
  - Deemed savings review and application
  - Billing analysis for additional research objectives
- Process Evaluation
  - Staff interviews
  - Contractor interviews
  - Participant surveys

In the following sections, the Evaluators summarize the findings and recommendations resulting from our evaluation activities.

1.2 Conclusions & Recommendations

The following section details the Evaluators' impact and process evaluation conclusions and recommendations for the Heating & Cooling Efficiency Program.

1.2.1.1 Impact Evaluation

The Evaluators provide the following impact evaluation conclusions and recommendations regarding Idaho Power's Heating & Cooling Efficiency Program:

First, the Evaluators present the conclusions and recommendations that affect all measures in the program:

- **Conclusion:** The Evaluators verified 1,779,679 kWh savings at 96.77% realization rate for the Heating & Cooling Efficiency Program. The Evaluators verified savings using the RTF-approved workbooks, the New Mexico TRM, IDL workpapers, and for the air source heat pump upgrades, a billing analysis completed for projects rebated through the program. The Evaluators present these verified savings, which achieve ±7.1% precision at the 90% confidence interval.
- **Conclusion:** The Evaluators verified air source heat pump upgrade projects using billing analysis results comparing participating household energy consumption to nonparticipating household energy consumption.
- **Conclusion:** The Evaluators found inconsistencies in program incentive application for several of the measures reviewed (air source heat pump upgrades, air source heat pump conversions, ductless heat pumps).
    - **Recommendation #1:** The Evaluators recommend IPC require customers fill out an incentive application consistent for all projects rebated during the program year.
- **Conclusion:** The Evaluators found most measure-level rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather the required information to claim savings for the measure through the Regional Technical Forum ("RTF") measure specifications. Although many of the program application documents submitted by customers were incomplete, IPC staff retroactively fill in information after following up with the customer. However, some forms remained incomplete after IPC had reviewed the applications. For the majority of cases, IPC's tracking database contained values for these accounts. However, this information may not be updated once the customer fulfills the application. The information most commonly omitted from the customer consist of the housing type (single-family vs. manufactured home), home vintage, home square footage, existing cooling type, and checkboxes indicating equipment had been installed to manufacturer requirements.
    - **Recommendation #2:** The Evaluators recommend IPC review each application to ensure the measure-level requirements are portrayed in rebate documentation prior to fulfilling incentives for the project.
- **Conclusion:** The Evaluators found instances in which equipment did not meet or exceed the RTF-specified efficiency requirements or measure specifications (air source heat pump upgrades and smart thermostats).
    - **Recommendation #3:** The Evaluators recommend IPC review each application to ensure the measure-level requirements are met prior to fulfilling incentives for the project.
- **Conclusion:** The Evaluators note that the IPC tracking database does not consistently reflect the same values found in the mail-in rebate applications documents. For example, four heat pump water heater projects in which incorrect equipment location was documented in the database, two open loop heat pump projects in which central A/C was not documented. Inconsistencies

between documentation and database values are commonly portrayed for equipment efficiency values, housing type, and home square footage.

    - **Recommendation #4:** The Evaluators recommend IPC work to improve methods for collecting web and mail-in rebate application information to reconcile the database, especially in cases where inputs are requirements for savings calculations.

- **Conclusion:** The Evaluators found that savings estimates provided by IPC had not been rounded to the nearest kWh for RTF-approved measures. The RTF presents measure-level unit energy savings rounded to the nearest full kWh.
    - **Recommendation #5:** The Evaluators recommend IPC update the database to round to the nearest full kWh.
- **Conclusion:** The Evaluators found that the majority of ducted air source heat pump projects (70%) did not meet all aspects of Performance Tested Comfort Systems ("PTCS") standards. Therefore, Commissioning, Controls, & Sizing savings claimed for each project was removed for projects in which the Evaluator was unable to verify the project met or exceeded all aspects PTCS certification. In most cases, the required information was present on rebate application materials, however, the values presented in the documents had not met PTCS standards. The RTF states that the controls and sizing components of the PTCS requirements are the most impactful components to PTCS savings. Because the majority of IPC ducted heat pumps meet individual PTCS requirements towards controls and sizing, but lack other components of PTCS requirements, the Evaluators believe that these projects still display significant potential for savings towards additional control and sizing activities implemented by the program.
    - **Recommendation #6:** The Evaluators recommend providing additional training to contractors rebating air source heat pumps through the program and reviewing documentation more thoroughly to confirm PTCS standards have been met. This will ensure PTCS savings from the RTF may be assigned to each project once the RTF workbook is reinstated.
- **Conclusion**: The Evaluators reviewed the New Mexico Technical Resource Manual ("TRM") and deemed it as an appropriate deemed savings source for the evaporative coolers rebated through the program, due to similar cooling degree days between the Boise, ID region and the Santa Fe, NM region. However, the New Mexico TRM requires a NTG ratio be applied to the evaporative cooler measure to indicate the proportion of projects in which evaporative coolers replace refrigerated air. The Evaluators relied on a literature review to estimate NTG for the region, sourced from the Public Company of New Mexico 2015 impact evaluation in which a comprehensive study was completed to estimate NTG for evaporative coolers.
    - **Recommendation #7:** The Evaluators recommend IPC apply this 44.4% NTG ratio for claimed savings of future projects rebated through the program. When participation permits, the Evaluators recommend estimating the NTG ratio for evaporative cooler projects rebated in the Idaho Power service territory.
- **Conclusion:** The Evaluators reviewed the literature review workpaper and confirmed that savings values are applicable to the ECM projects completed in the Idaho Power service territory. Therefore, the Evaluators utilized the savings calculations derived from the Integrated Design Lab ("IDL") literature review workpaper for the electronically commutated motors projects completed in the Idaho Power service territory.

  - **Recommendation #8:** The Evaluators recommend continuing to utilize the IDL workpaper to claim savings for the electronically commutated motors measure.
- **Conclusion:** The Evaluators reviewed and applied the savings values derived from the University of Idaho Integrated Design Lab workpaper on whole house fans (WHF) along with verified tracking data to estimate net program savings for this measure.
  - **Recommendation #9:** The Evaluators recommend utilizing the modeling results presented in the paper. However, The Evaluators recommend applying the savings values presented in the paper by calculating kWh impacts per square foot for four scenarios utilizing household number of stories and observed whole house fan cubic feet per minute ("CFM") rate per square foot. The Evaluators recommend claiming savings for future whole house fans using the deemed savings approach presented in the WHF section. The Evaluators adjusted the application of the savings represented in the IDL workpaper. Idaho Power used the constant 445.6 kWh savings per WHF. The calculation behind this value is unclear; however, the Evaluators utilized the IDL modeling results for each the one-story and two-story constructions, for each the 1 CFM/SQFT and 2 CFM/SQFT model results.
- **Conclusion:** The Evaluators found that heat pump water heater savings calculated by IPC lacked some interactive components.
  - **Recommendation #10:** The Evaluators recommend IPC ensure the measure-level savings applied to projects matches the total measure savings defined in the RTF workbook measure table to ensure expected savings accounts for the savings due to water heating, cooling interactions, and heating interactions.
- **Conclusion:** The Evaluators found that five smart thermostat models across 25 smart thermostat rebates (of the 392 smart thermostat rebates received throughout the program year) lacked eligibility for verified RTF savings. These five models lacked required occupancy sensing and/or geofencing capabilities, as required by the RTF workbook on Connected Thermostats.
  - **Recommendation #11:** The Evaluators recommend IPC consider providing a list of qualified products on program website or list of qualification criteria for smart thermostats to receive incentives through the program. In addition, the Evaluators recommend IPC verify that the rebated smart thermostat is replacing a non-qualified thermostat, as required by the RTF measure specifications.
- **Conclusion:** The Evaluators removed smart thermostat savings for three projects in which commissioning, controls, and sizing savings were claimed through the program, as required by the RTF measure specifications.
  - **Recommendation #12:** The Evaluators recommend IPC update database to refrain from claiming smart thermostat savings for households which also claim PTCS standards savings.
- **Conclusion:** The Evaluators found some inputs required in savings calculations for the whole house fans are not present or differ from values presented in the database, such as equipment CFM rate, home square footage, and the number of stories of the home.
  - **Recommendation #13:** The Evaluators recommend verifying home existing cooling type has central air conditioning, home square footage, whether the home is one-story or two-story, WHF manufacturer, model number, and serial number are consistent, verify CFM for each WHF. In addition, the Evaluators

recommend enforcing required documents for all rebates, as some rebates displayed blank or missing required information.

- **Conclusion:** The Evaluators found that all survey respondents indicated that the installed measure is still installed and functional. The survey effort met a precision of 7.24% with 129 responses.

1.2.1.2 Process Evaluation

The Evaluators provide the following process evaluation conclusions and recommendations regarding Idaho Power's Heating & Cooling Efficiency Program:

- **Conclusion:** The vast majority of responding customers were satisfied or very satisfied with the program (88.8%) and more than half recommended the program to people they know (61.9%). Satisfaction rates are similar for other HVAC programs in the area.
- **Conclusion:** The majority of customers participated in the program in order to lower their energy usage and save money on their utility bill (75.4%). About half of respondents noted a decrease in their electricity bill since participating in the program (49.2%).
- **Conclusion**: Direct contact with Idaho Power staff is valued by contractors and has historically been a reason why the program has succeeded. Most contractors reported positive experiences with Idaho Power staff. Many noted their participation in the program was a direct result of contact with Idaho Power staff, and several contractors specified they would like more contact with staff.
    - **Recommendation #14:** To the extent possible, the Evaluators recommend Idaho Power staff reach out to existing contractors using trainings, in-person visits, webinars, and other methods to maintain and nurture personal relationships between the program and contractors. Offering regular trainings, webinars, or other opportunities to bring staff and contractors together yields positive connections between the program and contractors which ultimately yields projects.
- **Conclusion**: Contractors experience with the program and with installing ducted heat pumps varies across the Idaho Power service territory which leads to several barriers to completing more program projects. According to contractor responses, barriers to completing more ducted heat pump projects in the region are:
        - Contractor's unawareness of the ducted heat pump program offerings.
        - The incentive ($250) for replacing existing ducted heat pumps with new more efficient units is insufficient so contractors do not offer it, or it is not enough to prompt a customer to act.
        - Less efficient (<8.5 HSPF) options are still seen as widely available, especially outside the Capital and Canyon areas, and those units are inexpensive enough that they still appeal to many contractors and customers.
        - Some contractors, especially in the Capital region have limited experience installing ducted heat pumps. This is likely a result of the area having several natural gas options for customers.
    - **Recommendation #15**: Consider increasing the existing incentive amounts as well as expand measures offered, if cost-effectiveness allows. Customers and participating

contractors alike suggested broadening the measures offered and/or increasing incentive amounts. Not only was equipment cost the biggest barrier to customer participation according to interviewed contractors, but many customers surveyed suggested offering larger and more wide-reaching discounts. Proposed increase includes the $250 contractor incentive for replacing a ducted heat pump, as well as the customer incentive for all eligible measures.

- **Recommendation #16:** Work with distributors and suppliers to better understand the availability of ducted heat pump units with an HSPF ≥8.5 and <8.5. Consider ways to incent distributors to push or offer higher efficient units, especially in areas outside of the Capital region.

- **Conclusion:** Many of the program top performing contractors did not install ducted heat pumps outside of the program. Many lesser participating contractors ("dabblers") and non-participating contractors display lack of knowledge about these standards or confirm that they do not implement them for installations conducted outside of the program.
    - Additional findings from this research effort found that many contractors that do not often participate in the program lack understanding of the program requirements, and therefore avoid the risk of trying to participate in the program. The reasons for installing non-program qualified heat pumps were equipment barriers, financial barriers, and a lack of understanding regarding program and install requirements.
  - **Recommendation #17:** The Evaluators recommend that IPC provide additional efforts to provide educational training to assist in building contractor awareness of the program and the program requirements. Work with contractors to increase training and educational opportunities about PTCS standards, and program requirements, address all concerns or questions they may have about the program and what equipment/environment is and is not eligible.
- **Conclusion:** The program is using a broad and comprehensive marketing approach that consists of direct mailings, bill inserts, and friend/family referral, as well as social media. Many of the program measures are predominantly measures that would be driven by contractors. Staff noted that they are not providing contractors co-branded collateral; however, contractors are listed on the website and they are encouraged to mention their role with the program. That said, program staff noted that it is a challenge to reach the customers at the right time and that there are many competing demands for their attention. This sentiment was echoed in customer survey responses, with twenty respondents suggesting increased in advertisement and outreach campaigns.
  - **Recommendation #18:** Invest in more marketing and outreach of the program. Customers recommended more print ads, online marketing, and bill inserts to let customers know about the program. Strategies that may help the program reach customers with the program message at the right time include:
    - **Use of search-based advertisement.** Customers searching for information on smart thermostats, evaporative coolers, and whole house fans may be effectively reach through search ads.

        - **Promote smart thermostat installations during heat pump replacements.** Approximately half of the air source heat pumps installed in 2020 included a smart thermostat. While that is a sizable share, there may be additional opportunities to promote smart thermostats during these installations.
    - **Recommendation #19:** To the extent possible, Idaho Power should engage existing account representatives to help with on the ground communication and marketing of the program. In the past, staff had on the ground account representatives who helped with contractor visits and check-ins; this assistance was invaluable to promoting the program across the service area.
- **Conclusion:** Thermostats installed on heat pumps are largely contractor installed. Seventy-four percent of respondents with thermostats installed on heat pumps said a contractor installed the thermostat. Those customers who did self-install them either did not change the heat pump settings or did not know what they were, suggesting that the manufacture default settings are being used.

1.2.1.3 Additional Research Objectives

The Evaluators provide the following additional research conclusions and recommendations regarding a subset of measures provided in Idaho Power's Heating & Cooling Efficiency Program:

The Evaluators summarize the conclusions and recommendations for the heat pumps and PTCS standards research efforts (Section 5.1.1.1):

- **Conclusion:** The majority of ducted heat pump projects (70%) completed through the program cannot be confirmed to meet PTCS standards either due to lack of required information in documentation, or due to provided documentation displaying values that do not meet PTCS standards. Nineteen of the 55 sampled projects that claimed PTCS savings were confirmed to have met PTCS requirements as found through document verification. For projects in which the Evaluators are unable to confirm PTCS standards are met, RTF Commissioning, Controls, and Sizing savings were removed from the project.
    - **Recommendation #20:** Although the Commissioning, Controls, and Standards RTF Workbook is deactivated, the Evaluators recommend IPC continue to require additional documents to properly verify each of the five components for PTCS certification to ensure any future RTF workbook remains applicable:
        - Collect each air source heat pump heating capacity at 17F and 47F and ensure heat pump sizing worksheets document heating load design temperature of equipment.
        - Collect equipment air flow values (CFM/BTUh) to confirm values are within 0.027 and 0.042.
        - Collect external static pressure value at 0.8 inches of water (200 Pa).
        - Require customers confirm that the equipment was installed to manufacturer's recommendations.
        - Require customers confirm that auxiliary heat does not engage when the outdoor air temperature is above 35F

- **Conclusion:** The Evaluators utilized the billing analysis results for the air source heat pump upgrades completed in PY2020 projects. The RTF deactivated the Commissioning, Controls, & Sizing workbook in January 2020. However, the RTF intends to consider other versions of this measure in the future.
    - **Recommendation #21:** Due to inability to claim savings from additional commissioning, controls, and sizing practices for ducted heat pump measures through the RTF while the measure is deactivated, the Evaluators recommend to continue analyzing impacts through measurement or observed billing analysis in the future. Once the RTF approves a new measure for PTCS standards, the Evaluators recommend using the UES values presented in the new workbook.
- **Conclusion:** Contractor respondents varied greatly in their experience installing ducted heat pumps and installation procedures conducted for non-program installations. Eleven respondents indicated they sometimes install ducted heat pumps that do not receive the Heating and Cooling Efficiency Program incentive. Two contractors indicated they use Manual J calculations for all non-program installs while three contractors noted following Manual J procedures for new construction ducted heat pumps, but not for retrofits, as the program requirements are too stringent.
- **Conclusion:** The Evaluators found that the top performers in the program typically install equipment outside the program to meet the PTCS/Manual J requirements. However, many dabblers and non-participating contractors display lack of knowledge about these standards or confirm that they do not implement them for installations conducted outside of the program. The Evaluators reference the recommendation noted in Recommendation #17.
- **Conclusion:** The contractor interviews concluded that the reasons for installing non-program qualified heat pumps were equipment barriers, financial barriers, and a lack of understanding regarding program and install requirements. Many contractors lack understanding of the program requirements, and therefore avoid the risk of trying to participate in the program. The Evaluators reference the recommendation noted in Recommendation #15.
- **Conclusion:** These results indicate that savings for air source heat pump upgrade measure with PTCS standards in the program achieve 1,263 kWh savings per year, about 30% higher than the savings values presented in the RTF for air source heat pump upgrades with commissioning, controls, and sizing standards. This value includes projects for which efficient equipment displays HSPF of 8.5 or greater.
    - **Recommendation #22:** Because the Commissioning, Controls, & Sizing workbook from the RTF will be deactivated and unable to be used towards PY2021 projects for claimed savings, and because the projects seem to benefit from additional savings due to these additional sizing activities, the Evaluators recommend using the results of this billing analysis to quantify savings for ducted heat pump upgrades projects rebated through the program. This analysis would estimate average impacts for the air source heat pump upgrades completed and verified by IPC’s Heating & Cooling Efficiency Program.

The Evaluators summarize the conclusions and recommendations for the ducted heat pumps 8.2 vs 8.5 HSPF standards research efforts as well as the billing analysis for the ducted heat pump conversions in Heating Zones 2 and 3 (Section 5.1.1.2):

- **Conclusion:** According to contractor responses, barriers to completing more ducted heat pump projects in the region are: low incentive levels and availability of less efficient options. The Evaluators reference the recommendation noted in Recommendation #15 and Recommendation #16.
    - The incentive ($250) for replacing existing ducted heat pumps with new more efficient units is insufficient so contractors do not offer it or it is not enough to prompt a customer to act.
    - Less efficient (<8.5 HSPF) options are still seen as widely available, especially outside the Capital and Canyon areas, and those units are inexpensive enough that they still appeal to many contractors and customers.
- **Conclusion:** Annual energy savings for air source heat pump conversions in Heating Zone 1, 2, and 2/3 totals 1,513 kWh per year 2,609 kWh per year, and 2,026 kWh per year, respectively. These results indicate that savings for air source heat pump conversion measures in Heating Zone 2 are, on average, 58% higher than energy savings for air source heat pump conversions in Heating Zone 1 and savings for the measure in Heating Zone 2/3 is, on average, 34% higher than in Heating Zone 1. However, the results of the billing analysis provide savings values significantly lower than the RTF-provided savings for this measure, regardless of Heating Zone.
- **Conclusion:** The RTF workbook which calculates ducted heat pump conversion savings is unable to be modified. In addition, research indicates that 8.2 HSPF equipment are still widely available and remain a valid option for customers outside of the program.

    Recommendation #23: The Evaluators recommend that IPC continue to use the RTF-approved UES values for ducted heat pump conversions to evaluate savings for the projects, which already define the federal minimum of 8.2 HSPF as the baseline. For the PTCS standards portion of the projects, the Evaluators recommend requiring sufficient documentation to confirm PTCS certification. In addition, due to RTF deactivation of the Commissioning, Controls, and Sizing workbook, and due to the results of the billing analysis, the Evaluators recommend IPC does not claim additional sizing savings for these projects.

The Evaluators summarize the conclusions and recommendations for the ECMs, whole house fans, and evaporative coolers measures research (Section 5.1.1.3):

- **Conclusion:** The Evaluators reviewed the Integrated Design Lab literature review workpaper and confirmed that savings values are applicable to the ECM projects completed in the Idaho Power service territory. The Evaluators reference the recommendation noted in Recommendation #8.
- **Conclusion:** Participants indicated that they use their whole house fan most June-September; about half (47.3%) of participants use their fan for four or more hours per day during summer months. The Evaluators used these results to estimate annual hours of operation for whole house fans in the program of between 244 and 731 hours, which is consistent with the IDL workpaper

estimate of 343 hours. The Evaluators reference the recommendation noted in Recommendation #9.

- **Conclusion:** The Evaluators found that of the two respondents (50%) of customers who had rebated an evaporative cooler had indicated that the evaporative cooler was replacing refrigerated air (an A/C unit). The Evaluators reference the recommendation noted in Recommendation #7.

The Evaluators summarize the conclusions and recommendations for the smart thermostat measure research efforts (Section 5.1.1.4):

- **Conclusion:** The customers who had self-installed the smart thermostat with a heat pump indicate little knowledge about the proper installation practices and had not adjusted auxiliary heat settings or compressor lockout settings with respect to the settings from their heat pump. Instead, the majority of self-install customers with heat pump systems had installed the smart thermostat to the default settings provided by the manufacturer. In contrast, the contractor-installed smart thermostats are installed to meet the proper auxiliary and compressor lockout settings with respect to the household's heat pump equipment settings. This research indicates that the self-installed smart thermostats may not be meeting the full potential of energy savings due to the oversight of these additional energy-saving settings.
  - **Recommendation #24:** The Evaluators recommend that IPC provide instructional education or requirements for self-installed smart thermostats rebated through the program. The Evaluators recommend IPC explore options for changing incentive levels for self-installed vs. contractor-installed smart thermostats to further incentivize customers to have their equipment properly installed to their heating equipment.
- **Conclusion:** Customers with smart thermostats find value in keeping their homes at a comfortable temperature. Additionally, customers use energy-saving features available to them to save energy when they are not home.
- **Conclusion:** The Evaluators found that the contractor-installed smart thermostats saved more energy than the self-installed smart thermostats. The Evaluators were unable to estimate savings for the self-installed smart thermostats, however, the contractor-installed smart thermostats saved 470 kWh per year while the aggregate of contractor-installed and self-installed smart thermostats saved 229 kWh per year.
  - **Recommendation #25:** The Evaluators recommend continuing to use the RTF-approved Connected Thermostat workbook to evaluate savings for this measure. The Evaluators also recommend revisiting billing analysis when additional self-installed thermostat projects are completed and available to use in further analyses.

2. General Methodology

The Evaluators completed an impact evaluation on each of the measures summarized in Table 1-1. Our general approach for this evaluation considers the cyclical feedback loop among program design, implementation, impact evaluation, and process evaluation. Our activities estimate and verify annual energy savings and identify whether the program is meeting its goals. This is aimed to provide guidance for continuous program improvement. The Evaluators summarize the research objectives for the impact and process evaluation for this program here:

1. Determine and verify the energy impacts (kWh) as well as ex-post realization rates attributable to the Heating & Cooling Efficiency Program for the 2020 program year;
2. Develop estimates of program non-electric impacts (NEIs) and non-energy benefits (NEBs);
3. Evaluate program design[1], implementation[2], and administration[3]; and
4. Report findings and observations from the evaluation and make recommendations to assist IPC in enhancing the effectiveness of programs and more accurately and transparently reporting program savings in future program cycles.

Furthermore, our team reviewed existing data on program performance and design and collected additional data on program performance and administration. We synthesized these data to identify gaps in program design and barriers to program implementation. This synthesis allows development of recommendations for program improvement that are grounded in the existing design and based on real-world feedback.

The Evaluators used the following approaches to accomplish the impact-related research goals listed above and calculate energy impacts defined by the International Performance Measurement and Verification Protocols (IPMVP)[4] and the Uniform Methods Project (UMP)[5]:

- Simple verification (web-based surveys supplemented with phone surveys)
- Document verification (review project documentation)
- Deemed savings (RTF UES, New Mexico TRM values, University of Idaho Integrated Design Lab (IDL) workpapers)
- Billing analysis for additional research objectives

The Evaluators used the following approaches to accomplish the process-related research goals and complete the research objectives identified by IPC for the program:

- Staff interviews
- Contractor interviews
- Participant surveys

[1] Including program mission, logic, and use of industry best practices
[2] Including quality control, operational practice, and outreach
[3] Including program oversight, staffing, management, training, documentation, and reporting
[4] https://www.nrel.gov/docs/fy02osti/31505.pdf
[5] https://www.nrel.gov/docs/fy18osti/70472.pdf

The M&V methodologies are determined by previous Idaho Power evaluation methodologies as well as the relative contribution of a given program to the overall energy efficiency impacts. Besides drawing on IPMVP, the Evaluators also reviewed relevant information on infrastructure, framework, and guidelines set out for EM&V work in several guidebook documents that have been published over the past several years. These include the following:

- Northwest Power & Conservation Council Regional Technical Forum (RTF)[6]
- New Mexico Technical Resource Manual (TRM)[7]
- National Renewable Energy Laboratory (NREL), United States Department of Energy (DOE) The Uniform Methods Project (UMP): Methods for Determining Energy Efficiency Savings for Specific Measures, April 2013[8]
- International Performance Measurement and Verification Protocol (IPMVP) maintained by the Efficiency Valuation Organization (EVO) with sponsorship by the U.S. Department of Energy (DOE)[9]

The Evaluators kept data collection instruments, calculation spreadsheets, programming code, and survey data available for Idaho Power records.

As part of the impact evaluation, the Evaluators also conducted additional billing analyses for measures in which additional research objectives were defined. These billing analyses comply with the IPMVP Option C procedures.

2.1 Glossary of Terminology

As a first step to detailing the evaluation methodologies, the Evaluators have provided a glossary of terms to follow:

- **Deemed Savings** – An estimate of an energy savings outcome for a single unit of an installed energy efficiency measure. This estimate (a) has been developed from data sources and analytical methods that are widely accepted for the measure and purpose and (b) are applicable to the situation being evaluated.
- **Expected Savings** – Calculated savings used for program and portfolio planning purposes.
- **Verified Savings** – Savings estimates after the unit-level savings values have been updated and energy impact evaluation has been completed, integrating results from billing analyses and appropriate RTF UES and New Mexico TRM values.
- **Gross Savings** – The change in energy consumption directly resulting from program-related actions taken by participants in an efficiency program, regardless of why they participated.
- **Free Rider** – A program participant who would have implemented the program measure or practice in absence of the program.
- **Net-To-Gross** – A factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts.

[6] https://rtf.nwcouncil.org/measures
[77] https://www.nm-prc.org/wp-content/uploads/2021/07/New-Mexico-TRM-2021-Final-03-09-2021.pdf
[8] Notably, The Uniform Methods Project (UMP) includes the following chapters authored by ADM. Chapter 9 (Metering Cross-Cutting Protocols) was authored by Dan Mort and Chapter 15 (Commercial New Construction Protocol) was Authored by Steven Keates.
[9] Core Concepts: International Measurement and Verification Protocol. EVO 100000 – 1:2016, October 2016.

- **Net Savings** – The change in energy consumption directly resulting from program-related actions taken by participants in an efficiency program, with adjustments to remove savings due to free ridership.
- **Non-Energy Benefits** – Quantifiable impacts produced by program measures outside of energy savings (comfort, health and safety, reduced alternative fuel, etc.).
- **Non-Energy Impacts** – Quantifiable impacts in energy efficiency beyond the energy savings gained from installing energy efficient measures (reduced cost for operation and maintenance of equipment, reduced environmental and safety costs, etc.).

2.2 Summary of Approach

This section presents our approach to accomplishing the impact and process evaluation of Idaho Power's Heating & Cooling Efficiency Program. This chapter is organized by evaluation objective. Section 2.2.3 and Section 3 describe the Evaluators' measure-specific impact evaluation methods and results in further detail and Section 2.2.4 and Section 4describe the Evaluator's process evaluation methods and results.

The Evaluators outline the approach for verifying, measuring, and reporting the residential portfolio impacts as well as summarizing potential program and portfolio improvements. The primary objective of the impact evaluation is to determine ex-post verified net energy savings. On-site verification and equipment monitoring was not conducted during this impact evaluation.

Our general approach for this evaluation considers the cyclical feedback loop among program design, implementation, and impact evaluation. Our activities during the evaluation estimate and verify annual energy savings and identify whether the program is meeting its goals. These activities are aimed to provide guidance for continuous program improvement and increased cost effectiveness for future program years.

The Evaluators employed the following approach to complete impact evaluation activities for the program. The Evaluators define one major approach to determining net savings for Idaho Power's Heating & Cooling Efficiency Program:

- A *Deemed Savings* approach involves using stipulated savings for energy conservation measures for which savings values are well-known and documented. These prescriptive savings may also include an adjustment for certain measures, such as lighting measures in which site operating hours may differ from RTF values.

The Evaluators accomplished the following quantitative goals as part of the impact evaluation:

- Verify savings with 10% precision at the 90% confidence level;
- Where appropriate, apply the RTF or New Mexico TRM to verify measure impacts;
- Where appropriate, apply IDL workpaper results to verify measure impacts; and
- Where additional research objectives are defined, conduct billing analysis with a suitable comparison group to estimate measure savings.

The Evaluators calculated verified savings for each measure based on the RTF UES, New Mexico TRM, or IDL workpapers in combination with the results from document review. The Evaluators also applied in-service rates (ISRs) from verification surveys for measures which met or exceeded 90/10 precision requirements from survey responses.

The Evaluators also completed billing analyses to support additional research objectives for a subset of measures in which additional research objectives were defined. Further methodology for the additional research objectives for these measures are provided in Section 2.2.5.

2.2.1 Database Review

At the outset of the evaluation, the Evaluators reviewed the databases to ensure that each program tracking database conforms to industry standards and adequately tracks key data required for evaluation.

Measure-level net savings were evaluated primarily by reviewing measure algorithms and values in the tracking system to assure that they are appropriately applied using the Regional Technical Forum Unit Energy Savings (UES). The Evaluators then aggregated and cross-check program and measure totals.

The Evaluators reviewed program application documents for a sample of incented measures to verify the tracking data accurately represents the program documents. The Evaluators ensured the home installed measures that meet or exceed program efficiency standards.

2.2.2 Verification Methodology

The Evaluators verified a sample of participating households for detailed review of the installed measure documentation and development of verified savings. The Evaluators verified tracking data by reviewing invoices and surveying a sample of participant customer households. The Evaluators also conducted a verification survey for program participants.

The Evaluators used the following equations to estimate sample size requirements for each program and fuel type. Required sample sizes were estimated as follows:

Equation 2-1: Sample Size for Infinite Sample Size

$$n = \left(\frac{Z \times CV}{d}\right)^2$$

Equation 2-2: Sample Size for Finite Population Size

$$n_0 = \frac{n}{1 + \left(\frac{n}{N}\right)}$$

Where,

- n = Sample size
- Z = Z-value for a two-tailed distribution at the assigned confidence level.
- CV = Coefficient of variation
- d = Precision level
- N = Population

For a sample that provides 90/10 precision, Z = 1.645 (the critical value for 90% confidence) and d = 0.10 (or 10% precision). The remaining parameter is *CV*, or the expected coefficient of variation of measures for which the claimed savings may be accepted. A *CV* of .5 was assumed for the program due to the homogeneity of participation[10], which yields a sample size of 68 for an infinite population. Sample sizes were adjusted for smaller populations via the method detailed in Equation 2-2.

The following sections describe the Evaluator's methodology for conducting document-based verification and survey-based verification.

2.2.2.1 Document-Based Verification

The Evaluators requested rebate documentation for a subset of participating customers. These documents included invoices, rebate applications and worksheets, and AHRI certifications for each measure in the Heating & Cooling Efficiency Program.

This sample of documents was used to cross-verify tracking data inputs. In cases where the Evaluators found any deviations between the tracking data and application values, the Evaluators reported and summarized those differences in the measure-level results in Section 3.2 for each measure type.

The Evaluators developed a sampling plan that achieves a sampling precision of ±10% at 90% statistical confidence – or "90/10 precision" – to estimate the percentage of projects for which the claimed savings are verified or require some adjustment.

The Evaluators developed the following samples for the program's document review using Equation 2-1 and Equation 2-2. The Evaluators ensured representation for each measure.

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[10] Assumption based off California Evaluation Framework: https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy/Energy_Programs/Demand_Side_Management/EE_and_Energy_Savings_Assist/CAEvaluationFramework.pdf

Table 2-1: Document-based Verification Samples and Precision by Measure

Measure	Measure Population	Sample (With Finite Population Adjustment)*	Precision at 90% CI
Heat pump conversion (retrofit)	96	15	90% Confidence ±7.1% Precision
Ductless heat pump	244	16	
Connected thermostat	392	17	
Electronically commutated motors	51	13	
Whole house fan (WHF)	129	15	
Heat pump water heater (HPWH)	26	11	
Heat pump upgrade (retrofit)	51	13	
Open loop heat pump (new construction)	3	3	
Open loop heat pump (retrofit)	3	3	
Evaporative cooler	9	6	
Heat pump upgrade (new construction)	14	8	
Duct sealing	1	1	
Total	**1,019**	**121**	

*Assumes sample size of 68 for an infinite population, based on *CV* (coefficient of variation) = 0.5, *d* (precision) = 10%, *Z* (critical value for 90% confidence) = 1.645.

The Evaluators reviewed 121 rebates' associated documentation for the impact evaluation activities of this program and surveyed a total of 129 rebated customers to verify installation as well as gather customer satisfaction with the equipment, program, and utility in general. The table above represents the number of rebates sampled in the Idaho and Oregon territories combined.

2.2.2.2 Survey-Based Verification

The Evaluators conducted survey-based verification for the Heating & Cooling Efficiency Program. The primary purpose of conducting a verification survey is to confirm that the measure was installed and is still currently operational.

The Evaluators used the sample plan provided previously in Table 2-1 for the program simple verification task. The Evaluators developed a sampling plan that achieved a sampling precision of ±7.24% at 90% statistical confidence for ISRs estimates at the measure-level during web-based survey verification.

The Evaluators implemented a web-based survey to complete the verification surveys. The findings from these activities served to estimate ISRs for each measure surveyed. These ISRs were applied to verification sample desk review rebates towards verified savings, which were then applied to the population of rebates. The measure-level ISRs resulting from the survey-based verification are summarized in Section 3.1. Although the Evaluators contacted all participants with valid email addresses and received over 121 responses, meeting the program-level 90/10 precision goal, we were unable to reach the measure-level response goal for several of the measures.

2.2.3 Impact Evaluation Methodology

The Evaluators employed a *deemed savings* approach to quantify program impacts for the Heating & Cooling Efficiency program. The Evaluators completed the steps outlined below to complete the impact evaluation for the Heating & Cooling Efficiency Program rebates.

1. Deliver a detailed data request outlining the information we require for each rebated equipment type.
2. Complete a thorough and comprehensive summary of program tracking data.
3. Validate the appropriate inputs to deemed savings and engineering algorithms were used for each measure.
4. Verify the gross energy (kWh) savings that are a result of the program.
5. Summarize and integrate the impact evaluation findings into the final report.

The Evaluators completed the validation for specific measures across each program using the RTF unit energy savings (UES) values, where available. The Evaluators ensured the proper measure unit savings were recorded and used in the calculation of IPC's ex-ante measure savings. The Evaluators requested and used the RTF workbooks, New Mexico TRM, and IDL workpapers employed during calculation of ex-ante measure savings. The Evaluators documented any cases where recommend values differed from the specific unit energy savings workbooks used by IPC.

In cases where the RTF has existing unit energy savings (UES) applicable to IPC's measures, the Evaluators verified the quantity and quality of installations and apply the RTF's UES to determine verified savings. In cases where the RTF does not define UES for the measure, the Evaluators reviewed and applied savings values derived from the following TRMs/workpapers:

- New Mexico TRM for evaporative coolers
- IDL workpaper for electronically commutated motors
- IDL workpaper for whole house fans

The Evaluators detail measure-specific impact evaluation methodologies in Section 3.2.

2.2.4 Process Evaluation Methodology

The process evaluation of the Heating & Cooling Efficiency Program was designed to accomplish the following research objectives:

- 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;
- Refine and refocus marketing strategies and increase program effectiveness;
- Provide recommendations for changing the program's structure, management, administration, design, delivery, operations, or target; and
- Help program designers and managers structure programs to achieve cost-effective savings.

The process evaluations focus on documenting the effects that the program activity had on encouraging installations of the energy efficiency measure or influencing the customer to make an energy-efficiency decision. The key research objectives in these process evaluations are:

- Document overall awareness of the program and its measures;
- Determine if there are significant differences between and among participant groups;
- Assess customer satisfaction with the utility and the program;
- Identify barriers for not participating;
- Identify areas for program improvement;
- Identify efficiencies in program implementation;
- Identify gaps in program participation for customers;
- Document energy efficiency motivations among participants;
- Identify patterns in how participants interact with measures
- Assess contractor engagement;
- Identify gaps in participation for contractors
- Characterize participating contractor practices for projects completed within and outside of the program
- Document best practices;
- Understand how customers are interacting with the measures incentivized through the program;
- Assess contractor views of the program and barriers to participation; and
- Review trade ally management best practices and provide recommendations as appropriate.

The process evaluation was designed to ensure that best practices and lessons learned from individual programs are then shared and incorporated across the entire program portfolio. In-depth interviews and customer participant surveys contain a standard set of questions to be addressed across all IPC programs to facilitate evaluation among and between programs. To achieve these objectives, the Evaluation team engaged in the research activities described in the sections below.

2.2.4.1 Documentation Review

The Evaluator reviewed materials on the program website including published incentive levels and application forms, as well as program marketing materials provided by program staff. This review provided a general understanding of the program design and implementation practices. The review also provided context for informing the interviews with program staff.

2.2.4.2 Program Staff Interviews

The Evaluators interviewed three IPC program staff. The interviews covered the following topics.

- Staff and partner roles in the program;
- The measures covered by the program and the decision processes used when considering measure offerings;
- Program marketing approaches;
- Contractor management practices; and
- Clarification of the objectives for the process evaluation.

2.2.4.3 Participant Survey

The Evaluators administered a survey to customers who participated in the 2020 program. The objective of the survey was to collect data on the following components:

- Sources of program awareness and motivations for participating;
- Customer experiences with the program and overall satisfaction;
- Measure specific questions related to how the installed equipment was utilized; and
- Home characteristics.

The Evaluator developed the survey guide in conjunction with Idaho Power staff to address of the above objectives through various questions to the participating customers. The survey questions are provided in Appendix B: Residential Participant Survey.

2.2.4.4 Participating Contractor Interviews

In January 2022, the Evaluator interviewed 19 Idaho Power approved contractors about the Heating & Cooling Efficiency Program. These interviews addressed four key topics.

- Program Effectiveness
- Program Satisfaction
- Barriers to program participation and suggestions for improvement
- Installation procedures for program vs. non-program ducted heat pump projects

The Evaluator developed the interview guide in conjunction with Idaho Power staff. As is typical with in-depth interviews, the guide provided a structure for the conversation. In some interviews, it is likely the interviewer would adapt some questions based on the conversation, and ask supplemental questions based on what they heard from respondents. In addition, receiving answers for all posed questions is not guaranteed, however, each interview results in a depth of information about the contractors' experience with the program and procedures that a survey would not be able to provide.

2.2.5 Additional Research Objectives Methodology

This section summarizes the methods the Evaluators employed for measures in which additional measure research has been requested by IPC. The list of measures includes:

- Heat pumps (with and without PTCS);
- Ducted air source heat pump (Zones 2 and 3);
- Whole house fans;
- Electronically commutated motors;
- Evaporative coolers; and,
- Connected thermostats.

The Evaluators completed research towards the following measure outcomes:

- Verify heat pump installations meet Performance Tested Comfort Systems ("PTCS") standards for commissioning, controls and sizing and determine if the deactivated Commissioning, Controls, and Sizing RTF workbook from January 2020 is reasonable to use to estimate verified energy savings for this measure.
- Understand and calculate savings for ducted air source heat pump conversions from electric forced air furnaces for Heating Zones 2 and 3. In addition, gather information on whether a 8.2

HSPF (federal standard) or 8.5 HSPF standard (RTF standard) is more typically installed for measures installed outside the program.

- Verify savings and review engineering calculations and assumptions for electronically commutated motors (ECMs), calculate savings relative to whole house fans and understand how customers use whole house fans relative to air conditioning, and calculate savings related to evaporative coolers and understand how customers use evaporative coolers relative to air conditioning.
- Review customer settings on self-installed connected thermostats for heat pump applications in order to understand customer configuration practices. Specifically, understand auxiliary heat settings with relation to customer knowledge on heat source equipment settings.

The Evaluators summarize methodology to complete the measure-specific research goals in the sections below.

2.2.5.1 Heat Pumps and PTCS Standards

The Evaluators completed verification to confirm that heat pump installations meet Performance Tested Comfort Systems ("PTCS") standards for commissioning, controls and sizing. One of the goals of this research is to determine if the deactivated Commissioning, Controls, and Sizing RTF workbook from January 2020 is reasonable to use to estimate verified energy savings for this measure. The Evaluators defined the following activities to provide sufficient insight towards the above topics for the heat pump installation with PTCS commissioning, controls, and sizing standards measure:

- Verify heat pumps meet PTCS standards
- Conduct participating contractor surveys to gather information on typical installation methods for heat pumps in the Idaho Power service territory
- Conduct a billing regression analysis using consumption data comparing participant and nonparticipant consumption to identify if PTCS standards result in additional savings as opposed to heat pump installations without PTCS standards

The Evaluators completed verification of heat pump installations meeting PTCS standards, further described below.

Verification of PTCS Standards

Verification of heat pumps meeting PTCS standards entail:

- A detailed review of project documentation;
- Secondary review of home characteristics;
- Analysis of pre- and post-retrofit duct leakage; and
- Documentation of control strategies (two-stage compressors, variable speed, etc.).

Housing characteristics were cross-referenced with publicly available data (from county assessor data or from websites such as Zillow.com) to validate square footage, number of stories, home vintage, etc.

In-depth Contractor Interviews

PTCS standards on commissioning, controls, and sizing may not be implemented for nonparticipating program heat pump installs. In order to gather additional insight into typical heat pump commissioning, controls, and sizing standards, the Evaluators included questions in participating program contractor in-depth interviews addressing the steps contractors typically undertake during a heat pump install that is not rebated through the program.

Billing Analysis

In order to determine if heat pump installations with PTCS standards on commissioning, controls, and sizing result in higher energy savings than heat pump installations without PTCS standards on commissioning, controls, and sizing, the Evaluators conducted a billing data regression analysis using monthly billing data. This analysis employed data from participating customers as well as data from nonparticipating customers to identify differences in energy usage due to the PTCS standards.

The Evaluators first identified and separated nonparticipating households likely to be using heat pumps from nonparticipating households likely using electric resistance furnaces. With a large enough population of nonparticipant data, the Evaluators identified whether the customer has gas or electric heating, and the extent to which backup heating is used.

The Evaluators used the nonparticipant households identified to have a heat pump as a counterfactual group for the participating households that have installed a heat pump with verified PTCS standards on commissioning, controls, and sizing. Propensity Score Matching (PSM) was employed to match a subset of nonparticipating heat pump households to the participating heat pump households. This step ensures the two groups are statistically similar and therefore comparable.

After the above steps were completed, a regression analysis with the consumption data from these two groups was conducted to identify differences in consumption between the groups. Further details of regression model specifications explored during analysis are presented in Section 2.2.5.5. Although the results of this analysis are unable to estimate incremental kWh savings differences due to the PTCS standards, this analysis provides an indirect measure of savings that indicates the extent to which PTCS standards increases energy efficiency relative to installations without those standards. The Evaluators present this value, not as a direct measurement of savings, but as a proxy for the overall impacts of the PTCS standards requirement.

This proxy value combined with contractor surveys on typical install behaviors inside and outside the program, provide information on whether the PTCS requirements amount to additional energy savings. Additionally, the above activities allow the Evaluators to determine if the deactivated RTF workbook UES is reasonable to estimate verified savings for this program year.

2.2.5.2 Air Source Heat Pump Conversions in HZ2/HZ3 & HSPF Baseline Research

This section summarizes the Evaluator's approach to complete the following research objectives for the air source heat pump conversions in the program:

- Understand and calculate savings for ducted air source heat pump conversions from electric forced air furnaces for Heating Zones 2 and 3
- Gain insights on whether 8.2 HSPF or 8.5 HSPF efficiency standard are more typical for measures installed within the program and outside the program
- If the RTF workbook allows, modify the RTF workbook baseline by integrating findings on typical HSPF efficiency standards outside the program

Billing Analysis

The current RTF workbook has insufficient data to develop proven savings for Heating Zone 2 and 3. Because Idaho Power's service territory lies in Heating Zones 2 and 3, Idaho Power would like to explore the available data due to the Heating & Cooling Efficiency Program. Savings may possibly be higher in Heating Zone 2 and 3 than the RTF savings proven in Heating Zone 1, which is warmer than Heating Zones 2 and 3. Due to these reasons, the Evaluators attempted to estimate verified savings for the air source heat pump conversions in Heating Zones 2 and 3 using a regression billing analysis.

The Evaluators first identified nonparticipant electric furnace households in order to use as a counterfactual for program-participating air source heat pump conversion from electric furnace households.

The Evaluators then used the matched participating and nonparticipating household consumption data to estimate verified energy savings in each the Heating Zone 2 and Heating Zone 3. The Evaluators then conducted a regression analysis to provide a savings value for each Heating Zone. Further details of regression model specifications explored during analysis are presented in Section 2.2.5.5.

Baseline Conversion Standards (8.2 vs. 8.5 HSPF) & RTF UES Modifications

The program requires a minimum 8.5 HSPF efficiency in order to participate in the program. In order to understand typical HSPF baseline standards outside the program, the Evaluators included questions to the in-depth contractor surveys addressing typical HSPF efficiency baselines for conversions conducted outside the program, within the Idaho Power service territory. In addition to the above contractor interview questions, the Evaluators explored if modification of the RTF baseline was possible, to include information from contractor interviews on typical equipment efficiencies installed outside of the program.

2.2.5.3 ECMs, Whole House Fans, and Evaporative Coolers

This section summarizes the Evaluator's approach to:

- Verify savings and review engineering calculations and assumptions for electronically commutated motors (ECMs);
- Calculate savings relative to whole house fans and understand how customers use whole house fans relative to air conditioning; and,
- Calculate savings related to evaporative coolers and understand how customers use evaporative coolers relative to air conditioning.

Electronically Commutated Motors

The Evaluators verified savings for ECMs by conducting an engineering review of assumptions used in Idaho Power deemed savings estimates. This addressed:

- The run mode of the baseline and ECM blower (continuous versus intermittent); and
- The HVAC equipment configuration and fuel type.

Whole House Fans

To better understand how whole house fans are used by customers, the Evaluators included survey questions for customers who installed whole house fans to provide insights into their use compared to air conditioning.

Surveys address average hours of use of the whole-house fan per week during the summer cooling season and compares impacts with assumptions for whole house fan deemed savings parameters in other TRMs (normalized to length of cooling season).

Evaporative Coolers

The savings from evaporative coolers are dependent upon the type of usage they are otherwise displacing. The energy savings potential is significant when compared against refrigerated air options (including central and window air conditioning). The Evaluators address this in surveys with evaporative cooling participants, addressing whether the unit replaced existing refrigerated air systems or if it supplanted what would have otherwise been the purchase of a refrigerated air system. The Evaluators further address if the participant has other cooling options in their home with a participant survey and discuss with them when they use either system.

2.2.5.4 Smart Thermostats

This section summarizes the Evaluator's approach to:

- Review customer settings on self-installed connected thermostats for heat pump applications in order to understand customer configuration practices. Specifically, to understand customers' understanding of proper smart thermostat settings, controls, and scheduling relative to the home's heating type, in addition to understanding customer understanding of auxiliary heat settings.

In order to gain a better understanding of how customers are configuring smart thermostats with self-installs, the Evaluators completed the following activities:

- Conduct a billing analysis comparing contractor smart thermostat installs and DIY smart thermostat installs rebated through the program
- Conduct participant surveys with questions focusing on their smart thermostat energy-impacting features and how they use them as well as what type of heating source they use

The Evaluators analyzed smart thermostat installs rebated through the program with heat pump heating type. The Evaluators completed a pre/post billing analysis with contractor-installs and a pre/post billing analysis with self-installs. The heating type is identifiable with monthly consumption data.

The Evaluators matched a statistically similar control group via PSM for each regression analysis. The Evaluators first identified heating type of nonparticipant households, then match seasonal pre-period usage as well as additional housing characteristics where applicable. The resulting regression results quantifies energy saving differences for smart thermostats in heat pump households in which the thermostats were professionally installed and DIY-installed. Further details of regression model specifications explored during analysis are presented in Section 2.2.5.5.

In addition, the Evaluators included questions in customer surveys to provide insights into customer configuration practices for connected thermostats. This information was collected as part of the Evaluator's larger survey effort for the process evaluation of the Heating and Cooling program.

2.2.5.5 Billing Analysis Methodology

The Evaluators estimated impact energy savings using a billing analysis for the following measures:

- Heat pumps (with and without PTCS)
- Ducted air source heat pump (Heating Zones 2 and 3)
- Smart thermostats (contractor-installed and DIY-installed)

This section describes the billing analysis methodology employed by the Evaluators as part of additional research objectives for the program. The Evaluators performed billing analyses with a matched control group and utilized a quasi-experimental method of producing a post-hoc control group. In program designs where treatment and control customers are not randomly selected at the outset, such as for downstream rebate programs, quasi-experimental designs are required.

For the purposes of this analysis, a household is considered a treatment household if it has received a program incentive. Additionally, a household is considered a control household if the household has not received a program incentive. To isolate measure impacts, treatment households are eligible to be included in the billing analysis if they installed only one measure during the 2018, 2019, or 2020 program years. Isolation of individual measures are necessary to provide valid measure-level savings. Households that installed more than one measure may display interactive energy savings effects across multiple measures that are not feasibly identifiable. Therefore, instances where households installed isolated measures are used in the billing analyses. In addition, the pre-period identifies the period prior to measure installation while the post-period refers to the period following measure installation.

The Evaluators utilized propensity score matching (PSM) to match nonparticipants to similar participants using pre-period billing data. PSM allows the evaluators to find the most similar household based on the customers' billed consumption trends in the pre-period and verified with statistical difference testing.

After matching based on these variables, the billing data for treatment and control groups are compared, as detailed in IPMVP Option C. The Evaluators fit regression models to estimate weather-dependent daily consumption differences between participating customer and nonparticipating customer households.

Identify Nonparticipant Heating Type

The Evaluators developed two approaches in order to identify the heating type for potential control customers.

1. Approach 1 separates customers into electric heating versus gas heating.
2. Approach 2 further separates electric heating customers identified in Approach 1 into Electric Resistance (ER) versus Heat Pump (HP)/Other.

Both approaches depend on ratios that are unitless. A unitless ratio helps to ensure that the heating type classification is not based simply on a customer's overall load, which may result in bias for the control group (e.g., by simply classifying customers based on their absolute loads, homes with higher occupancy may have their heating type inaccurately classified).

The first approach identifies electric heating versus gas heating customers by utilizing monthly bills normalized to the Typical Meteorological Year (TMY). The Evaluators calculated the ratio of normalized winter kWh load (Jan-Dec) to normalized annual kWh load and considered customers with a ratio greater than 0.3 to be electric heating and less than or equal to 0.3 to be gas heating. A ratio of 0.3 corresponded to the 95th percentile for customers in which the household heating type was known to be a Gas Furnace. The Evaluators found that 2.7% of treatment customers identified as having electric heating through this method in fact had gas heating (per the tracking data). This 2.7% is the assumed error rate for control customers classified as having electric heating through this method.

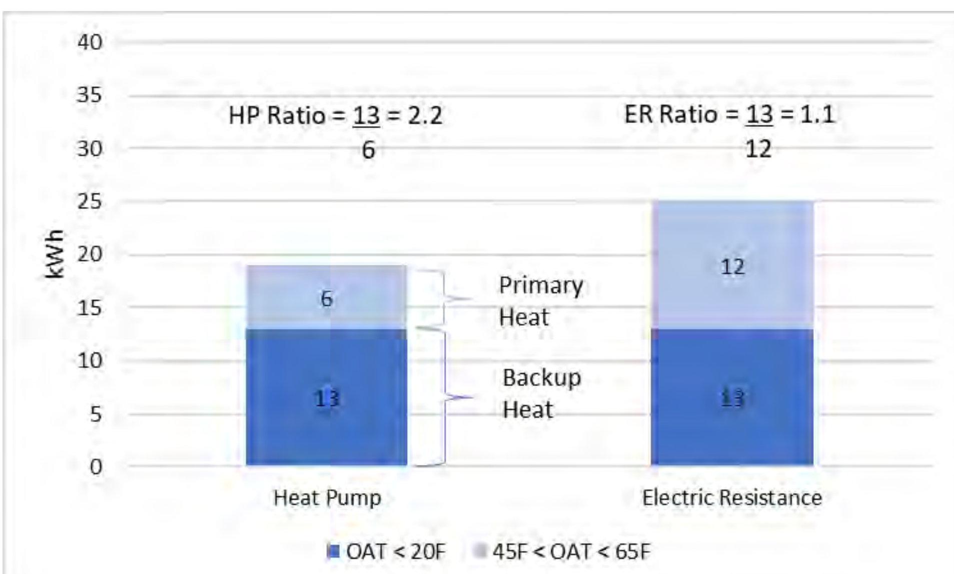
The second approach separates customers identified as having electric heating into two groups: Electric Resistance (ER) and Heat Pumps (HP)/Other. The Evaluators utilized hourly AMI data to calculate the following ratio:

$$\frac{\text{Average usage during first winter peak when Outside Air Temperature (OAT) is less than 20F}}{\text{Average usage during first winter peak when OAT is between 40F and 65F}}$$

The first winter peak is defined as the hours between 8 am and 9 am, during the months of December, January, and February.

The logic behind this method is that HP customers will display a higher ratio than non-HP customers because they will rely on back-up electric heating when outside air temperatures are very low (see Figure 2-1).

Figure 2-1: HP/ER Classification Example



The Evaluators determined the OAT ranges based on the observable temperature ranges during the 2018/2019 winter. The Evaluators considered customers with a ratio less than 1.5 to be ER heating. The remaining customers (with a ratio greater than or equal to 1.5) are either HP or ER that cannot be classified. The ratio of 1.5 corresponded to the 50th percentile for treatment customers with an Electric Furnace heating type reported in the tracking data. The Evaluators found that 10% of treatment customers identified as having ER heating through this method in fact had HP heating (per the tracking data). This is the assumed error rate for control customers classified as having ER heating through this method.

Cohort Creation

The PSM approach estimates a propensity score for treatment and control customers using a logistic regression model. A propensity score is a metric that summarizes several dimensions of household characteristics into a single metric that can be used to group similar households. The Evaluators created a post-hoc control group by compiling billing data from a subset of nonparticipants in the IPC territory to compare against treatment households using quasi-experimental methods. This allowed the Evaluators to select from a large group of similar households that have not installed an incented measure. With this information, the Evaluators created statistically valid matched control groups for each measure via seasonal pre-period usage. Prior to matching, the Evaluators assigned nonparticipant heating type with the methodology provided in the section above. This allows the Evaluators to isolate customers with the same heating type as the participants, leading to a better counterfactual match for the analyses.

The Evaluators matched customers in the control group to customers in the treatment group based on nearest seasonal pre-period usage (e.g., summer, spring, fall, and winter) and exact 5-digit zip code matching, after restricting to appropriate heating type in nonparticipants. After matching, the Evaluators conducted a *t*-test for each month in the pre-period to help determine the success of PSM.

After PSM, the Evaluators ran the following regression models for each measure:

- Fixed effect Difference-in-Difference (D-n-D) regression model (recommended in UMP protocols)[11]
- Random effects post-program regression model (PPR) (recommended in UMP protocols)

The second model listed above (PPR) was selected because it had the best fit for the data, identified using the adjusted R-squared. Further details on regression model specifications can be found below.

Data Collected

The following lists the data collected for the billing analysis:

1. Monthly billing data for program participants (treatment customers)
2. Monthly billing data for a group of non-program participants (control customers)
3. Program tracking data, including customer identifiers, address, and date of measure installation
4. National Oceanic and Atmospheric Administration (NOAA) weather data between January 1, 2018 and December 31, 2021)
5. Typical Meteorological Year (TMY3) data

[11] National Renewable Energy Laboratory (NREL) Uniform Methods Project (UMP) Chapter 17 Section 4.4.7.

Billing and weather data were obtained for program years 2018 through 2021. Weather data was obtained from the nearest weather station with complete data during the analysis years for each customer by mapping the weather station location with the customer zip code. TMY weather stations were assigned to NOAA weather stations by geocoding the minimum distance between each set of latitude and longitude points. This data is used for extrapolating savings to long-run, 30-year average weather.

Data Preparation

The following steps were taken to prepare the billing data:

1. Gathered billing data for homes that participated in the program.
2. Excluded participant homes that also participated in the other programs, if either program disqualifies the combination of any other rebate or participation.
3. Gathered billing data for similar customers that did not participate in the program in evaluation.
4. Removed bills missing usage, billing start date, or billing end date.
5. Remove bills with outlier durations (<10 days or >60 days).
6. Excluded bills with consumption indicated to be outliers (average daily usage > 200 kWh).
7. Calendarized bills (recalculates bills, usage, and total billed such that bills begin and end at the start and end of each month).
8. Obtained weather data from nearest NOAA weather station using 5-digit zip code per household.
9. Computed Heating Degree Days (HDD) and Cooling Degree Days (CDD) for a range of setpoints. The Evaluators assigned a setpoint of 65°F for both HDD and CDD.
10. Selected treatment customers with only one type of measure installation during the analysis years and combined customer min/max install dates with billing data (to define pre- and post-periods).
11. Restricted to treatment customers with install dates in specified range (typically February 1, 2020 through October 1, 2020) to allow for sufficient post-period billing data.
12. Restricted to control customers with heating systems representative of treatment group. This has the effect of removing control customers with incomparable usage relative to the treatment group.
13. Removed customers with incomplete post-period bills (<6 months).
14. Removed customers with incomplete pre-period bills (<6 months).
15. Restricted control customers to those with usage that was comparable with the treatment group usage.
16. Created a matched control group using PSM and matching on pre-period seasonal usage and exact matching to zip code and/or Heating Zone.

Regression Models

The Evaluators ran the following models for matched treatment and control customers for each measure with sufficient participation. For net savings, the Evaluators selected either Model 1 or Model 2. The model with the best fit (highest adjusted R-squared) was selected.

Model 1: Fixed Effects Difference-in-Difference Regression Model

The following equation displays the first model specification to estimate the average daily savings due to the measure.

Equation 2-3: Fixed Effects Difference-in-Difference (D-n-D) Model Specification

$$ADC_{it} = \alpha_0 + \beta_1(Post)_{it} + \beta_2(Post \times Treatment)_{it} + \beta_3(HDD)_{it} + \beta_4(CDD)_{it} + \beta_5(Post \times HDD)_{it} + \beta_6(Post \times CDD)_{it} + \beta_7(Post \times HDD \times Treatment)_{it} + \beta_8(Post \times CDD \times Treatment)_{it} + \beta_9(Month)_t + \beta_{10}(Customer\ Dummy)_i + \varepsilon_{it}$$

Where,

- *i* = the *i*th household
- *t* = the first, second, third, etc. month of the post-treatment period
- ADC_{it} = Average daily usage reading *t* for household *i* during the post-treatment period
- $Post_{it}$ = A dummy variable indicating pre- or post-period designation during period t at home *i*
- $Treatment_i$ = A dummy variable indicating treatment status of home *i*
- HDD_{it} = Average heating degree days (base with optimal Degrees Fahrenheit) during period *t* at home *i*
- CDD_{it} = Average cooling degree days (base with optimal Degrees Fahrenheit) during period t at home i *(if electric usage)*
- $Month_t$ = A set of dummy variables indicating the month during period t
- $Customer\ Dummy_i$ = a customer-specific dummy variable isolating individual household effects
- ε_{it} = The error term
- α_0= The model intercept
- β_{1-10} = Coefficients determined via regression

The Average Daily Consumption (ADC) is calculated as the total monthly billed usage divided by the duration of the bill month. β_2 represents the average change in daily baseload in the post-period between the treatment and control group and β_7 and β_8 represent the change in weather-related daily consumption in the post-period between the groups. Typical monthly and annual savings were estimated by extrapolating the β_7 and β_8 coefficients with Typical Meteorological Year (TMY) HDD and CDD data. However, in the case of gas usage, only the coefficient for HDD is utilized because CDDs were not included in the regression model.

The equation below displays how savings were extrapolated for a full year utilizing the coefficients in the regression model and TMY data. TMY data is weighted by the number of households assigned to each weather station.

Equation 2-4: Savings Extrapolation

$$Annual\ Savings = \beta_2 * 365.25 + \beta_7 * TMY\ HDD + \beta_8 * TMY\ CDD$$

Model 2: Random Effects Post-Program Regression Model

The following equation displays the second model specification to estimate the average daily savings due to the measure. The post-program regression (PPR) model combines both cross-sectional and time series data in a panel dataset. This model uses only the post-program data, with lagged energy use for the same calendar month of the pre-program period acting as a control for any small systematic differences between the treatment and control customers; in particular, energy use in calendar month t of the post-program period is framed as a function of both the participant variable and energy use in the same calendar month of the pre-program period. The underlying logic is that systematic differences between treatment and control customers will be reflected in the differences in their past energy use, which is highly correlated with their current energy use. These interaction terms allow pre-program usage to have a different effect on post-program usage in each calendar month.

The model specification is as follows:

Equation 2-5: Post-Program Regression (PPR) Model Specification

$$\begin{aligned} ADC_{it} = {} & \alpha_0 + \beta_1(Treatment)_i + \beta_2\,(PreUsage)_i + \beta_3\,(PreUsageSummer)_i \\ & + \beta_4(PreUsageWinter)_i + \beta_5(Month)_t + \beta_6(Month \times PreUsage)_{it} \\ & + \beta_7(Month \times PreUsageSummer)_{it} + \beta_8(Month \times PreUsageWinter)_{it} \\ & + \beta_9(HDD)_{it} + \beta_{10}(CDD)_{it} + \beta_{11}(Treatment \times HDD)_{it} + \beta_{12}(Treatment \times CDD)_{it} \\ & + \varepsilon_{it} \end{aligned}$$

Where,

- i = the ith household
- t = the first, second, third, etc. month of the post-treatment period
- ADC_{it} = Average daily usage for reading t for household i during the post-treatment period
- $Treatment_i$ = A dummy variable indicating treatment status of home i
- $Month_t$ = Dummy variable indicating month of month t
- $PreUsage_i$ = Average daily usage across household i's available pre-treatment billing reads
- $PreUsageSummer_i$ = Average daily usage in the summer months across household i's available pretreatment billing reads
- $PreUsageWinter_i$ = Average daily usage in the winter months across household i's available pre-treatment billing reads
- HDD_{it} = Average heating degree days (base with optimal Degrees Fahrenheit) during period t at home i
- CDD_{it} = Average cooling degree days (base with optimal Degrees Fahrenheit) during period t at home i *(if electric usage)*
- ε_{it} = Customer-level random error
- α_0= The model intercept for home i
- β_{1-12} = Coefficients determined via regression

The coefficient β_1 represents the average change in consumption between the pre-period and post-period for the treatment group and β_{11} and β_{12} represent the change in weather-related daily consumption in the post-period between the groups. Typical monthly and annual savings were estimated by extrapolating the β_{11} and β_{12} coefficients with Typical Meteorological Year (TMY) HDD and CDD data.

Equation 2-6: Savings Extrapolation

$$Annual\ Savings = \beta_1 * 365.25 + \beta_{11} * TMY\ HDD + \beta_{12} * TMY\ CDD$$

The equation above displays how savings were extrapolated for a full year utilizing the coefficients in the regression model and TMY data.

2.2.6 Data Collection

The following primary data collection activities were completed to support the evaluation of the HCE Program.

2.2.6.1 Program Staff Interviews

The Evaluators interviewed three IPC program staff to gain understanding of the program design and implementation procedures to inform the process evaluation of the program. The interviews were held with two program analysts and the senior engineer who is responsible for the day-to-day management of the program.

2.2.6.2 Participant Survey

The Evaluators administered a survey to customers who participated in the 2020 program. The participant survey responses were used to inform the process evaluation, address additional research questions on thermostat settings, and verify the measure installations.

The survey was administered online, and customers were recruited by email in January 2022. Each customer received up to three emails asking them to complete the survey. Customers were offered a $10 electronic gift card for completing the survey. Customers with inactive IPC accounts were excluded from the survey sample.

Table 2-2 summarizes the survey data collection. As shown, 129 program participants completed the survey and the overall response rate was 19%.

Table 2-2: Summary of Survey Data Collection

Measurement	Number of Project Sites	Count of Sites with Measures Installed						
		Thermostats Installed on Heat Pumps	Thermostats Installed on other HVAC Equipment	Whole House Fans	Evaporative Coolers	Heat Pumps	Electronically Commutated Motors	Heat Pump Water Heaters
Population	784	181	211	129	9	409	51	26
Customers Contacted by Email	675	136	170	112	9	253	40	25
Survey Responses	129	28	39	21	2	41	2	8
Response Rate	19%	21%	23%	19%	22%	16%	5%	32%

Table 2-3 compares the distributions of measures installed at participating sites to those who completed the survey. As shown, the survey sample was fairly representative of the participant population, although a smaller share of respondents who received heat pump incentives completed the survey.

Table 2-3: Distribution of Measures Installed at Participating Sites and Installed by Survey Respondents

Measure	Percent of Sites with Measure Installed	Percent of Survey Respondents with Measure Installed
Thermostats Installed on Heat Pumps	23%	22%
Thermostats Installed on other HVAC Equipment	27%	30%
Whole House Fans	16%	16%
Evaporative Coolers	1%	2%
Heat Pumps	52%	32%
Electronically Commutated Motors	7%	2%
Heat Pump Water Heaters	3%	6%

2.2.6.3 Participating Contractor Interviews

In January 2022, the Evaluator interviewed 19 Idaho Power approved contractors about the Heating & Cooling Efficiency Program. The interviews informed the process evaluation and addressed research questions on heat pump installation practices and efficiencies of heat pump units not installed through the program.

Idaho Power provided a list of 82 approved contractor contacts. From that list, we recruited potential respondents via email and phone from January 13 to January 25, 2022. We contacted all 82 respondents and received feedback from 19 contractors (Table 2-4). Seven of the participants were from the top performers group that completed at least four projects, six were completed from contractors who completed projects one to three projects, and six from those who did not complete a project in 2020.

Table 2-4: Contractor Interview Disposition Summary

Disposition	Count
Complete	17
Partial complete	2
Refused	11
Attempted	50
Bad number	2
Total	82

The Evaluators attempted to reach contractors up to five times and offered a $50 gift card to all contractors that completed interviews with us. The interviews, conducted by phone, averaged about 30 minutes, and were recorded with permission of the respondent.

2.2.7 Net-To-Gross

The Northwest RTF UES measures do not require NTG adjustments as they are built into the deemed savings estimates. In addition, billing analyses with counterfactual control groups, as proposed in our general methodology, does not require a NTG adjustment, as the counterfactual represents the efficiency level at current market (i.e., the efficiency level the customer would have installed had they not participated in the program).

However, the Evaluators employed the New Mexico TRM[12] to calculate verified savings for the evaporative coolers measure, which requires that a NTG ratio indicating the proportion of projects which had installed the evaporative cooler to replace refrigerated air must be applied to this deemed savings value. For this measure, "NTG" is intertwined with baseline – savings from evaporative coolers are based on their potential to delay conversion to refrigerated air or to induce customers to retrofit from refrigerated air. To the extent that a customer may have a preexisting evaporative cooling system and no stated intention to otherwise convert to refrigerated air, this is simultaneously a question of baseline and NTG. The Evaluators provided a literature review to select the weighted average baseline for this measure (refrigerated air versus standard efficiency evaporative coolers), which in the literature is denominated as a "NTG". Further details are provided in the impact evaluation results section for evaporative coolers in Section 3.2.4.

2.2.8 Non-Energy Impacts & Non-Energy Benefits

The Evaluators used the Regional Technical Forum (RTF) to quantify non-energy impacts (NEIs) and/or non-energy benefits (NEBs) for residential measures with established RTF values where available. Measures with quantified NEIs and NEBs include residential air source heat pumps, ductless heat pumps, duct sealing, heat pump water heaters, open loop heat pumps, and smart thermostats.

[12] https://www.nm-prc.org/wp-content/uploads/2021/07/New-Mexico-TRM-2021-Final-03-09-2021.pdf

3. Impact Evaluation Results

The Evaluators completed an impact evaluation on Idaho Power's Heating & Cooling Efficiency Program to verify program-level and measure-level energy savings for PY2020. The following sections summarize findings for the electric impact evaluation in the program in the Idaho and Oregon service territory. The Evaluators used data collected and reported in the tracking database, online application forms, applicable TRMs and workpapers to evaluate savings. Table 3-1 summarizes the Heating & Cooling Efficiency Program verified impact savings by measure.

Table 3-1: Heating & Cooling Efficiency Program Verified Impact Savings by Measure

Measure	Expected Savings (kWh)	Verified Savings (kWh)	Realization Rate
Air-Source Heat Pump: 8.5 HSPF	10,432	6,780	65.00%
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	658,487	590,769	89.72%
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	27,359	64,413	235.44%
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	56,381	53,558	94.99%
Ductless Heat Pump	556,279	553,529	99.51%
Duct Sealing	848	848	100.03%
Evaporative Cooler	13,239	5,878	44.40%
Electronically Commutated Motor	145,921	165,074	113.13%
Heat Pump Water Heater	40,768	32,456	79.61%
Open Loop Water Source Heat Pump: 3.5 COP	23,444	23,442	99.99%
Electric Heating System to Open Loop Water Source Heat Pump: 3.5 COP	7,054	7,054	100.00%
Oil/Propane Heating System to Open Loop Water Source Heat Pump: 3.5 COP	14,108	15,622	110.73%
Smart Thermostat - Self Installed	127,114	106,073	83.45%
Smart Thermostat - Contractor Installed	100,152	92,382	92.24%
Whole House Fan	57,482	61,800	107.51%
Total	**1,839,068**	**1,779,679**	**96.77%**

In PY2020, Idaho Power completed and provided incentives for residential electric measures in Idaho and Oregon under the Heating & Cooling Efficiency Program and reported total electric energy savings of 1,839,068 kWh and total verified energy savings of 1,779,679 kWh. The air source heat pump upgrades, duct sealing, electronically commutated motors, and open loop heat pump conversions, and whole house fans measures exceeded savings goals based on reported savings. The remaining measures did not meet expected savings, leading to an overall achievement of 96.77% of the expected savings for the program. Further details of the impact evaluation results by program are provided in the sections following.

The Evaluators also conducted billing analyses to support additional research objectives defined by IPC. The results of the billing analysis are not used towards the verified impacts for this impact evaluation, but solely as additional insights to measure installation practices. The Evaluators define these additional research objectives in Section 2.2.5.

The Evaluators summarize the non-energy impacts and non-energy benefits results in the table below.

Table 3-2: Heating & Cooling Efficiency Program Verified NEIs & NEBs

Measure	C02 Reduction (Tons over Expected Measure Life)	Escalated NEBs ($/yr)
Air-Source Heat Pump: 8.5 HSPF	70.875	$1,314.54
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	6,173.86	$98,869.38
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	103.0625	$1,836.63
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	567.8	$9,027.05
Ductless Heat Pump	5,726.82	$90,345.49
Duct Sealing	9.00	$129.70
Evaporative Cooler	N/A	N/A
Electronically Commutated Motor	N/A	N/A
Heat Pump Water Heater	208.24	$3,117.47
Open Loop Water Source Heat Pump: 3.5 COP	256.50	$3,815.31
Electric Heating System to Open Loop Water Source Heat Pump: 3.5 COP	N/A	N/A
Oil/Propane Heating System to Open Loop Water Source Heat Pump: 3.5 COP	N/A	N/A
Smart Thermostat - Self Installed	1,159.70	$19,084.75
Smart Thermostat - Contractor Installed	986.90	$16,132.54
Whole House Fan	N/A	N/A
Total	**15,262.76**	**$243,672.87**

3.1 Simple Verification Results

The Evaluators surveyed participant customers between January and February of 2022 using a web approach (online survey). The Evaluators deployed 675 surveys and received responses from 129 unique customers that participated in Idaho Power's Heating & Cooling Efficiency Program. Customers with a valid email were sent the survey via an email invitation. The Evaluators summarize the aggregate results of the survey in Table 3-3.

Table 3-3: Simple Verification Survey Response Rate

Measurement	Number of Project Sites
Population	784
Customers Contacted by Email	675
Survey Responses	129
Response Rate	19%

3.1.1 In-Service Rates

The Evaluators calculated in-service rates of installed measures from the 129 simple verification survey responses detailed above. The Evaluators asked participants if the rebated equipment is currently installed and working, in addition to questions about the new equipment fuel type. The Evaluators achieved 7.10% precision for the ductless heat pump, connected thermostat, and whole house fan measures in the program through survey verification, summarized in Table 3-4. Also presented in the following table is the measure-level ISRs determined from the verification survey for each measure that achieved 90/10 precision.

Table 3-4: Simple Verification Precision by Measure

Measure	Population	Respondents	ISR
Ductless heat pump	244	27	100%
Connected thermostat	392	74	100%
Whole house fan (WHF)	129	22	100%

The measures which did not achieve the response goals still displayed 100% in-service rates. These ISR values were utilized in the desk reviews for the program in order to calculate verified savings. For measures in which 90/10 precision was not met, the Evaluators applied an assumed 100% in-service rate for the measure. Additional insights from the survey responses are summarized in Appendix B: Residential Participant Survey.

3.2 Measure-Level Impact Evaluation Results

The Evaluators summarize the program and measure-specific impact analysis activities, results, conclusions, and recommendations for the Heating & Cooling Efficiency Program in the section below.

3.2.1 Air Source Heat Pumps

The Heating & Cooling Efficiency Program encourages customers to upgrade their existing electric or oil/propane heating equipment with high efficiency air source heat pumps. Customers receive incentives after installation and after submitting a completed rebate form. Table 3-5 summarizes the air source heat pump measures offered under this program.

Table 3-5: Air Source Heat Pump Measure Description

Measure	Description	Impact Analysis Methodology
Air-Source Heat Pump: 8.5 HSPF	New construction high efficiency air source heat pump	RTF UES
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	Conversion from electric heating system to high efficiency air source heat pump	RTF UES
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	Retrofit from existing air source heat pump to high efficiency air source heat pump	RTF UES
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	Conversion from oil/propane heating system to high efficiency air source heat pump	RTF UES

Table 3-6 summarizes the verified electric energy savings for the impact evaluation of the Heating & Cooling Efficiency Program air source heat pump measures.

Table 3-6: Air Source Heat Pump Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Air-Source Heat Pump: 8.5 HSPF	14	10,432	6,780	65.00%
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	88	658,487	590,769	89.72%
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	51	27,359	64,413	235.44%
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	8	56,381	53,558	94.99%
Total	**161**	**752,658**	**715,520**	**95.07%**

The air source heat pump measures displayed verified savings of 715,520 kWh with a realization rate of 95.07% against the expected savings for the program. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the air source heat pumps in the section below.

3.2.1.1 Database Review & Document Verification

The following sections describe the Evaluator's database review and document verification findings for the air source heat pump measures offered under the program. Before conducting the impact analysis, the Evaluators conducted a database review for the air source heat pump measures. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected 76 rebates to review program application documentation and rebate forms. The Evaluators note that the required information was validated by IPC employees prior to providing incentives to the customer. The Evaluators found the air source heat pump rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather all required information to claim savings for the measure through the RTF measure specifications. However, the Evaluators found many of the program application documents submitted by customers to be incomplete from the customer. IPC staff retroactively fill in information after following up with the customer. The information most commonly omitted from the customer consist of the housing type (single-family vs. manufactured home), home vintage, and home square footage.

All 76 rebate documents were provided with associated AHRI documents for the project. In addition, the Evaluators found all 76 sampled air source heat pump rebate documents to display HSPF values consistent with the HSPF values found on the AHRI directory for each model. All sampled air source heat pump upgrades displayed SEER values of 14 or higher, as required by the RTF. In addition, all air source heat pump conversion equipment met or exceeded the federal HSPF minimum requirement.

The Evaluators found some inconsistencies displayed in the tracking database for this measure:

- Of the 76 sampled rebates, seven displayed discrepancies in documented home type. These seven rebates had been categorized as single-family homes; however, rebate documentation confirmed the site was a manufactured home. In addition, two of the sampled rebates had documented the Heating Zone for the site inconsistent with the RTF Heating Zone for the zip code.

- The Evaluators note that one of the 76 sampled air source heat pump retrofit projects had provided no information on the project, however, savings were still claimed for the measure. The rebate application, Heating & Cooling Efficiency air source heat pump worksheet, and equipment sizing worksheets provided for this project were blank, and therefore the Evaluators did not claim any savings for this project.
- Although all 76 sampled air source heat pump rebate documents to display HSPF values consistent with the HSPF values found on the AHRI directory for each model, two of the air source heat pump upgrade measures displayed HSPF values of 8.5, lower than the RTF minimum of 9.0. The Evaluators removed verified savings for these two projects.
- In addition, the Evaluators identified and corrected 7 project home types (SF vs MH), disqualified savings for two projects that did not meet RTF HSPF requirements, and identified and corrected one project in which the Heating Zone was documented incorrectly.

The Evaluators note that the IPC tracking database does not consistently reflect the same values found in the mail-in rebate applications documents. The Evaluators recommend IPC work to improve methods for collecting web and mail-in rebate application information to reconcile the database.

3.2.1.2 Verification Surveys

The Evaluators randomly selected a subset of participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed heat pump still properly functioning?

Table 3-7 displays the ISRs for each of the air source heat pump measures for the Idaho and Oregon territory combined.

Table 3-7: Air Source Heat Pump Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Air-Source Heat Pump: 8.5 HSPF	14	2	2	100%
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	88	10	10	100%
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	51	5	5	100%
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	8	0	N/A	N/A

*These ISRs did not meet 90/10 precision, however, the Evaluators applied a 100% ISR to each of the ASHP measures

All survey respondents for each water heater measure described equipment to be currently functioning, leading to a 100% ISR. Although the survey responses did not meet 90/10 precision for the population of ASHP measures, The Evaluators applied 100% ISRs to each rebate to quantify verified savings for each measure.

3.2.1.3 PTCS Verification

As part of the document verification and impact evaluation activities, the Evaluators reviewed the sampled rebates for the air source heat pump conversion, retrofit, and new construction measures to verify if the projects meet PTCS requirements. The Evaluators provide the results of the PTCS verification efforts in Section 5.1.1.1 under additional research objectives results.

3.2.1.4 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the air source heat pump measures. The Evaluators reviewed and applied the current RTF UES values for the air source heat pump measure along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following RTF workbooks to calculate verified savings for the measure:

- ResSFExistingHVAC_v4_2
- ResMHExistingHVAC_v3_4
- ResHeatingCoolingCommissioningControlsSizingSF_v3_6
- ResMHHeatingCoolingCommissioningControlsSizing_v3_3

The Evaluators conducted a billing analysis for the air source heat pump upgrade measure in order to quantify relative savings achieved from additional commissioning, controls, and sizing activities implemented by Idaho Power through the program. The Evaluators estimated a total of 1,263 kWh saved for each air source heat pump upgrade project completed through the program. Because the additional commissioning, controls, and sizing activities completed by IPC are not able to be claimed through the deactivated RTF workbook, the Evaluators deemed it appropriate to apply the results of the billing analysis to the air source heat pump upgrade measure. This estimate encompasses observable savings derived from the projects completed through the program, including both the HVAC equipment savings and the additional commissioning, controls, and sizing installation practices. Therefore, the realization rate for this measure deviates substantially from expected savings for the measure. The Evaluators recommend continuing to conduct billing analysis or measurement verification to quantify savings for ducted heat pumps rebated through the program. Further detail of the billing analysis results is presented in Section 5.1.1.1.

The verified savings for the air source heat pump measures are 715,520 kWh with a realization rate of 95.07%, as displayed in Table 3-6. The realization rate for the electric savings in the air source heat pump measures deviate from 100% due to the various document review findings. During document review, the Evaluators found 19 of the 55 sampled air source heat pump projects that claimed PTCS savings had met PTCS commissioning standards. The Evaluators removed RTF commissioning, controls, and sizing savings from projects were unable to be confirmed to meet PTCS certification. This removal of savings for the commissioning, controls, and sizing component was the largest contributing factor to low realization rate for air source heat pump projects. The realization rates verified from the sample were used to extrapolate savings to the population. The Evaluators applied the measure-level realization rates to the population for each measure.

For the air source heat pump upgrades measure, the Evaluators applied verified savings resulting from billing analysis. The Evaluators summarize the expected savings and the verified savings and realization rates for each component of the air source heat pump measures in Table 3-8 and Table 3-9.

Table 3-8: Expected Air Source Heat Pump Savings by Component

Measure	Expected HVAC Component Savings (kWh)	Expected Commissioning, Controls, Sizing Component Savings (kWh)	Expected Total kWh Savings (kWh)
Air-Source Heat Pump: 8.5 HSPF	1,446	8,986	10,432
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	606,721	51,766	658,487
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	5,223	22,136	27,359
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	53,230	3,150	56,381
ASHP	**666,620**	**86,038**	**752,658**

Table 3-9: Verified Air Source Heat Pump Savings and Realization Rate by Component

Measure	Verified HVAC Component Savings (kWh)	Verified Comm., Controls, Sizing Component Savings (kWh)	Verified Total kWh Savings (kWh)	Realization Rate HVAC Component	Realization Rate Comm., Controls, Sizing Component	Total Realization Rate
Air-Source Heat Pump: 8.5 HSPF	1,445	5,335	6,780	99.95%	59.37%	65.00%
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	579,473	11,296	590,769	95.51%	21.82%	89.72%
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	64,413	0	64,413	N/A	N/A	235.44%
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	50,643	2,915	53,558	95.14%	92.53%	94.99%
Total	**695,974**	**19,546**	**715,520**	**104.40%**	**22.72%**	**95.07%**

*The results of billing analysis were used to verify savings for this measure and therefore components are unable to be separated

Due to verification of the air source heat pump upgrade measure being derived from the billing analysis, component-level savings are unable to be summarized in the table above. Instead, total realization rate is provided for this measure. The changes summarized in the document verification and PTCS verification findings led to the lowered realization rate for the air source heat pump measures in the Heating & Cooling Efficiency Program. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates.

3.2.1.5 Non-Energy Impacts & Non-Energy Benefits

The Evaluators also verified total non-energy impacts and benefits derived from the RTF workbook for the air source heat pump measures. These values were derived from values provided in the RTF workbooks under CO2 reductions over expected measure life and present value total societal benefits. The Evaluators provide a summary of the results in the table below.

Table 3-10: Air Source Heat Pump Non-Energy Impacts & Benefits

Measure	C02 Reduction (Tons Over Expected Measure Life)	Escalated NEBs ($/yr)
Air-Source Heat Pump: 8.5 HSPF	70.88	$1,314.54
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	6173.86	$98,869.38
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF	103.06	$1,836.63
Oil/Propane Heating System to Air-Source Heat Pump: 8.5 HSPF	567.80	$9,027.05
Total	**6,915.60**	**$111,047.61**

3.2.2 Ductless Heat Pumps

The Heating & Cooling Efficiency Program encourages customers to upgrade their existing zonal electric, heating equipment with high efficiency ductless heat pumps. Customers receive incentives after installation and after submitting a completed rebate form. Table 3-11 summarizes the ductless heat pump measure offered under this program.

Table 3-11: Ductless Heat Pump Measure Description

Measure	Description	Impact Analysis Methodology
Ductless Heat Pump	Ductless heat pump with HSPF 9.0 or greater installed in the main living area of the house with existing zonal electric heat	RTF UES

Table 3-12 summarizes the verified electric energy savings the ductless heat pump measure.

Table 3-12: Ductless Heat Pump Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Ductless Heat Pump	244	556,279	553,529	99.51%

The ductless heat pump measure displayed verified savings of 553,529 kWh with a realization rate of 99.51% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the ductless heat pumps in the section below.

3.2.2.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the ductless heat pump measures offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the ductless heat pump measures. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected 17 rebates to review program application documentation and rebate forms. The Evaluators note that the required information was validated by IPC employees prior to providing incentives to the customer. The Evaluators found the ductless heat pump rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather all of the required information to claim savings for the measure through the RTF measure specifications. The Evaluators found many of the program application documents submitted by customers to be incomplete from the customer. IPC staff retroactively fill in information after following up with the customer. The information most commonly omitted from the customer consist of the housing type (single-family vs. manufactured home), home vintage, home square footage, and existing cooling type.

All 17 rebate documents were provided with associated AHRI documents for the project, and all 17 projects qualified for RTF savings for ductless heat pumps. In addition, the Evaluators found all 17 sampled ductless heat pump rebate documents to display HSPF values consistent with the HSPF values found on the AHRI directory for each model. However, one of the ductless heat pump upgrade projects had assigned claimed savings for an HSPF tier higher than that of which the equipment displayed.

The Evaluators note that the IPC tracking database does not consistently reflect the same values found in the mail-in rebate applications documents. The Evaluators recommend IPC work to improve methods for collecting web and mail-in rebate application information to reconcile the database.

3.2.2.2 Verification Surveys

This section describes the results of the verification surveys completed for this measure. The Evaluators randomly selected a subset of ductless heat pump rebate participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed heat pump still properly functioning?

Table 3-13 displays the ISRs for each of the ductless heat pump measures for Idaho and Oregon territory combined.

Table 3-13: Ductless Heat Pump Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Ductless Heat Pump	244	26	26	100%

*These ISRs did not meet 90/10 precision, however, the Evaluators applied a 100% ISR to each of the DHP measures

All survey respondents for each heat pump measure described equipment to be currently functioning, leading to a 100% ISR. Although the survey responses did not meet 90/10 precision for the population of DHP measures, The Evaluators applied 100% ISRs to each rebate to quantify verified savings for each project.

3.2.2.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the ductless heat pump measures. The Evaluators reviewed and applied the current RTF UES values for the ductless heat pump measure along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following RTF workbook to calculate verified savings for the measure:

- ResSFExistingHVAC_v4_2

The verified savings for the measure is 533,529 kWh with a realization rate of 99.51%, as displayed in Table 3-12. The realization rate for the electric savings in the ductless heat pump measures deviate from 100% due to the correction of savings for one project. The Evaluators identified and corrected one project in which the HSPF value for the equipment was documented incorrectly, leading to 93% realization rate for this project. The Evaluators also rounded each project's savings to the nearest full kWh, as recommended when using the RTF UES values. The realization rates verified from the sample were used to extrapolate savings to the population. The Evaluators applied the measure-level realization rates to the population for the measure.

These two changes led to the lowered realization rate for the ductless heat pump measures in the Heating & Cooling Efficiency Program. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates.

3.2.2.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators also verified total non-energy impacts and benefits derived from the RTF workbook for the ductless heat pump measures. These values were derived from values provided in the RTF workbooks under CO2 reductions over expected measure life and present value total societal benefits. The Evaluators provide a summary of the results in the table below.

Table 3-14: Ductless Heat Pump Non-Energy Benefits

Measure	C02 Reduction (Tons Over Expected Measure Life)	Escalated NEBs ($/yr)
Ductless Heat Pump	5,726.82	$90,345.49

3.2.3 Duct Sealing

The Heating & Cooling Efficiency Program encourages customers to conduct duct sealing for their homes to reduce energy consumption. Customers receive incentives after installing duct sealing and after submitting a completed rebate form. Table 3-15 summarizes the duct sealing measure offered under this program.

Table 3-15: Duct Sealing Measure Description

Measure	Description	Impact Analysis Methodology
Duct Sealing	Conduct duct sealing in existing home	RTF UES

Table 3-16 summarizes the verified electric energy savings the duct sealing measure.

Table 3-16: Duct Sealing Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Duct Sealing	1	847.72	848	100.03%

The duct sealing measure displayed verified savings of 848 kWh with a realization rate of 100.03% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the duct sealing projects in the section below.

3.2.3.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the duct sealing measures offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the duct sealing measures. One duct sealing project was completed in PY2020. The Evaluators verified documentation from this project.

The Evaluators found the duct sealing rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather all required information to claim savings for the measure through the RTF measure specifications. The Evaluators did not find any deviations between the database values and the rebate documentation provided.

3.2.3.2 Verification Surveys

Due to low participation for this measure, the Evaluators did not conduct verification survey for this measure. The Evaluators assumed 100% in-service rate for the duct sealing measure

3.2.3.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the duct sealing measure. The Evaluators reviewed and applied the current RTF UES values for the duct sealing measure along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following RTF workbook to calculate verified savings for the measure:

- ResSFDuctSealing_v5_1

The verified savings for the measure is 848 kWh with a realization rate of 100.03%, as displayed in Table 3-16. The realization rate for the electric savings in the duct sealing measures deviate from 100% due to rounding each project's savings to the nearest full kWh, as recommended when using the RTF UES values. This change alone led to the realization rate of 100.03% for the duct sealing measures in the Heating & Cooling Efficiency Program. The ISRs for the project was 100% and therefore did not affect the verified savings realization rates.

3.2.3.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators also verified total non-energy impacts and benefits derived from the RTF workbook for the duct sealing measure. These values were derived from values provided in the RTF workbooks under CO2 reductions over expected measure life and present value total societal benefits. The Evaluators provide a summary of the results in the table below.

Table 3-17: Duct Sealing Non-Energy Impacts & Benefits

Measure	C02 Reduction (Tons Over Expected Measure Life)	Escalated NEBs ($/yr)
Duct sealing	9.00	$129.70

3.2.4 Evaporative Coolers

The Heating & Cooling Efficiency Program encourages customers to install an evaporative cooler to reduce the use of central A/C for cooling in the summer months. Customers receive incentives after installation and after submitting a completed rebate form. Table 3-18 summarizes the evaporative cooler measure offered under this program.

Table 3-18: Evaporative Cooler Measures

Measure	Description	Impact Analysis Methodology
Evaporative Coolers	A home cooling product that is an alternative to central or window air conditioners	New Mexico TRM

Table 3-19 summarizes the verified electric energy savings the evaporative cooler.

Table 3-19: Evaporative Cooler Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Evaporative Cooler	9	13,239	5,878	44.40%

The evaporative cooler measure displayed verified savings of 5,878 kWh with a realization rate of 44.40% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the evaporative coolers in the section below.

3.2.4.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the evaporative cooler measure offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the evaporative cooler projects. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected 6 rebates to review program application documentation and rebate forms. The Evaluators note that the required information was validated by IPC employees prior to providing incentives to the customer. The Evaluators found the evaporative cooler rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather all required information to claim savings for the measure. However, the Evaluators found many of the program application documents submitted by customers to be incomplete from the customer. IPC staff retroactively fill in information after following up with the customer. The information most commonly omitted from the customer consist of the home vintage, and home square footage.

The Evaluators note that no discrepancies were found between the database and the rebate documents.

3.2.4.2 Verification Surveys

This section describes the results of the verification surveys completed for this measure. The Evaluators randomly selected a subset of evaporative cooler rebate participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed evaporative cooler still properly functioning?
- Why did you purchase the evaporative cooler?
- In addition to the evaporative cooler, which of the following do you use to cool your home?
- Would you say that the evaporative cooler is the main way that you cool your house?
- What is the main way you cool your home?
- Which of the following best describes why you use the evaporative cooler?

Table 3-20 displays the ISRs for each of the evaporative coolers measures for Idaho and Oregon territory combined.

Table 3-20: Evaporative Cooler Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Evaporative Cooler	9	2	2	100%

*These ISRs did not meet 90/10 precision, however, the Evaluators applied a 100% ISR to each of the EC projects

All survey respondents for each evaporative cooler measure described equipment to be currently functioning, leading to a 100% ISR. Although the survey responses did not meet 90/10 precision for the population of EC measure, The Evaluators applied 100% ISRs to each rebate to quantify verified savings for each project.

One of the two respondents had indicated that they had installed the evaporative cooler to replace refrigerated air.

3.2.4.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the evaporative cooler measures. The Evaluators reviewed and applied the current New Mexico TRM deemed savings values for evaporative coolers along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following New Mexico TRM section to calculate verified savings for the measure:

- New Mexico Technical Reference Manual, July 2021, Section 4.7 Evaporative Coolers[13]

The Evaluators reviewed the New Mexico TRM and confirmed that savings values are applicable to the Idaho Power service territory, due to similarity of cooling degree days between Boise, ID and Santa Fe, NM. Therefore, the Evaluators utilized the Santa Fe savings values derived from the New Mexico TRM for the evaporative cooler projects completed in the Idaho Power service territory.

The verified savings for the measure is 5,878 kWh with a realization rate of 44.40%, as displayed in Table 3-19. The realization rates verified from the sample were used to extrapolate savings to the population. The Evaluators applied the measure-level realization rates to the population for each measure. The realization rate for the electric savings in the evaporative cooler measures deviate from 100% due to the application of a NTG ratio to each evaporative cooler project. The New Mexico TRM indicates that a NTG ratio indicating the proportion of projects which had installed the evaporative cooler to replace refrigerated air must be applied to this deemed savings value, and the Evaluators interpreted this NTG as consistent with RTF practices of establishing a market practice baseline to address NTG matters.

For the NTG ratio for evaporative coolers, 2 of the 9 customers had responded to the survey. One of the respondents (50%) had indicated that the evaporative cooler was replacing refrigerated air (an A/C unit). Due to low response rate, the Evaluators chose to conduct a literature review and selected the NTG ratio of 44.4% calculated for Public Service Company of New Mexico (PNM) provided in the PNM 2015 impact evaluation in which a comprehensive survey effort was performed to estimate NTG for evaporative coolers. This survey effort yielded 90% confidence and ±8.3% sample precision for the evaporative cooler channel in PNM's Stay Cool Program. The Evaluators selected this NTG because the results are similar to IPC survey responses, the value summarizes a large study that met 90/10 precision for the PNM impact evaluation, and the 44.40% value represents the same service area in which the impact savings values are sourced from.

This NTG factor led to the lowered realization rate for the evaporative cooler measures in the Heating & Cooling Efficiency Program. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates. The Evaluators recommend IPC apply this NTG adjustment factor when calculating claimed savings for future program years. The Evaluators also recommend including plans to update this NTG adjustment factor in future evaluation efforts.

[13] https://www.nm-prc.org/wp-content/uploads/2021/07/New-Mexico-TRM-2021-Final-03-09-2021.pdf

3.2.4.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators did not estimate total non-energy impacts or benefits for evaporative coolers.

3.2.5 Electronically Commutated Motors

The Heating & Cooling Efficiency Program encourages customers to install electronically commutated motors to increase home's energy efficiency. Customers receive incentives after installation and after submitting a completed rebate form. Table 3-21 summarizes the electronically commutated motor measure offered under this program.

Table 3-21: Electronically Commutated Motors Measures

Measure	Description	Impact Analysis Methodology
Electronically Commutated Motors	A highly efficient alternative to the traditional permanent split capacitor motor (PSC).	IDL Workpaper

Table 3-22 summarizes the verified electric energy savings the measure.

Table 3-22: Electronically Commutated Motors Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Electronically Commutated Motors	51	145,921	165,074	113.13%

The electronically commutated motor measure displayed verified savings of 166,074 kWh with a realization rate of 113.13% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the electronically commutated motors in the section below.

3.2.5.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the electronically commutated motor measure offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the electronically commutated motor measures. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected 13 rebates to review program application documentation and rebate forms. The Evaluators note that the required information was validated by IPC employees prior to providing incentives to the customer. The Evaluators found the electronically commutated motor rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather all required information to claim savings for the measure. However, the Evaluators found many of the program application documents submitted by customers to be incomplete from the customer. IPC staff retroactively fill in information after following up with the customer. However, there were a few cases where some components of the application were not present.

The Evaluators found two of the ECM documents displayed model numbers that were unable to be verified using provided equipment details. One application did not submit a model number and all but one of the rebates did not document equipment serial numbers. This makes verification of model number and associated CFM rate difficult. One rebate did not collect home square footage or year built.

The Evaluators note that the IPC tracking database does not consistently reflect the verified equipment efficiency values (horsepower). The Evaluators recommend IPC work to improve methods for verifying collecting web and mail-in rebate application information to reconcile the database.

3.2.5.2 Verification Surveys

This section describes the results of the verification surveys completed for this measure. The Evaluators randomly selected a subset of electronically commutated motor rebate participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed electronically commutated motor still properly functioning?

Table 3-23 displays the ISRs for the electronically commutated motor measure for Idaho and Oregon territory combined.

Table 3-23: Electronically Commutated Motors Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Electronically Commutated Motor	51	2	2	100%

*These ISRs did not meet 90/10 precision, however, the Evaluators applied a 100% ISR to each of the ECM projects

All survey respondents for each ECM measure described equipment to be currently functioning, leading to a 100% ISR. Although the survey responses did not meet 90/10 precision for the population of ECM measures, The Evaluators applied 100% ISRs to each rebate to quantify verified savings for each project. No further adjustments were required during the impact evaluation.

3.2.5.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the electronically commutated motor measure. The Evaluators reviewed and applied the savings values derived from the University of Idaho Integrated Design Lab workpaper on Electronically Commutated Motors along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following workbook to calculate verified savings for the measure:

- University of Idaho Integrated Design Lab, Electronically Commutated Motors Literature Review, December 31, 2014.

The Evaluators reviewed the literature review workpaper and confirmed that savings values are applicable to the ECM projects completed Idaho Power service territory. Therefore, the Evaluators utilized the savings calculations derived from the Integrated Design Lab literature review workpaper for the electronically commutated motors projects completed in the Idaho Power service territory.

The verified savings for the measure is 165,074 kWh with a realization rate of 113.13% as displayed in Table 3-22. The realization rate for the electric savings in the ECM measures deviate from 100% due to the correction of ECM horsepower connection values for four projects. The realization rates verified from the sample were used to extrapolate savings to the population. The Evaluators applied the measure-level realization rates to the population for each measure.

The results of the document verification led to high realization rate for the electronically commutated motor measures in the Heating & Cooling Efficiency Program. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates.

3.2.5.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators did not estimate total non-energy impacts or benefits for electronically commutated motors.

3.2.6 Heat Pump Water Heater

The Heating & Cooling Efficiency Program encourages customers to upgrade their existing electric water heater with a high efficiency heat pump water heater. Customers receive incentives after installation and after submitting a completed rebate form. Table 3-24 summarizes the heat pump water heater measure offered under this program.

Table 3-24: Heat Pump Water Heater Measures

Measure	Description	Impact Analysis Methodology
Heat Pump Water Heater	A highly efficient alternative to a traditional electric resistance storage water heater	RTF UES

Table 3-25 summarizes the verified electric energy savings the heat pump water heater.

Table 3-25: Heat Pump Water Heater Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Heat Pump Water Heater	26	40,768	32,456	79.61%

The heat pump water heater measure displayed verified savings of 32,456 kWh with a realization rate of 79.61% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the heat pump water heater measure in the section below.

3.2.6.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the heat pump water heater measures offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the heat pump water heater measures. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected 11 rebates to review program application documentation and rebate forms. The Evaluators found all program application documents submitted by customers to be complete from the customer. The Evaluators found the heat pump water heater rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather most required information to claim savings for the measure through the RTF measure specifications. The rebate applications do not currently collect information on whether the exhaust air is ducted to the outside, as required by the RTF measure specifications. The Evaluators recommend adding a field in the rebate application form to account for this detail for each project.

All 11 rebate documents were provided with associated AHRI documents for the project, and all 11 projects qualified for RTF savings for heat pump water heaters. The Evaluators found four of the 11 projects had documented incorrect heat pump water heater location in the database. The Evaluators also found one project in which Heating Zone was inaccurately categorized. The Evaluators corrected equipment location and Heating Zone indicated from rebate documentation and home zip code. The Evaluators also note that four of the 11 rebates did not have equipment tier efficiency documented. The Evaluators verified equipment tier efficiency using the NEEA HPWH Tier database[14] and found consistent values with the database.

The Evaluators note that the IPC tracking database does not consistently reflect the same values found in the mail-in rebate applications documents, such as home type and water heater location described above. The Evaluators recommend IPC work to improve methods for collecting web and mail-in rebate application information to reconcile the database.

3.2.6.2 Verification Surveys

This section describes the results of the verification surveys completed for this measure. The Evaluators randomly selected a subset of heat pump water heater rebate participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed heat pump water heater still properly functioning?

Table 3-26 displays the ISRs for the heat pump water heater measures for Idaho and Oregon territory combined.

Table 3-26: Heat Pump Water Heater Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Heat pump water heater	26	8	8	100%

*These ISRs did not meet 90/10 precision, however, the Evaluators applied a 100% ISR to each of the HPWH measures

All survey respondents for each heat pump water heater measure described equipment to be currently functioning, leading to a 100% ISR. Although the survey responses did not meet 90/10 precision for the

[14] https://neea.org/img/documents/HPWH-qualified-products-list.pdf

population of HPWH measures, The Evaluators applied 100% ISRs to each rebate to quantify verified savings for each project.

3.2.6.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the heat pump water heater measures. The Evaluators reviewed and applied the current RTF UES values for the heat pump water heater measure along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following RTF workbook to calculate verified savings for the measure:

- ResHPWH_v4_2

The verified savings for the measure is 32,456 kWh with a realization rate of 79.61%, as displayed in Table 3-25. The realization rates verified from the sample were used to extrapolate savings to the population. The Evaluators applied the measure-level realization rates to the population for each measure. The realization rate for the electric savings in the heat pump water heater measures deviate from 100% due to the correction of referenced RTF savings for each project. The expected savings values for each project in the IPC tracking database had included the water heating component and cooling interactive effects component but had unintentionally left out the heating interactive component represented in the RTF workbook. When including the heating interactive component, project-level savings decreases for heat pump water heaters. The Evaluators also adjusted savings for four projects in which the location of the heat pump water heater was indicated to be in a different location than that used to calculate expected project savings. The Evaluators also rounded each project's savings to the nearest full kWh, as recommended when using the RTF UES values.

These changes led to the lowered realization rate for the heat pump water heater measures in the Heating & Cooling Efficiency Program. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates.

3.2.6.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators also verified total non-energy impacts and benefits derived from the RTF workbook for the heat pump water heater measures. These values were derived from values provided in the RTF workbooks under CO2 reductions over expected measure life and present value total societal benefits. The Evaluators provide a summary of the results in the table below.

Table 3-27: Heat Pump Water Heater Non-Energy Impacts & Benefits

Measure	C02 Reduction (Tons Over Expected Measure Life)	Escalated NEBs ($/yr)
Heat pump water heater	208.24	$3,117.47

3.2.7 Open Loop Heat Pumps

The Heating & Cooling Efficiency Program encourages customers to upgrade their existing electric, or oil/propane heating equipment with high efficiency open loop (water source) heat pump. Customers receive incentives after installation and after submitting a completed rebate form. Table 3-28 summarizes the open loop heat pump measure offered under this program.

Table 3-28: Open Loop Heat Pump Measure Description

Measure	Description	Impact Analysis Methodology
Open Loop Water Source Heat Pump: 3.5 COP	New construction high efficiency open loop heat pump	RTF UES
Electric Heating System to Open Loop Water Source Heat Pump: 3.5 COP	Conversion from electric heating system to high efficiency open loop heat pump	RTF UES
Oil/Propane Heating System to Open Loop Water Source Heat Pump: 3.5 COP	Conversion from oil/propane heating system to high efficiency open loop heat pump	RTF UES

Table 3-29 summarizes the verified electric energy savings the open loop heat pump measure.

Table 3-29: Open Loop Heat Pump Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Open Loop Water Source Heat Pump: 3.5 COP	3	23,444	23,442	99.99%
Electric Heating System to Open Loop Water Source Heat Pump: 3.5 COP	1	7,054	7,054	100.00%
Oil/Propane Heating System to Open Loop Water Source Heat Pump: 3.5 COP	2	14,108	15,622	110.73%
Total	**6**	**44,607**	**46,118**	**103.39%**

The open loop heat pump measures displayed verified savings of 46,118 kWh with a realization rate of 103.39% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the open loop heat pump measures in the section below.

3.2.7.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the open loop heat pump measures offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the open loop heat pump measures. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected six rebates to review program application documentation and rebate forms. The Evaluators found all program application documents submitted by customers to be complete from the customer. The Evaluators found the open loop heat pump rebate application forms for the Heating &

Cooling Efficiency Program had provided questions to gather most required information to claim savings for the measure through the RTF measure specifications. The rebate applications do not currently collect information on whether the existing water heater is an electric tank without a desuperheater, as required by the RTF measure specifications. The Evaluators recommend adding a field in the rebate application form to account for the desuperheater requirement for each project. In addition, although the program application includes a field to collect home square footage, five of the six rebate applications did not document home square footage.

All six rebate documents were provided with associated AHRI documents for the project, and all 6 projects qualified for RTF savings for open loop heat pumps. The Evaluators found both of the Oil/Propane Heating System to Open Loop Water Source Heat Pump projects to have central A/C installed at the home, however, the database documented these projects as having no central A/C. In addition, all project savings values were rounded to the nearest full kWh, as portrayed in the RTF workbooks. These two changes led to deviations from 100% realization rate for the measures.

3.2.7.2 Verification Surveys

This section describes the results of the verification surveys completed for this measure. The Evaluators randomly selected a subset of open loop heat pump rebate participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed heat pump still properly functioning?

Table 3-30 displays the ISRs for each of the open loop heat pump measures for Idaho and Oregon territory combined.

Table 3-30: Open Loop Heat Pump Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Open loop heat pumps	6	0	0	N/A

*These ISRs did not meet 90/10 precision, however, the Evaluators applied a 100% ISR to each of the DHP measures

Of the 6 completed projects, none of the customers responded to the surveys. The Evaluators applied an assumed 100% ISR to each rebate to quantify verified savings for each project.

3.2.7.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the open loop heat pump measures. The Evaluators reviewed and applied the current RTF UES values for the open loop heat pump measures along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following RTF workbook to calculate verified savings for the measure:

- ResGSHP_v2_7

The verified savings for the measure is 46,118 kWh with a realization rate of 103.39%, as displayed in Table 3-29. The realization rate for the electric savings in the open loop heat pump measures deviate from 100% due to the correction of referenced RTF savings for two open loop heat pump conversion projects. The expected savings values for each project in the IPC tracking database had incorrectly identified the home's existing cooling type. The Evaluators updated these project savings based on findings from document verification, leading to 111% realization rate for these two projects. The Evaluators also rounded each project's savings to the nearest full kWh, as recommended when using the RTF UES values.

These changes led to the larger than 100% realization rate for the open loop heat pump measures in the Heating & Cooling Efficiency Program. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates.

3.2.7.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators also verified total non-energy impacts and benefits derived from the RTF workbook for the open loop heat pump measures. These values were derived from values provided in the RTF workbooks under CO2 reductions over expected measure life and present value total societal benefits. The Evaluators provide a summary of the results in the table below.

Table 3-31: Open Loop Heat Pump Non-Energy Impacts & Benefits

Measure	C02 Reduction (Tons Over Expected Measure Life)	Escalated NEBs ($/yr)
Open Loop Water Source Heat Pump: 3.5 COP	256.50	$3,815.31
Electric Heating System to Open Loop Water Source Heat Pump: 3.5 COP	N/A	N/A
Oil/Propane Heating System to Open Loop Water Source Heat Pump: 3.5 COP	N/A	N/A
Total	**256.50**	**$3,815.31**

3.2.8 Smart Thermostats

The Heating & Cooling Efficiency Program encourages customers to install a connected thermostat to increase home's energy efficiency. Customers receive incentives after installation and after submitting a completed rebate form. In 2020, IPC began allowing smart thermostat rebates for self-installed thermostats. Prior to this, all rebated smart thermostats must have been contractor-installed. The Evaluators summarize savings for each installation type. Table 3-32 summarizes the smart thermostat measure offered under this program.

Table 3-32: Smart Thermostat Measure Description

Measure	Description	Impact Analysis Methodology
Smart Thermostat - Self Installed	Self-installed connected thermostat replacing non-qualifying thermostat	RTF UES
Smart Thermostat - Contractor Installed	Contractor-installed connected thermostat replacing non-qualifying thermostat	RTF UES

Table 3-33 summarizes the verified electric energy savings the smart thermostat.

Table 3-33: Smart Thermostat Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Smart Thermostat - Self Installed	240	127,114	106,073	83.45%
Smart Thermostat - Contractor Installed	152	100,152	92,382	92.24%
Total	**392**	**227,267**	**198,455**	**87.32%**

The smart thermostat measures displayed verified savings of 198,455 kWh with a realization rate of 87.32% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the smart thermostat measures in the section below.

3.2.8.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the smart thermostat measures offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the smart thermostat measures. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected 24 rebates to review program application documentation and rebate forms. The Evaluators note that the required information was validated by IPC employees prior to providing incentives to the customer. The Evaluators found many of the program application documents submitted by customers to be incomplete from the customer. IPC staff retroactively fill in information after following up with the customer. The information most commonly omitted from the customer consist of the housing type (single-family vs. manufactured home), home vintage, home square footage, and existing cooling type.

The Evaluators found the smart thermostat rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather most required information to claim savings for the measure through the RTF measure specifications. The rebate applications do not currently collect information on whether the smart thermostat is replacing another qualified smart thermostat, as required by the RTF measure specifications. The Evaluators recommend adding a field in the rebate application form to account for each of these requirements for each project.

A small portion of rebates do not correctly document smart thermostat model number (10%) or serial number (15%), which made verification of equipment qualification difficult for 3% of rebates. The Evaluators also verified that 25 of the 392 smart thermostat models did not meet RTF measure specification (6%). These thermostats lacked eligibility for program savings due to the lack of occupancy detection and/or geofencing capabilities. Of the 392 smart thermostats, 12 were unable to be verified as eligible due to missing information on model details (3%). The remaining smart thermostats were verified to qualify for RTF measure savings (91%). The thermostats that were verified to fail eligibility requirements were removed from verified savings (25 smart thermostat projects).

In addition, the connected thermostat savings for three rebates were removed due to customer participation in air source heat pump commissioning, controls, and sizing savings, as required by the RTF measure specifications. These findings led to deviations from 100% realization rate for the smart thermostat measures.

3.2.8.2 Verification Surveys

This section describes the results of the verification surveys completed for this measure. The Evaluators randomly selected a subset of smart thermostat rebate participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed smart thermostat still properly functioning?

Table 3-34 displays the ISRs for each of the smart thermostat measures for Idaho and Oregon territory combined.

Table 3-34: Smart Thermostat Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Smart Thermostat	392	74	74	100%

Of the 392 completed projects, 74 of the customers responded to the surveys and all 74 respondents indicated the smart thermostat is still installed and functioning. The 74 responses for this measure met the measure-level requirements for 7.24% precision at the 90% confidence interval for the program. The Evaluators applied this 100% ISR to each rebate to quantify verified savings for each project.

3.2.8.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the smart thermostat measures. The Evaluators reviewed and applied the current RTF UES values for the connected thermostat measures along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following RTF workbook to calculate verified savings for the measure:

- ResConnectedTstats_v1.3

The verified savings for the measure is 198,455 kWh with a realization rate of 87.32%, as displayed in Table 3-33. The realization rate for the electric savings in the smart thermostat measures deviate from 100% due to eligibility requirements specified by the RTF workbook. The RTF requires the connected thermostat have occupancy sensor and/or geofencing capabilities to align with RTF-calculated UES values. In addition, the Evaluators removed savings for projects in which the home also was verified to receive air source heat pump commissioning, controls, and sizing savings through the RTF. The Evaluators also rounded each project's savings to the nearest full kWh, as recommended when using the RTF UES values.

These changes led to the lower than 100% realization rate for the smart thermostat measures in the Heating & Cooling Efficiency Program. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates.

3.2.8.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators also verified total non-energy impacts and benefits derived from the RTF workbook for the smart thermostat measures. These values were derived from values provided in the RTF workbooks under CO2 reductions over expected measure life and present value total societal benefits. The Evaluators provide a summary of the results in the table below.

Table 3-35: Smart Thermostat Non-Energy Impacts & Benefits

Measure	C02 Reduction (Tons Over Expected Measure Life)	Escalated NEBs ($/yr)
Smart Thermostat - Self Installed	1,159.70	$19,084.75
Smart Thermostat - Contractor Installed	986.90	$16,132.54
Total	**2,146.60**	**$35,217.29**

3.2.9 Whole House Fans

The Heating & Cooling Efficiency Program encourages customers to install a whole house fan to reduce the use of central A/C use and increase home energy efficiency. Customers receive incentives after installation and after submitting a completed rebate form. Table 3-36 summarizes the whole house fan measure offered under this program.

Table 3-36: Whole House Fan Measure Description

Measure	Description	Impact Analysis Methodology
Whole House Fans	A high-volume fan that cools a home in the evening and early morning hours, allowing the air conditioner to be manually turned off	IDL Workpaper

Table 3-37 summarizes the verified electric energy savings the whole house fan measure.

Table 3-37: Whole House Fan Verified Electric Savings

Measure	PY2020 Participation	Expected Savings	Verified Savings	Realization Rate
Whole House Fans	129	57,482	61,800	107.51%

The whole house fan measure displayed verified savings of 61,800 kWh with a realization rate of 107.51% against the expected savings for the measure. The Evaluators summarize the measure-specific impact analysis activities, results, conclusions, and recommendations for the whole house fans in the sections below.

3.2.9.1 Database Review & Document Verification

This section describes the Evaluator's database review and document verification findings for the whole house fans measure offered under the program.

Before conducting the impact analysis, the Evaluators conducted a database review for the whole house fan measures. The Evaluators selected a subset of rebate applications to cross-verify tracking data inputs, summarized in Section 2.2.2.1.

The Evaluators selected 15 rebates to review program application documentation and rebate forms. The Evaluators note that the required information was validated by IPC employees prior to providing incentives to the customer. The Evaluators found the whole house fan rebate application forms for the Heating & Cooling Efficiency Program had provided questions to gather most of the required information to claim savings for the measure through the RTF measure specifications. The rebate applications had lacked a field which confirms whether the whole house fan was installed to manufacturer settings. The Evaluators recommend IPC add a field to the rebate application documents to confirm this detail.

The Evaluators found many of the program application documents submitted by customers to be incomplete from the customer; however, IPC staff retroactively fill in information after following up with the customer.

The Evaluators found one of the WHF documents did not document equipment serial number. This made verifying equipment eligibility difficult. In addition, the Evaluators found two rebates which had indicated unrealistically large home square footage values. The Evaluators corrected these two values using publicly available data for these households through Zillow.com. In addition, the Evaluators had corrected the existing cooling type for one of the sampled rebates in which project documentation lacked home cooling type.

The Evaluators recommend ensuring the collected information for these rebates is consistent between the database and the rebate documents provided for each project. In addition, the Evaluators recommend requiring complete information filled detailing the equipment manufacturer, model number, and serial number for each project.

3.2.9.2 Verification Surveys

This section describes the results of the verification surveys completed for this measure. The Evaluators randomly selected a subset of whole house fan rebate participant customers to survey for simple verification of installed measure. The Evaluators included questions such as:

- Is the newly installed whole house fan still properly functioning?

Table 3-38 displays the ISRs for the whole house fan measure for Idaho and Oregon territory combined.

Table 3-38: Whole House Fan Verification Survey ISR Results

Measure	Number of Rebates	Number of Survey Completes	Number of Surveys Indicating Measure is Functioning	In-Service Rate
Whole House Fan	129	22	22	100%

All survey respondents for each WHF measure described equipment to be currently functioning, leading to a 100% ISR. The 22 responses for this measure met the measure-level requirements to achieve 7.24% precision at the 90% confidence interval. The Evaluators applied 100% ISRs to each rebate to quantify verified savings for each project. No further adjustments were required during the impact evaluation.

3.2.9.3 Verified Savings

This section summarizes the verified impact results of the impact evaluation for the whole house fan measure. The Evaluators reviewed and applied the savings values derived from the University of Idaho Integrated Design Lab workpaper on Whole House Fans along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following workpaper to calculate verified savings for the measure:

- Integrated Design Lab (IDL) at University of Idaho, 2015 Task #9: Technical Assistance for Whole House Fan Report (October 14, 2015)

The Evaluators reviewed the workpaper and confirmed that results of the analysis presented are applicable to the WHF projects completed Idaho Power service territory. Therefore, the Evaluators utilized the savings calculations derived from the Integrated Design Lab literature review workpaper for the whole house fans completed in the Idaho Power service territory.

The Evaluators recommend utilizing the modeling results presented in the paper. However, the Evaluators recommend applying the savings values presented in the paper differently than the current method Idaho Power employs.

The Evaluators adjusted the application of the savings represented in the IDL workpaper. Idaho Power used the constant 445.6 kWh savings per WHF. The calculation behind this value is unclear; however, The Evaluators utilized the IDL modeling results for each the one-story and two-story constructions, for each the 1 CFM/SQFT and 2 CFM/SQFT model results. The Evaluators calculated a kWh saved/SQFT value for each of the following scenarios:

- One story home with whole house fan displaying 1 CFM/SQFT
- One story home with whole house fan displaying 2 CFM/SQFT
- Two story home with whole house fan displaying 1 CFM/SQFT
- Two story home with whole house fan displaying 2 CFM/SQFT

The Evaluators applied the appropriate kWh/SQFT values to each of the sampled rebates. The verified savings for the measure is 165,074 kWh with a realization rate of 113.13% as displayed in Table 3-37. The realization rates verified from the sample were used to extrapolate savings to the population. The Evaluators applied the measure-level realization rates to the population for each measure. The realization rate for the electric savings in the WHF measures deviate from 100% due to the adjustment of application of savings from the IDL workpaper. The ISRs for each of the measures was 100% and therefore did not affect the verified savings realization rates. No further adjustments were conducted for this measure.

3.2.9.4 Non-Energy Impacts & Non-Energy Benefits

The Evaluators did not estimate total non-energy impacts or benefits for whole house fans.

4. Process Evaluation Results

The Evaluators completed a process evaluation on Idaho Power's Heating & Cooling Efficiency Program. The following sections summarize findings for the process evaluation in the Idaho and Oregon service territory.

4.1 Program Design and Operations

Idaho Power's Heating and Cooling Efficiency Program provides residents in Idaho Power's service area rebates for purchasing and properly installing a variety of energy efficient heating and cooling equipment and services. The program measures are ductless heat pumps, open-loop water-source heat pumps, air-source heat pumps, duct sealing, electronically commutated motors, evaporative coolers, heat pump water heaters, smart thermostats, and whole house fans.

Residential customers must use a licensed, and Idaho power approved, participating contractors for all installs other than evaporative coolers and smart thermostats. Residents receive incentives for all program measures, while participating contractors receive a stipend for ductless heat pumps, ducted air-source heat pumps, ducted open-loop water-source heat pumps, and duct sealing.

All Idaho Power customers with electrically heated homes are eligible to participate, however program staff target those homes that are particularly high energy users. Program goals are based off kWh savings. Idaho Power uses regional deemed savings values from the RTF to define the per-unit savings.

Although Idaho Power staff work closely with a Honeywell representative who helps with the administrative side of program and onsite verifications, the program is self-implemented.

4.1.1 Program Incentive Design

Since the program's inception in 2007, program staff have expanded measures to provide more opportunities for engagement. Table 4-1 below provides an overview of the measures, participation, and their calculated expected savings. When deciding on new measures, staff use data from the RTF savings workbook, market readiness, and research pilots. No new measures were added in 2021.

Table 4-1: List of Program Measures, Expected Savings, Incentive Dollars, and Acquisition Cost

Measure	Number of Projects	Expected Savings (kWh)	Incentive Dollars	Acquisition Cost
Smart thermostat	392	227,267	$29,389.69	$0.13
Ductless heat pump	242	556,279	$183,000.00	$0.33
Whole house fan	129	57,482	$25,800.00	$0.45
Air source heat pump (retrofit - electric resistance replacement)	88	658,487	$69,850.00	$0.11
Air source heat pump (retrofit - heat pump replacement)	51	27,359	$12,750.00	$0.47
Electronically commutated motor	51	145,921	$2,550.00	$0.02
Heat pump water heater	26	40,768	$7,800.00	$0.19
Air source heat pump (new construction)	14	10,432	$5,600.00	$0.54
Evaporative cooler	9	13,239	$1,350.00	$0.10
Air source heat pump (retrofit - oil/propane replacement)	8	56,381	$3,200.00	$0.06
Open loop heat pump (new construction)	3	23,444	$3,000.00	$0.13
Open loop heat pump (retrofit - oil/propane replacement)	2	14,108	$2,000.00	$0.14
Duct sealing	1	848	$350.00	$0.41
Open loop heat pump (retrofit - electric resistance replacement)	1	7,054	$1,000.00	$0.14

4.1.2 Participation by Region

Table 4-2 summarizes the distribution of participation by IPC regions. The geographic distribution of participants is also shown in Figure 4-1 and Figure 4-2.

Table 4-2: Participation by Region

State	Region	Number of Participants	Expected Savings (kWh)	Incentive Dollars
ID	Canyon	141	336,832.95	$52,819.32
ID	Capital	472	717,831.36	$138,646.28
ID	Eastern	56	133,772.47	$28,175.00
ID	Southern	114	255,885.84	$51,449.09
ID	Western	119	337,081.18	$65,075.00
OR	Western	16	57,664.56	$11,475.00

Figure 4-1: Distribution of Participants (Idaho)

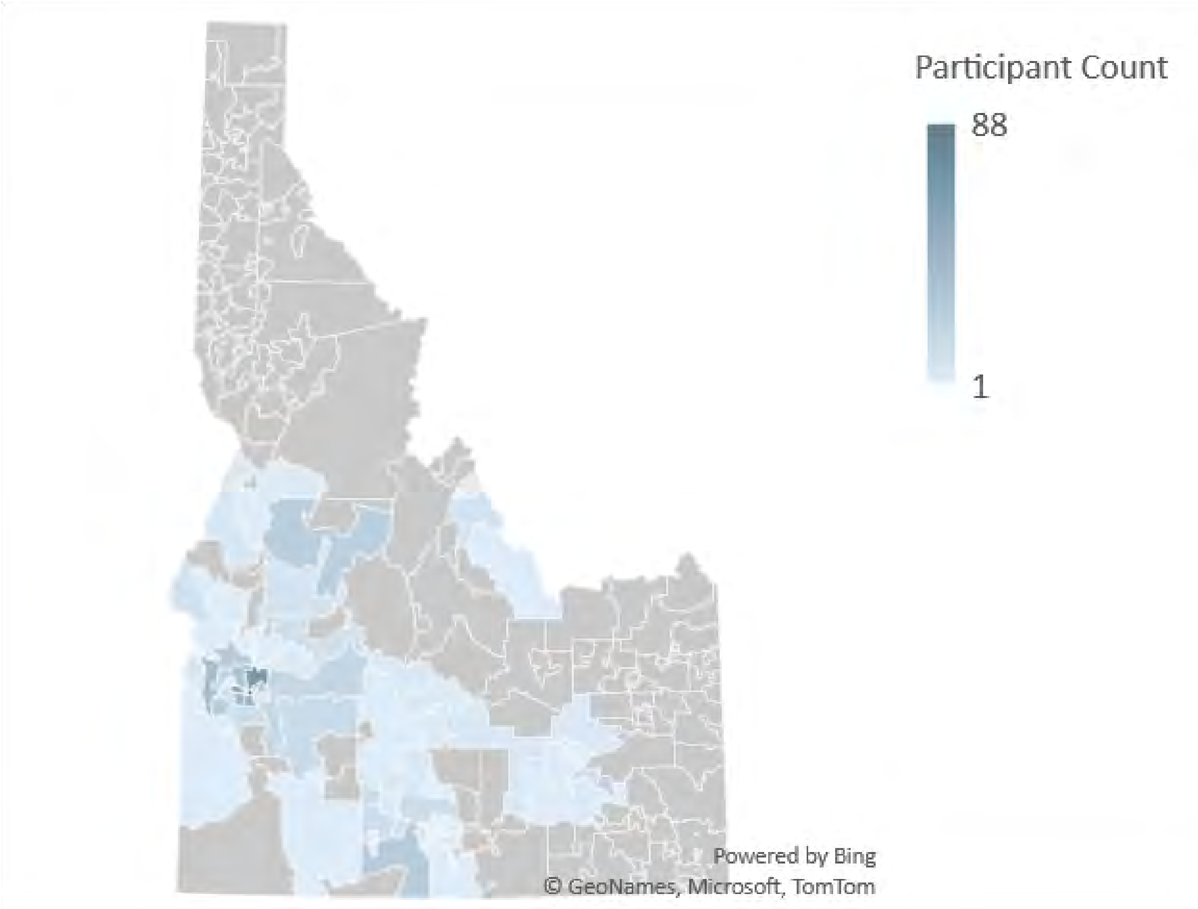
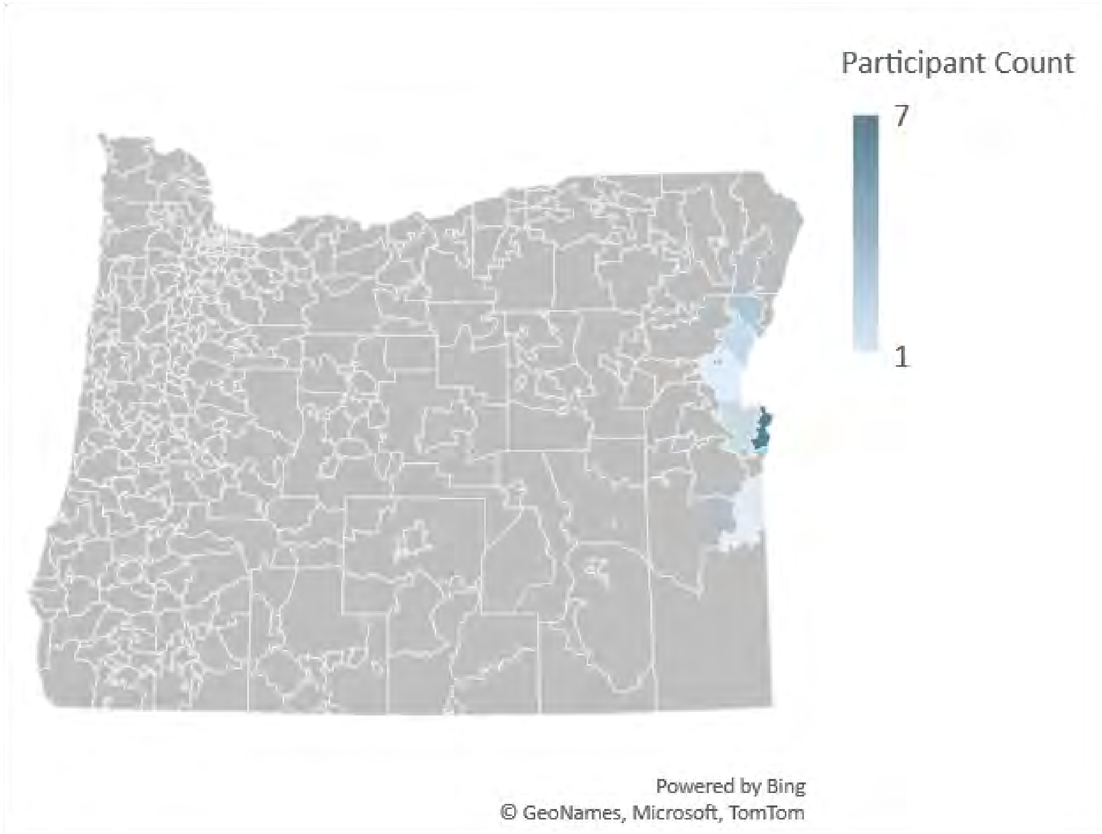


Figure 4-2: Distribution of Participants (Oregon)



4.1.3 Program Marketing and Outreach

The program relies heavily on direct mailings, bill inserts, and friend/family referral, as well as social media. Although Idaho Power does not provide official co-branding materials to participating contractors, participating contractors are listed on the website and staff encourage them to mention the program and their affiliation in their own marketing materials.

Program staff noted that marketing is key challenge – that it is difficult to reach the right person, at the right time, with the right message, in a media environment that places many competing demands on customers' attention.

While many of the measures are contractor driven, some additional opportunities to encourage to customers to install qualifying measures at the right time include the following.

- **Use of search-based advertisement.** Customers searching for information on smart thermostats, evaporative coolers, and whole house fans may be effectively reach through search ads.
- **Promote smart thermostat installations during heat pump replacements.** Approximately half of the air source heat pumps installed in 2020 included a smart thermostat. While that is a sizable share, there may be additional opportunities to promote smart thermostats during these installations.

4.1.4 Trade Ally Network and Management

Program staff do not limit the number of participating contractors allowed in the network; however participating contractors must meet a variety of requirements to qualify. In addition to being licensed and insured, participating contractors must complete a training to ensure they understand the technical and process requirements of the Heating and Cooling Efficiency Program, as well as purchase the air supply flow tester kit necessary for measurement and verification. Program staff tailor the training to meet the needs and interests of the participating contractor; in the past, trainings were offered to multiple contractors at a time, but due to COVID precautions, staff now meet with interested contractors individually.

In general, 10-12 new contractors join each year, however due to turnover from existing contractors, the network rarely exceeds 100 contractors. When recruiting new contractors, staff focus on contractors who are committed to the program; they do not want "*one hit wonders*" who are only looking to become involved to satisfy one customer. Through sit down meetings and phone calls, program staff are able to ascertain contractors' motivations and determine if they are a good fit for the program.

As of December 2021, Idaho Power had 89 contractors on their list of approved contractors. Program staff categorize contractors based on engagement into three categories: top performers, dabblers, and non-participants (Table 4-3).

Table 4-3: Participating Contractor Engagement

Contractor Participation Category	Number of Contractors
Top Performers (4+ jobs/year)	24
Dabblers (1-3 jobs/year)	31
Non-Participants (0 jobs/year)	34

Once contractors become an official "Participating Contractor" they are required to complete at least one qualified install per year to remain active; exceptions were made in 2020 and 2021 due to the COVID-19 pandemic. Program staff stay in touch with contractors throughout the year through various informal channels, such as phone calls or emails, as well as in-person check-ins and meetings. Staff do not send out regular newsletters or email blasts. In the past, staff had on the ground account representatives who helped with contractor visits and check-ins; this assistance has decreased over the years due to capacity issues.

4.1.5 Quality control practices

Typically, program staff, with help from Honeywell, conduct on site verifications for 10% of equipment installed. In response to the pandemic, staff reduced verification requirements to 5% of total installs and switched to virtual verifications, rather than in person. Instead of randomly choosing which installs to verify, program staff pick installs based on install type and contractor in an attempt to ensure all contractors are meeting codes and requirements.

4.2 Contractor Interview Findings

This section summarizes the Evaluator's findings of the contractor interview process evaluation efforts.

4.2.1 Respondent Overview and Background

The 19 respondents represented all regions served by IPC, most were owners or presidents of their company, and the majority reported being part of the Heating and Cooling Efficiency program for "many years" or "since inception" (Table 4-4).

Table 4-4: Respondent Summary

Respondent	2020 Activity	Region	Interview Completion Status	Respondent Type	Years with Program
Resp10	Non-part.	Capital	Complete	Owner/Pres.	Don't know
Resp12	Dabbler	Capital	Complete	Owner/Pres.	4
Resp13	Non-part.	Capital	Complete	Owner/Pres.	5 or more
Resp17	Top performer	Capital	Complete	Owner/Pres.	5 or more
Resp18	Top performer	Capital	Partial	Office Manager	2
Resp19	Dabbler	Capital	Partial	Office Manager	3
Resp6	Top performer	Canyon	Complete	Owner/Pres.	3
Resp7	Top performer	Canyon	Complete	Owner/Pres.	3
Resp8	Top performer	Canyon	Complete	Owner/Pres.	5 or more
Resp11	Dabbler	Canyon	Complete	Technician	4
Resp14	Top performer	Canyon	Complete	Owner/Pres.	5 or more
Resp2	Non part.	Southern	Complete	Owner/Pres.	2
Resp3	Dabbler	Southern	Complete	Owner/Pres.	5 or more
Resp4	Non part.	Southern	Complete	Owner/Pres.	5 or more
Resp9	Dabbler	Southern	Complete	Owner/Pres.	5 or more
Resp15	Non part.	Southern	Complete	Owner/Pres.	5 or more
Resp16	Dabbler	Southern	Complete	Owner/Pres.	5 or more
Resp1	Top performer	Eastern	Complete	Owner/Pres.	5 or more
Resp5	Non part.	Eastern	Complete	Technician	5 or more

4.2.2 Program Effectiveness

To assess the effectiveness of the program for contractors, we asked respondents about their motivations to join the program and compared that to what they told us about any benefits they may have realized from being in the program.

4.2.2.1 Program Awareness and Motivation

Many contractors reported person-to-person outreach from IPC representatives about the program was critical to them joining the program. Six respondents specified, unprompted by the interviewer, that they initially became aware of the program because of outreach by an IPC representative. All six indicated they were thankful to receive this outreach from IPC and joined the program because of this outreach efforts. Furthermore, all six indicated this outreach had happened at least three years ago.

Respondents reported a variety of motivations for participating in the Heating and Cooling Efficiency Program. Of the 18 contractors that reported on why their firm became an approved contractor in the program, the majority (15) joined to better serve customers by helping the customer lower their cost of new equipment and installation. Four contractors reported that being part of the program keeps them competitive with other contractors in the region. As one respondent stated, *"If I cannot offer the program, [the customer] will go somewhere else."* Three respondents noted positive experiences with IPC in the past which motivated them to participate in this program. Two respondents were enthusiastic supporters of efficient technologies like heat pumps and one reported that the program ensures contractors are installing equipment to the efficiency standards required by code. According to this respondent, local permit officials approve HVAC permits for health and safety issues, but only the IPC program verifies if the contractor installed the equipment to run as efficiently as possible (Table 4-5).

Table 4-5: Contractor Motivations to be Approved Contractor

Motivation	Count
Opportunity to better serve customers	15
Keeps firm competitive with other contractors	4
Positive experience with past IPC programs	3
Support heat pump technology and using efficient equipment	2
Program ensures contractors are installing equipment to efficiency standards	1

4.2.2.2 Program Benefits

The program offerings often convince customers to do projects they may not have otherwise done, and the program benefited contractors in other ways, too. Ten respondents reported some specific benefits they have received from being part of the program.

- Seven reported the program incentives convince "*fence sitters*" to do a project and this has led to additional business for the contractor.
- Three reported being listed as an approved contractor on the IPC website as an approved contractor brought them additional business. One of these respondents specified that being an approved contractor provides their firm credibility in the marketplace.
- Three reported that the program allowed them to become comfortable selling and installing newer heat pump technologies. One of these respondents noted that developing this comfort with newer technologies enabled their firm to develop a lucrative business line selling and installing ductless heat pumps.

4.2.3 Program Satisfaction

Respondents reported irregular communications with IPC staff, and they mostly discussed project eligibility questions or clarifying application details. Fifteen of the respondents indicated having some type of communication with IPC staff in the last year. Of those, 11 reported the communications were typically clarification questions from IPC staff about a submitted application. For example, an incentive application may have been missing a piece of data and the staff would call the contractor to get that data. Additionally, eight respondents reported reaching out to IPC staff with project eligibility questions. For example, one contractor reported asking staff about potential program opportunities for a home that was heated exclusively by wood. Most respondents reported communicating with IPC staff four times a year or less with only two respondents reporting regular or monthly communications with IPC staff.

In almost all cases, respondents appreciated their contact with IPC staff. All but one respondent expressed high satisfaction with their communication with staff. Respondents stated things like *"[Staff*

Person] is really good. They are really responsive and get back [to me] right away". Another respondent appreciated the timeline flexibility the IPC staff extended to him when he was experiencing staffing issues that led to delays in submitting program paperwork. The one dissatisfied respondent stated he reached out to staff three times in 2021 about a project eligibility question but never heard back.

Nine respondents reported receiving training from IPC and almost all these respondents stated they took the training at least several years ago. Six of the respondents described the training as technical (e.g., duct blasting, HRV systems) and four described the training as program related (e.g., application requirements). All these respondents reported not taking an IPC sponsored training in at least the last two years.

4.2.4 Barriers to Program Participation and Suggestions for Improvement

Eleven respondents specified barriers that inhibit program participation and they offered suggestions for ways to improve the program and overcome some of these barriers (Table 4-6).

Table 4-6: Barriers to Program Participation and Suggestions for Improvement

Respon.		Barriers					Suggestions for Improvement			
	2020 Activity Level	Not enough financial incentives for customers	Contractors unaware of program	Not enough financial incentives for contractors	Program not using same rules as neighboring utilities	Customers not aware of heat pump benefits	Increase contact with IPC staff	Increase incentives/financial options for customers	Educate public about heat pump benefits	Offer contractor incentives for ductless heat pump installation
Resp1	Top perfor.	✓						✓	✓	
Resp14	Top perfor.			✓						
Resp16	Dabbler	✓					✓	✓		
Resp3	Dabbler	✓						✓		
Resp19	Dabbler		✓				✓			
Resp11	Dabbler					✓			✓	
Resp4	Non-part.	✓						✓		
Resp5	Non-part.						✓			
Resp13	Non-part.		✓				✓		✓	
Resp2	Non-part.				✓					
Resp15	Non-part.		✓				✓			
Total		4	3	1	1	1	5	4	3	1

Respondents provided the following details about the barriers.

- **Four respondents reported the financial incentives for customers are not enough to convince some customers to act**. According to these respondents, the $250 incentive for replacing an existing ducted heat pump with a new efficient unit is not enough to convince a customer to act. One of these respondents also stated that a lack of financing options for customers was a barrier to participation.
- **Three contractors explicitly stated they were unaware of many of the details of the program which keeps them from recommending it to customers**. For example, one contractor stated, *"my sales staff will be afraid to mention the program to a client because we are afraid of getting something wrong with the program."*
- **One respondent stated that the program needs to offer more money to contractors to complete applications**. This respondent appreciated the existing contractor incentive for completing ducted heat pump applications, but they did not specify a higher amount that would be more amenable.
- **One respondent that works in multiple electric utility territories reported that a neighboring utility has a lower HSPF threshold for heat pumps (8.2) in their program**. According to this respondent, the differences in program requirements can be difficult for them to navigate.
- **One respondent reported that customers are not aware of heat pumps and their benefits.** According to this respondent, the unfamiliarity with heat pumps in the marketplace makes selling all kinds of heat pumps more difficult.

Respondents provided four suggestions for overcoming these barriers and improving the program.

- Almost half of those that provided suggestions reported they would like to see more interactions with program staff and would like more information about the program in general. One of these respondents specified wanting more information about the program and ducted heat pumps. This respondent was not sure they were qualified to install ducted units through the program.
- Four respondents reported the program should increase incentive amounts, especially the $250 incentive for replacing existing ducted heat pumps with newer more efficient ducted units. One would also like to see the program offer good financing terms for customers to do program qualified work.
- Three respondents reported that the program could increase the public's awareness of the program specifically, and the benefits of heat pumps in general. One respondent specified that they think bill inserts about the program could be included in customer bills more often.
- One contractor would like to see incentives for contractors that complete ductless installations, like what the program offers contractors that complete ducted installations.

4.2.5 Installation Procedures and Equipment for Program vs. Non-Program Ducted Heat Pump Projects

To determine if the performance tested comfort standards (PTCS) required for ducted heat pump installations are an impediment to contractors completing more projects through the program, we asked respondents to tell us about their non-program ducted heat pump installations. As discussed below, this task was complicated by a couple of factors that emerged during the interviews. To better understand what we heard during the initial interviews, we called contractors back to clarify and verify our understanding of their installations.

Respondents did not always differentiate clearly between programs offered by IPC. For example, one respondent began the interview reporting about their firm's participation in the low-income weatherization program. The interviewer eventually realized that the respondent seemed to be talking about a different program, but the respondent had a hard time differentiating between programs because, according to the respondent, they completed 10 times more projects through the low-income weatherization program and had very little experience with the Heating and Cooling Efficiency program.

Respondents used the generic term "heat pump" interchangeably to refer to several different technologies including ducted heat pumps, ductless heat pumps (a.k.a. mini-splits), and water-source heat pumps (a.k.a. geothermal or ground-source). This made understanding contractors difficult because they would be referring to one type of heat pump and then switch to talking about another type of heat pump without clearly specifying which heat pump type they were talking about. Interviewers attempted to clarify with respondents which type they were referring to as much as possible.

Contractor respondents varied greatly in their experience installing ducted heat pumps, their experience using the program for ducted heat pump projects, and in their perspectives on the availability of efficient (HSPF ≥8.5) equipment versus less efficient (<8.5) equipment (Table 4-7**).**

- Three contractors, two in the Canyon region and one in Southern Idaho had experience completing installations through the program and outside the program.
- Eleven respondents indicated they sometimes install ducted heat pumps that do not receive the Heating and Cooling Efficiency Program incentive
    - None of these respondents indicated that the non-program heat pumps meet all of Idaho Power's program equipment standards.
    - Eight noted that the non-program heat pumps they install are HSPF ≥8.5
    - Only two contractors indicated they use Manual J calculations for all non-program installs. Three more contractors noted following Manual J for new construction, but not for retrofits.
- Three respondents, two in the Capital region and one in Southern Idaho, reported not completing any ducted heat pump projects in the last year, either through the program or outside of the program. Therefore, these respondents could not speak to the differences in installation procedures or equipment.

Table 4-7: Respondent Recall of Program and Non-Program Ducted Heat Pump Installations

Resp	Program Participation Data				Non-Program HP Install Data					
	Region	Act. Level	Prog. Ducted HP	Non-prog. Ducted HP	HSPF ≥8.5	Winter Balance Point	Manual J Calc.	Air Flow Calc. /Nanometer	Checks refrigerant charge	Measure Supply Return Temp.
1	Eastern	Top perf.	Yes	No	N/A	N/A	N/A	N/A	N/A	N/A
2	Southern	Non part.	No	Yes	75% Yes	Program to 10 degrees	For new construction, not retrofits	Yes	Yes	Yes
3	Southern	Dab.	Yes	Yes	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions
4	Southern	Non part.	No	Yes	100% Yes	Program to 15-20 degrees	No	No	Yes	Yes
5	Eastern	Non part.	No	No	N/A	N/A	N/A	N/A	N/A	N/A
6	Canyon	Top perf.	Yes	Yes	90% Yes	Not sure	Yes	Yes	Yes	Yes
7	Canyon	Top perf.	Yes	No	100% Yes	N/A	N/A	N/A	N/A	N/A
8	Canyon	Top perf.	Yes	Yes	100% Yes	Selects balance point based on system	No	Didn't answer question	Didn't answer question	Didn't answer question
9	Southern	Dab.	Yes	Yes	100% Yes	Program to 30 degrees	Yes	Yes	Yes	Yes
10	Capital	Non part.	No	No	N/A	N/A	N/A	N/A	N/A	N/A
11	Canyon	Dab.	Yes	No	N/A	N/A	N/A	N/A	N/A	N/A
12	Capital	Dab.	Yes	Yes	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions
13	Capital	Non par.	No	Yes	Not sure	Not sure	For new construction, not retrofits	For new construction, not retrofits	For new construction, not retrofits	Yes
14	Canyon	Top perf.	No	No	N/A	N/A	N/A	N/A	N/A	N/A
15	Southern	Non par.	No	Yes	95% Yes	Program to 10-15 degrees	For new construction, not retrofits	Yes	Yes	Yes

Resp	Program Participation Data				Non-Program HP Install Data					
	Region	Act. Level	Prog. Ducted HP	Non-prog. Ducted HP	HSPF ≥8.5	Winter Balance Point	Manual J Calc.	Air Flow Calc. /Nanometer	Checks refrigerant charge	Measure Supply Return Temp.
16	Southern	Dab.	Yes	Yes	100% Yes	Program to 15 degrees	Yes	Yes	Yes	Yes
17	Capital	Top perf.	Yes	No	N/A	N/A	N/A	N/A	N/A	N/A
18	Capital	Top perf.	Yes	No	N/A	N/A	N/A	N/A	N/A	N/A
19	Capital	Dab.	No	Yes	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions

The reasons for installing non-program qualified heat pumps were equipment barriers, financial barriers, and a lack of understanding regarding program and install requirements.

- Equipment Barriers
  - Five contractors noted they do not always install ducting when installing new equipment explaining: "*ID Power has stringent rules for insulation/leaking, its fine and dandy, but unless there's something extremely wrong, the ducting is going to be fine and it's not worth tearing it all apart*."
  - Three contractors noted they only install program approved ducted heat pump for new construction, not retrofit, as it is often too difficult to meet sizing and ducting program requirements in retrofits.
- Financial Barriers
  - One contractor noted that they sometimes install non-program heat pumps because the equipment that meet IPC equipment standards are often cost-prohibitive for customers: "*our customers want things installed, but as cheaply as possible. These systems cost a lot of money…people do not have $10,000 lying around.*"
  - One contractor reported mostly completing ducted heat pumps in some new construction applications. According to this respondent, the $250 incentive for replacing an existing ducted unit with a new unit is not worth the time and effort to pursue because it does not offset the cost of the project enough.
  - Two contractors reported completing ducted units outside of the program because the HSPF requirement was too high to participate in the program. These firms install 8.2 HSPF units because, according to these respondents, customers only want the least expensive option.
- Misunderstanding regarding program and install requirements
  - Three respondents were either not the installers or not familiar enough with IPC's requirements to adequately speak to them during the interview.

- One respondent reported doing many installations in rental units that and believed these installs did not qualify for the program, even though these installs followed the installation procedures of the program. This respondents' answers reflect a misunderstanding of qualifying applicants, as property managers of rental properties do qualify.

4.3 Participant Survey Findings

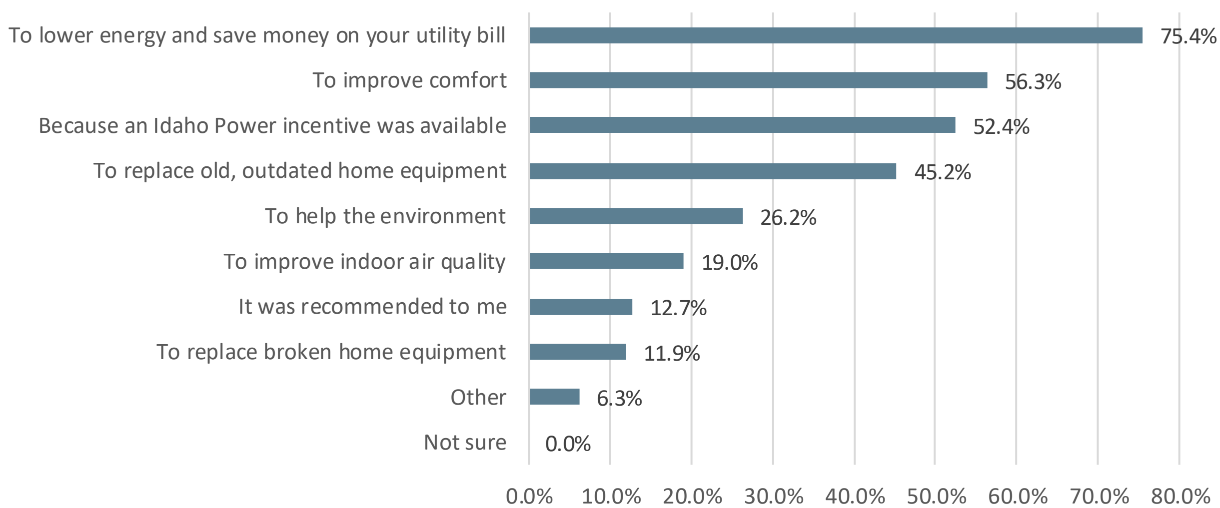
This section summarizes the Evaluator's findings of the participant survey process evaluation efforts.

4.3.1 Motivation and Satisfaction

As summarized in Section 2.2.6, 129 program participants completed the survey and the overall response rate was 19%.

The majority of respondents indicated that they participated in the program in order to lower their energy usage and save money on their utility bill (Figure 4-3). A desire to improve comfort, the availability of the incentive, and the need to replace old, outdated equipment were also popular response options.

Figure 4-3: Motivation for Participation (n=126)



Participants that worked with contractors are primarily working with contractors they previously worked with or heard about from someone they knew. About two-thirds of participants worked with a contractor (64.2%, n=81). Among those participants who used a contractor, three-quarters (74.1%) had either worked with the contractor before or heard about the contractor through someone they knew (74.1%). More than eight percent (8.6%) found the contractor through the IPC contractor list.

Most participants who filled out the application found it easy to complete. Most participants filled out the incentive application themselves (69%) or with their contractor (27%). Among the respondents who filled out the application themselves (n=87), 80.8% found it somewhat easy or very easy to complete. Three respondents said it was somewhat difficult to complete. The issues noted were difficulty figuring out what was needed and that it could not be completed online. A little less than a third (29.4%) of participants communicated with an Idaho Power representative.

About half of participants (49.2%) noticed a decrease in their electricity bill since participating in the program and 70.6% noticed other benefits (Figure 4-4**)**. Respondents also noted their homes were a more consistent and comfortable temperature, they were able to change home temperature remotely, and the air was cleaner and free of pollutants (Table 4-8).

Figure 4-4: Impact on Electricity Bill

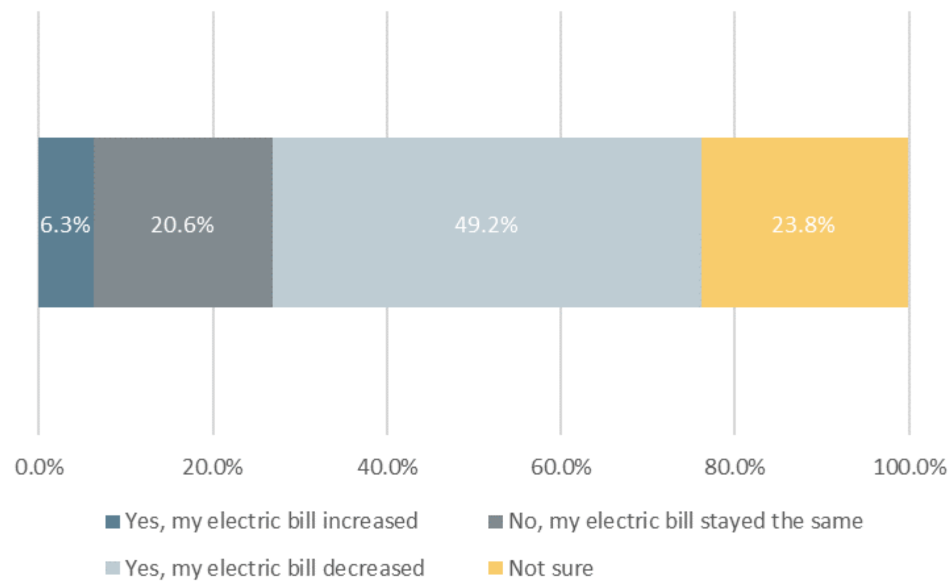
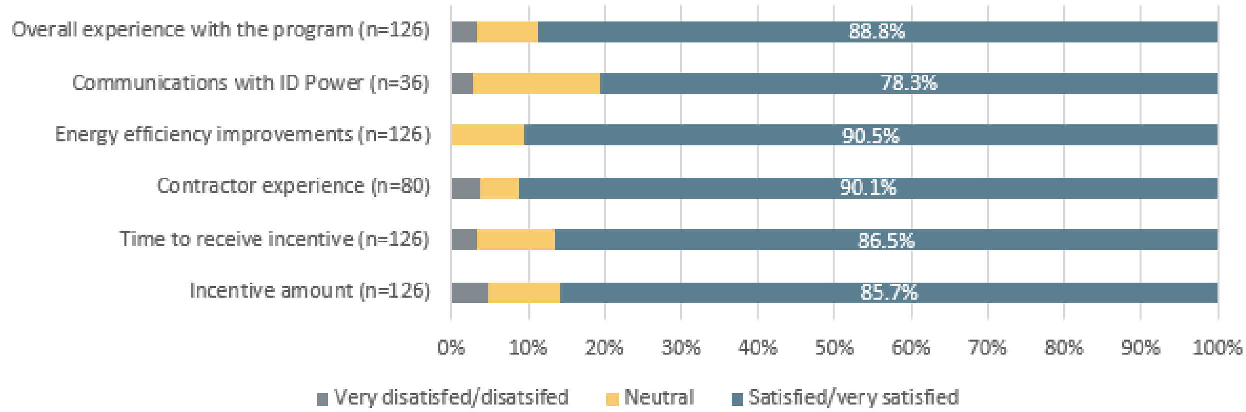


Table 4-8: Program Benefits

Benefit	Count	Example Quotes
Comfort	28	*"More comfortable temperature management"*
Air Quality	14	*"Fresher air in the house, better overall smell to the air"*
Efficiency and Energy Savings	12	*"Money savings. It pays for itself over about 4 years."*
Enhanced temperature control	28	*"I can adjust my temp if I'm too cold simply by picking up my ipad, bedside. That ease means that I keep the temperature lower, knowing it's easy to raise by several degrees if I'm sitting still"* *"We have sensors in every room. This has helped with work from home and managing the temperatures for different rooms. I love being able to change which room is used as the "main", so I can be comfortable no matter what room I'm in."*
Consistent temperature	17	*"The house stays a constant temp without having to check the thermostat"*
Thermostat aesthetic	2	*"Better looking thermostat."*

Most respondents, 88.8%, were either satisfied or very satisfied with Idaho Power's Heating & Cooling Efficiency Program. Figure 4-5 demonstrates respondents' satisfaction with various aspects of the program. In general, respondents were satisfied or very satisfied with all aspects of the program and 61.9% of respondents have recommended the program to someone they know.

Figure 4-5: Program Satisfaction



Despite the generally high levels of satisfaction, customers did provide suggestions for improvement (Table 4-9). Many respondents suggested increasing marketing and communication efforts, noting that the program is not well advertised. Additionally, respondents suggested offering more measures, such as insulation, as well as increasing incentive amounts. Respondents also noted that the application process could be simplified and even moved to a fully online platform.

Table 4-9: Suggestions for Improvement

Suggestion	Count	Quotes
Marketing	20	*"A marketing campaign about real people real homes and real results"*
Incentive	6	*"More $ incentives of course!"* *"Offer a little more money. It might get more people to go with efficient electric items."*
Simplify process	7	*"Make some of the questions on the form easier to answer or omit some of the questions."* *"Somehow simplifying the process for our contractor to successfully do their part! He told us he tried multiple times to get the information put together . . . somehow it wasn't simplified enough to be completed."* *"Online forms/ email submission."* *Also, reducing administrative challenges. I had some HVAC work that would have qualified for the incentive but my preferred contractor was not "Idaho Power" approved so it was not eligible. I also left my existing system in place for redundancy (specific to the circumstances of my home) which also would have made it not eligible for the rebate.*
Other incentives	11	*I think a broader range of incentives and more flexibility for incentives would be beneficial.*

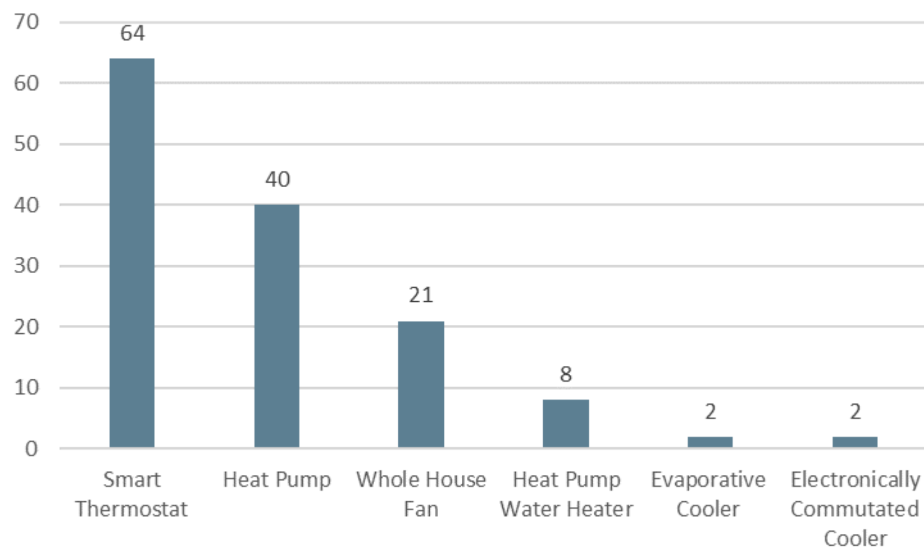
More than three-quarters (77.8%) of respondents indicated they are satisfied or somewhat satisfied with Idaho Power as their utility provider and a little more than half (55.6%) noted that participation in the Heating & Cooling Efficiency Program influenced their opinion of the utility. Respondents explained that they appreciated IPC's commitment to energy efficiency and their customer's financial well-being.

Idaho Power brings to best tools to its customers to save on energy. Have been in different states with other electricity providers and frankly Idaho Power is one of the very best!	*I appreciate that a power company is working towards sustainability and more green thinking*
I believe that is showed Idaho Power is interested in the consumer's well-being and the provided incentives help promote that image.	
Knowing they care about their customers to try and find ways to help them save money and incentivize it	*It is telling that the power company wants us to reduce our energy usage. We obviously feel the same about decreasing energy usage and that is heartwarming. So glad!!*

4.3.2 Measure Specific Questions

The Idaho Power Heating & Cooling efficiency program offers a variety of measures to clients. Figure 4-6 demonstrates the types of measures offered and number of survey respondents who received each measure.

Figure 4-6: Number of Participants per Measure



4.3.2.1 Smart Thermostat

All 64 surveyed participants indicated that the smart thermostat rebated under the program was still installed and functioning properly.

About half of the 64 participants who installed a smart thermostat through the program were replacing a programmable thermostat (56.3%). 51.6% of participants installed thermostat themselves (n=33) and of those, 17 connected it to a c-wire. The most popular smart thermostat brands were Nest (35.9%), Ecobee (15.6%), and Honeywell (15.6%).

The majority of participants with smart thermostats indicated that their thermostat was connected to the internet (85.9%). About two thirds (65.6%) of participants with smart thermostats have their thermostats change to away mode when they are not home. Among participants who have smart thermostats set to away mode, more than a third (38.1%) are not sure how the thermostat detects if they are home. The median away mode temperatures in the winter months is 65 degrees, while the median away mode temperature in the summer months is 77 degrees. The most common reason for not switching to away mode is someone is normally home or wanting to keep the house at a comfortable temperature.

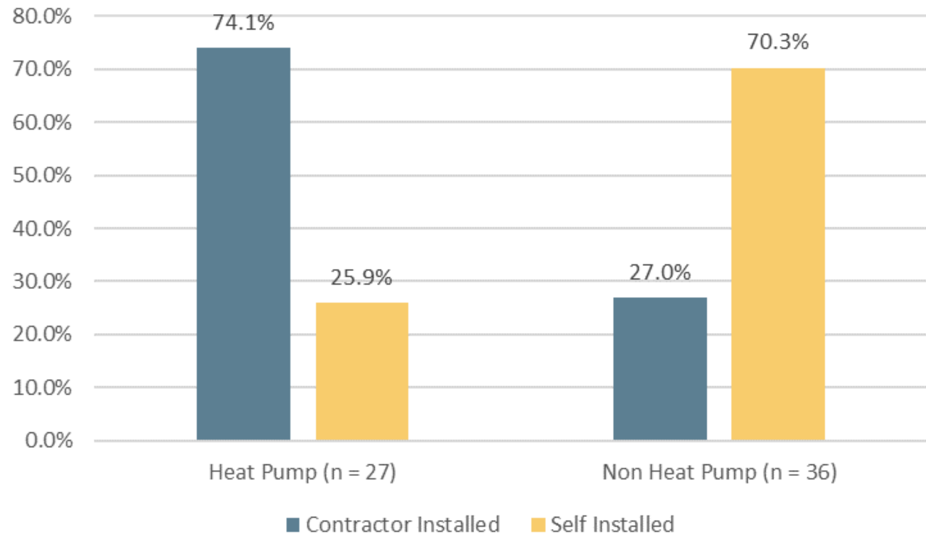
Twenty-six percent of thermostats installed on heat pumps are self-installed and those customers are using the default manufacturer heat pump settings. There is a clear difference in the rates of self-installation of thermostats for heat pumps and non-heat pump equipment, with heat pump installations predominantly performed by contractors (74.1% of thermostats installed on a heat pump were installed by a contractor vs. 27.0% installed on other heating and cooling equipment, see Figure 4-7).[15] Although the number of responses is limited, it is noteworthy that all customers who installed a Nest thermostat self-installed it, whereas other brands were mostly installed by contractors.

Customers that are self-installing thermostats on heat pumps appear to be using the manufacturer default heat pump settings.

- Four respondents installed a Nest thermostat, all of whom installed the thermostats themselves. Three of the four respondents stated that they did not know what the heat pump balance setting was, and one stated they kept it set to the manufacturer default setting.
- Fourteen respondents who installed a non-Nest thermostat had the thermostat installed by a contractor and two self-installed the thermostat. One respondent stated that they changed the auxiliary heating settings but said they did not set the compressor lockout or auxiliary heating threshold temperatures.

[15] The difference is statistically significant at $p < .05$

Figure 4-7: Smart Thermostat Installation

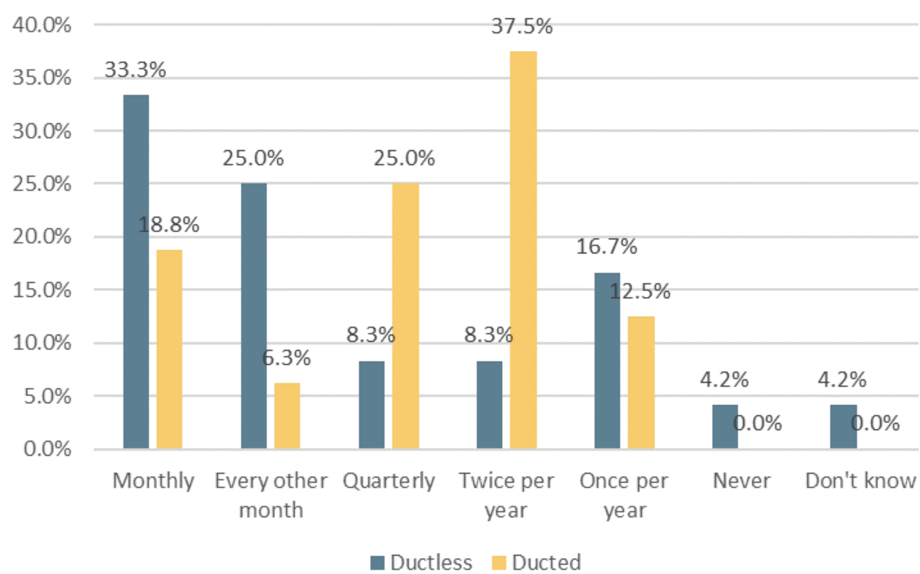


4.3.2.2 Heat Pump

All 40 surveyed participants indicated that the heat pump rebated under the program was still installed and functioning properly.

Among the 40 participants with a heat pump, 60% (n=24) have a ductless heat pump and 40% (n=16) have a ducted heat pump. One third of ductless heat pump owners clean their filter monthly and 18.8% of ducted heat pump owners change the handler or filter monthly (Figure 4-8).

Figure 4-8: Frequency of Filter Changes



4.3.2.3 Whole House Fan

All 21 surveyed participants indicated that the whole house fan rebated under the program was still installed and functioning properly.

Although all participants with a whole house also have an air conditioner, these participants also indicated they use their air conditioner at least 25% less now that they have a whole house fan (Figure 4-9). Participants indicated that they use their whole house fan most June-September; about half (47.3%) of participants use their fan for four or more hours per day during summer months.

Figure 4-9: Air Conditioner Usage

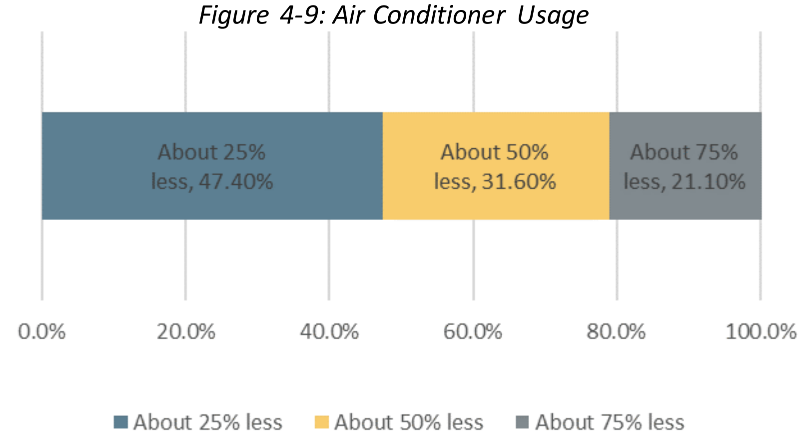
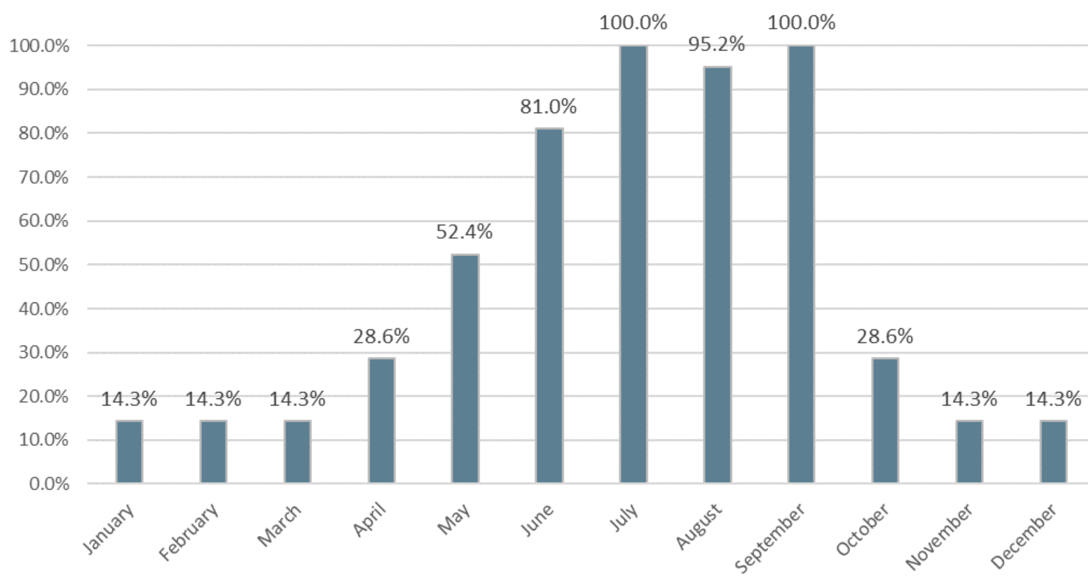


Figure 4-10: Percent of Respondents Running Fan During Each Month



4.3.2.4 Evaporative Cooler

The two surveyed participants indicated that the evaporative cooler rebated under the program was still installed and functioning properly.

Both participants who bought an evaporative cooler through the program indicated that the evaporative cooler is the primary equipment they use to cool their homes. In addition to the evaporative cooler, both participants also use ceiling fans to cool their homes, and one participant also uses a window A/C unit. One participant bought the evaporative cooler to replace an old evaporative cooler. The remaining participant bought the evaporative cooler to replace an A/C system.

4.3.2.5 Electronically Commutated Motor

The two surveyed participants indicated that the electronically commutated motor rebated under the program was still installed and functioning properly.

Neither of the participants who bought an electronically commutated motor use the continuous fan function.

4.3.2.6 Heat Pump Water Heater

All 8 surveyed participants indicated that the heat pump water heater rebated under the program was still installed and functioning properly.

All the participants who bought a heat pump water heater were replacing an electric resistance storage tank water heater.

5. Additional Research Objectives Results

This section summarizes the results of the additional measure research conducted for the program. The list of measures includes:

- Heat pumps (with and without PTCS);
- Ducted air source heat pump (Heating Zones 2/3);
- Whole house fans;
- Electronically commutated motors;
- Evaporative coolers; and,
- Connected thermostats.

The Evaluators completed research towards the following measure outcomes:

- Verify heat pump installations meet Performance Tested Comfort Systems ("PTCS") standards for commissioning, controls and sizing and determine if the deactivated Commissioning, Controls, and Sizing RTF workbook from January 2020 is reasonable to use to estimate verified energy savings for this measure.
- Understand and calculate savings for ducted air source heat pump conversions from electric forced air furnaces for Heating Zones 2 and 3. In addition, gather information on whether a 8.2 HSPF (federal standard) or 8.5 HSPF standard (RTF standard) is more typically installed for measures installed outside the program.
- Verify savings and review engineering calculations and assumptions for electronically commutated motors (ECMs), calculate savings relative to whole house fans and understand how customers use whole house fans relative to air conditioning, and calculate savings related to evaporative coolers and understand how customers use evaporative coolers relative to air conditioning.

- Review customer settings on self-installed connected thermostats for heat pump applications in order to understand customer configuration practices. Specifically, understand auxiliary heat settings with relation to customer knowledge on heat source equipment settings.

The Evaluators summarize measure-specific results in the sections below.

5.1.1.1 Heat Pumps and PTCS Standards

The Evaluators completed the following research activities for heat pumps with PTCS standards:

- Verify heat pumps meet PTCS standards
- Conduct participating contractor surveys to gather information on typical installation methods for heat pumps in the Idaho Power service territory
- Conduct a billing regression analysis using consumption data comparing participant and nonparticipant consumption to identify if PTCS standards result in additional savings as opposed to heat pump installations without PTCS standards

The Evaluators summarize the results of these research efforts in the sections below.

Verification of PTCS Standards

The Bonneville Power Administration (BPA) documents the requirements of PTCS standards for air source heat pumps, ground source heat pumps, and duct sealing[16]. The Evaluators referenced these requirements to verify if a project meets PTCS standards and therefore meets the RTF commissioning requirements, based off of these standards. The Evaluators summarize the 5 PTCS requirements for ducted air source heat pumps here:

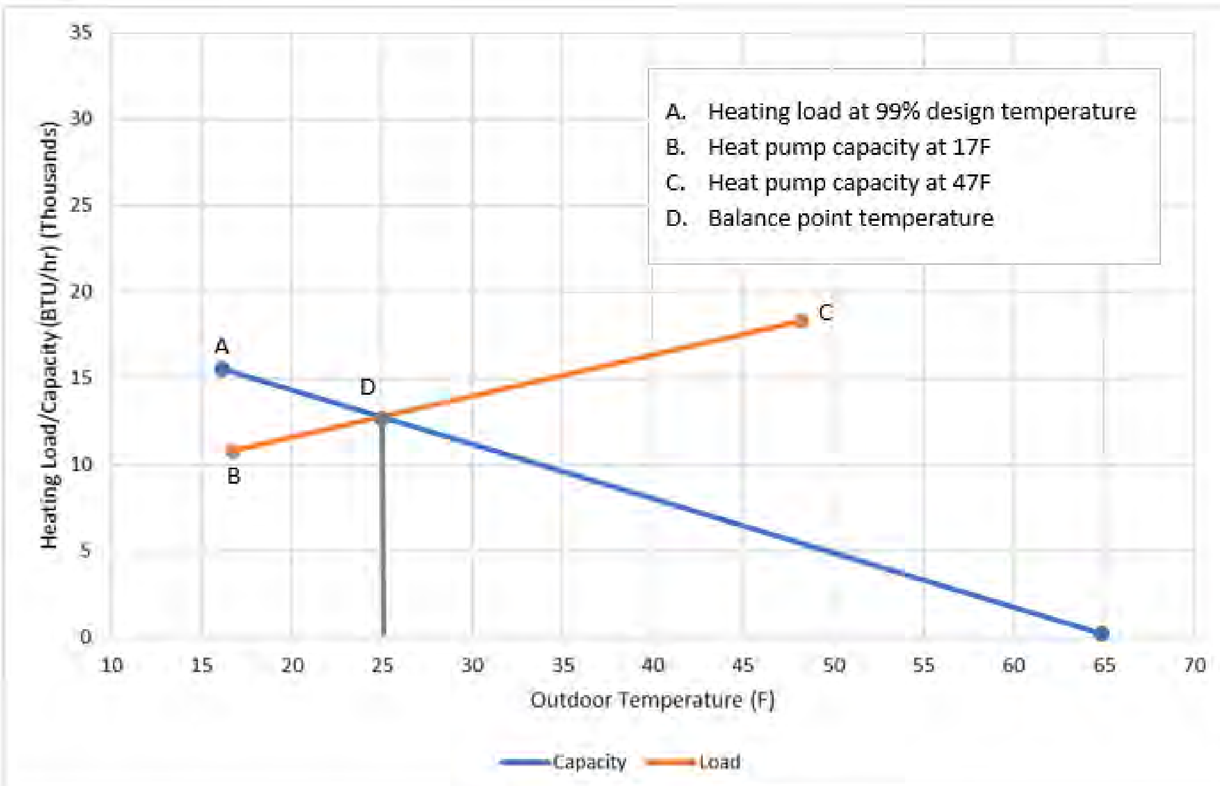
1. The equipment must be sized with a balance point of 35F or less. The balance point of the system is the intersection of the heating load and the heating pump capacity between 17F and 47F (Figure 5-1).
2. The external static pressure (ESP) acting on the system air handler must not exceed 0.8 inches of water (200 Pa).
3. Air flow across the indoor coil must be as specified in the heat pump manufacturer's documentation, or at least 325 to no more than 500 cubic feet per minute (CFM) per 12,000 Btu/hr output at AHRI rating conditions if the manufacturer's documentation is not specific.
4. Temperature change across the air handler indoor coil must be at or above the minimum temperature split[17] when the outdoor air temperature is 65F or less. The subcooling must meet manufacturer's documented requirements if the outdoor temperature is greater than 65F[18].
5. If a low ambient temperature compressor cutout option is installed, it must not cut out the compressor at temperatures above 5F. Auxiliary heat must also be controlled in such a manner that it does not engage when the outdoor air temperature is above 35F, except when supplemental heating is required during a defrost cycle or when emergency heating is required during a refrigeration cycle failure. For constant speed systems with multiple stages of

[16] https://www.bpa.gov/EE/Sectors/Residential/Pages/PTCS-Essentials.aspx
[17] https://www.bpa.gov/EE/Sectors/Residential/Documents/HP_Temp_Split_Table.pdf
[18] https://www.bpa.gov/EE/Sectors/Residential/Documents/R-410A_Pressure_Temperature_Chart.pdf

compression and supply air temperature sensor control, auxiliary heat shall be controlled in such a manner that it does not engage when the supply air temperature is above 85F.

In addition to the above, PTCS certification can only be applied to systems with single and two stage compressors. Variable speed/capacity compressors are not eligible.

Figure 5-1: Air Source Heat Pump Balance Point Example



Provided Documentation

The Evaluators had received project documentation including the following components:

- Internal IPC cover page detailing the project type
- Program rebate incentive application
- Program air source heat pump worksheet
- Technician installation worksheets
- Invoice associated to equipment and installation
- AHRI certificate associated with equipment
- A worksheet detailing the equipment sizing and heating load at 30F, 9F, or 11F

Some projects also included a short form or compliance report detailing the equipment specifications. The Evaluators used the above documents to verify PTCS certification where possible. In the case a project does not contain the necessary information to confirm PTCS certification, commissioning savings was removed from the project.

PTCS Verification Findings

The Evaluators verified each project's heating capacity at 17F and 47F with the associated AHRI reference number associated with the model. The heating load design temperature was collected from the heat pump sizing worksheets provided with the rebate applications. The balance point at the intersection for these two slopes was verified through calculation.

For some projects, the ESP was not available. The normal system operating pressure (NSOP), which is measured during the supply air flow test, was used as replacement for the ESP when not provided in the documentation. This value is measured in a similar fashion as the ESP, and provides sufficient proxy for the ESP. The True Flow test documents were reviewed to confirm if the air flow across the coil is within the required CFM per 12,000 BTU/hr.

The Evaluators found that 19 of the 55 rebated projects which claimed PTCS standards had met the requirements for the PTCS ducted air source heat pump certification and therefore qualified for the RTF commissioning UES. The balance point and the ESP were only available if the compliance report or short form was provided. In most cases where the project failed to meet PTCS standards, the failure occurred due to measured values not meeting or exceeding requirements rather than lack of information provided. The next largest contributing factor for a project to fail PTCS certification was due measurements indicating auxiliary heater operated at outsides air temperatures above 35F and therefore exceed the 35F maximum auxiliary heater operation controls. The documentation provided in most cases did not include information to confirm this requirement.

In addition, within the controls portion of the air source heat pump rebate worksheet, many customers and contractors did not confirm whether the verification had been completed by a qualified technician. The Evaluators recommend that in cases where worksheets or information is not filled out on incentive applications, IPC staff follow up to confirm with the customer or contractor before submitting rebate incentives. This additional step will allow evaluators to confirm savings for each project.

The Evaluators summarize the number of sampled projects that pass, fail, or fail to verify PTCS requirements in the table below.

Table 5-1: PTCS Verification Summary

PTCS Requirement	Description	Passed	Failed	Missing
1	Balance point of 35F or less	32	18	5
2	External static pressure less than .8 inches of water (200 Pa)	47	3	5
3	Air flow (CFM/Btuh) between .027 - .042	44	8	3
4a	Actual temperature split meets requirements	45	10	0
4b	Actual subcooling (F) meets requirements	51	0	4
5	Auxiliary must not engage when the supply air temperature is above 85F	55	0	0

Nineteen of the 55 sampled projects passed all 5 PTCS requirements defined by the Bonneville Power Administration and by the RTF Commissioning, Controls, & Sizing workbook, representing a 30% verification rate.

Because the controls and sizing components of the PTCS standards are the most impactful towards PTCS savings, the balance point requirement of 35F or lower and the temperature split and subcooling controls are critical to claiming and observing PTCS savings. Therefore, although 70% of the projects do not meet all 5 PTCS requirements simultaneously, the majority of projects meet or exceed these requirements individually. The Evaluators therefore believe that projects still display quantifiable savings due to these additional program requirements. Therefore, although RTF specifications are not met, quantifiable savings may be verified through billing analysis of observed monthly customer bills. Based on PTCS verification findings and the components being met, there likely exists significant potential for additional savings through the PTCS activities.

In-depth Contractor Interviews

PTCS standards on commissioning, controls, and sizing provided in the section above may not be implemented for nonparticipating program heat pump installs. In order to gather additional insight into typical heat pump commissioning, controls, and sizing standards, the Evaluators included questions in participating program contractor in-depth interviews addressing the steps contractors typically undertake during a heat pump install that is not rebated through the program. The Evaluators provide more detailed results of the contractor interviews in Section 4.2.5. The Evaluators provide a brief summary of the detailed results in this section.

To determine if the performance tested comfort standards (PTCS) required for ducted heat pump installations are an impediment to contractors completing more projects through the program, we asked respondents to tell us about their non-program ducted heat pump installations. The Evaluators summarize the results in the table below.

Table 5-2: Respondent Recall of Non-Program Ducted Heat Pump Installation Procedures

Resp	2020 Category	Winter Balance Point	Manual J Calc.	Air Flow Calc. / Nanometer	Checks refrigerant charge	Measure Supply Return Temp.
1	Top perf.	N/A	N/A	N/A	N/A	N/A
2	Non part.	Program to 10 degrees	For new construction, not retrofits	Yes	Yes	Yes
3	Dab.	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions
4	Non part.	Program to 15-20 degrees	No	No	Yes	Yes
5	Non part.	N/A	N/A	N/A	N/A	N/A
6	Top perf.	Not sure	Yes	Yes	Yes	Yes
7	Top perf.	N/A	N/A	N/A	N/A	N/A
8	Top perf.	Selects balance point based on system	No	Didn't answer question	Didn't answer question	Didn't answer question
9	Dab.	Program to 30 degrees	Yes	Yes	Yes	Yes
10	Non part.	N/A	N/A	N/A	N/A	N/A
11	Dab.	N/A	N/A	N/A	N/A	N/A
12	Dab.	Unable to answer	Unable to answer	Unable to answer	Unable to answer	Unable to answer

Resp	2020 Category	Winter Balance Point	Manual J Calc.	Air Flow Calc. / Nanometer	Checks refrigerant charge	Measure Supply Return Temp.
		technical questions	technical questions	technical questions	technical questions	technical questions
13	Non par.	Not sure	For new construction, not retrofits	For new construction, not retrofits	For new construction, not retrofits	Yes
14	Top perf.	N/A	N/A	N/A	N/A	N/A
15	Non par.	Program to 10-15 degrees	For new construction, not retrofits	Yes	Yes	Yes
16	Dab.	Program to 15 degrees	Yes	Yes	Yes	Yes
17	Top perf.	N/A	N/A	N/A	N/A	N/A
18	Top perf.	N/A	N/A	N/A	N/A	N/A
19	Dab.	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions	Unable to answer technical questions

The Evaluators summarize the findings here:

- Ten respondents were able to answer the technical questions presented during the interview about the installation practices. Of the ten respondents, three had indicated that they conduct the same program-required installation procedures outside of the program but had indicated that they only conduct those practices for new construction air source heat pumps, and not for retrofit air source heat pumps. These three respondents had indicated it is often too difficult to meet sizing and ducting program requirements in retrofits.
- Five contractors noted they do not always install ducting when installing new equipment explaining: *"ID Power has stringent rules for insulation/leaking, its fine and dandy, but unless there's something extremely wrong, the ducting is going to be fine and its not worth tearing it all apart."*
- The PTCS standards require that the balance point not exceed 30F. Five contractors indicated that they typically install the equipment set to a balance point of 30F or lower for installations outside the program.
- Respondent RESP6, a top performer in the program, reported that installation practices and procedures do not differ between program and non-program units. According to this respondent, they always do Manual J calculations and the *"installers do not even know if they are completing a program or non-program project"* when they are on the job site.
- Like RESP6, RESP7, also a top performer in the program, reported there was no difference in equipment efficiency standards or installation procedures for program or non-program installations. *"Everything we do is 8.5 HSPF or above."* Projects completed outside of the program were in other service territories or in new construction.
- One respondent reported doing many installations in rental units that and believed these installs did not qualify for the program, even though these installs followed the installation procedures

of the program. This respondents' answers reflect a misunderstanding of qualifying applicants, as property managers of rental properties do qualify.

- According to this respondent, the $250 incentive for replacing an existing ducted unit with a new unit is not worth the time and effort to pursue because it does not offset the cost of the project enough.

The Evaluators found mixed responses with respect to installation practices completed by contractors outside the program. Many top performers did not install ducted heat pumps outside of the program. In addition, many dabblers and non-participating contractors display lack of knowledge about these standards or confirm that they do not implement them for installations conducted outside of the program. Additional findings from this research effort found that many contractors lack understanding of the program requirements, and therefore avoid the risk of trying to participate in the program. The reasons for installing non-program qualified heat pumps were equipment barriers, financial barriers, and a lack of understanding regarding program and install requirements.

Billing Analysis

The results of the billing analysis for the air source heat pump upgrade measure with PTCS standards is provided in this section. The methodology for the billing analysis is provided in Section 2.2.5.5. Table 5-3 displays customer counts for customers considered for billing analysis (i.e. customer with single-measure installations) and identifies measures that met the requirements for a billing analysis. Additional detail for this billing analysis is provided in Appendix A: Billing Analysis Results.

Table 5-3: Measures Considered for Billing Analysis, Air Source Heat Pump Upgrades

Measure	Measure Considered for Billing Analysis	Number of Customers w/ Isolated-Measure Installations	Sufficient Participation for Billing Analysis
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF with PTCS standards	✓	72	✓

The Evaluators attempted to estimate measure-level energy savings through billing analysis regression with a counterfactual group selected via propensity score matching. The Evaluators attempted to isolate each unique measure. In doing so, the Evaluators also isolate the measure effects using the customer's consumption billing data.

A billing analysis was completed for measures that had at least 30 customers with single-measure installations. This restriction was met by the air source heat pump upgrades with PTCS standards. Therefore, the Evaluators continued with regression analysis for the measure. This ensured that measures would have a sufficient sample size after applying PSM data restrictions (e.g. sufficient pre- and post-period data). The billing analysis included participants in PY2018, PY2019, and PY2020 in order to acquire the maximum number of customers possible.

The Evaluators were provided a considerable pool of control customers to draw upon. The Evaluators used nearest neighbor matching with a 3 to 1 matching ratio. Therefore, each treatment customer was matched to 3 similar control customers. The final number of customers in each the treatment and control group are listed in Table 5-4.

The Evaluators performed t-tests on pre-period usage by month to determine the success of PSM. The t-tests confirmed that PSM performed well for the measure in each Heating Zone. T-tests of monthly pre period usage can yield a statistically significant difference 40% of the time for one to two months out of 12. Thus, the Evaluators set a tolerance band allowing two months out of 12 to vary in pre-period usage at the 95% confidence level. The groups for this measure passed this threshold, indicating the groups were well matched on all included covariates.

Table 5-4 provides annual savings per customer for the air source heat pump upgrades with PTCS commissioning. Model 1 (D-n-D) was selected as the final model for the measure as it provided the highest adjusted R-squared among the regression models. Savings are statistically significant at the 90% level. The adjusted R-squared shows the model provided an excellent fit for the data (0.79).

Table 5-4: Estimated Savings, Air Source Heat Pump Upgrades

Measure	Treatment Customers	Control Customers	Annual kWh Savings per Customer	90% Lower CI	90% Upper CI	Adjusted R-Squared	Model
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF with PTCS standards	24	72	1,263	198	2,328	0.79	Model 1: D-n-D

The goal of this additional research objective is to attempt to quantify incremental savings for PTCS commissioning efforts achieved by IPC and the Heating & Cooling Efficiency Program.

These results indicate that savings for air source heat pump upgrade measure with PTCS standards in the program achieve 1,263 kWh savings per year. This value differs from the RTF provided UES values for air source heat pump upgrades with PTCS commissioning. The RTF provides UES values for air source heat pump upgrades with PTCS commissioning between 788 kWh and 1,160 kWh, depending on Heating Zone. The billing analysis displays statistically significant results with high precision and low error. The results of the billing analysis provide savings results about 30% higher than the RTF-provided savings for this measure.

The Evaluators are unable to separate the estimated savings between the air source heat pump upgrade savings from the equipment component and the air source heat pump upgrade savings from the PTCS commissioning component. However, the results of the billing analysis indicate that observed savings from this measure for participants in the Heating & Cooling Efficiency Program are significantly higher than currently estimated by the RTF.

In January 2020, the RTF deactivated the Commissioning, Controls, & Sizing workbook for single family homes with air source heat pump equipment installed. The RTF voted to deactivate the workbook due to insufficient billing data to calibrate simulated model savings outputs to the northwest region.

The high savings value derived from this billing analysis may be due to the baseline defined for the RTF air source heat pump workbook. The RTF defines the baseline for this measure as homes with air source heat pumps of HSPF 8.5 and 14 SEER. However, the projects contained in the Heating & Cooling Efficiency Program most likely are replacing older units that fall below the current 14 SEER/8.2 HSPF federal standard. This would lead to deflated expected savings compared to the observed savings from the billing analysis. In addition, commissioning, controls, and sizing savings being dependent on local climate, which the RTF have been unable to sufficiently quantify savings due to PTCS standards.

This billing analysis provides insight on the relative impact of the air source heat pump upgrades and PTCS commissioning activities provided by IPC in the Heating & Cooling Efficiency Program. The results of this analysis are unable to be used to estimate separate savings values for the air source heat pump upgrade and the PTCS commissioning standards, however, it does provide insight on the impact of the air source heat pump upgrades and PTCS commissioning activities in the program, combined.

Because the Commissioning, Controls, & Sizing workbook from the RTF will be deactivated and unable to be used towards PY2021 projects for claimed savings, the Evaluators recommend conducting billing analyses for this measure for PY2021 to estimate observed, verified impacts from the measure. This analysis would estimate average impacts for the air source heat pump upgrades completed by IPC's Heating & Cooling Efficiency Program, which would therefore include the PTCS commissioning efforts completed by the contractors that IPC train and work alongside.

Conclusions and Recommendations

The Evaluators summarize the conclusions and recommendations for the heat pumps and PTCS standards research efforts:

- **Conclusion:** The majority of ducted heat pump projects completed through the program cannot be confirmed to meet PTCS standards either due to lack of required information in documentation, or due to provided documentation displaying values that do not meet PTCS standards. Nineteen of the 76 sampled projects met PTCS requirements as found through document verification. For projects in which the Evaluators are unable to confirm PTCS standards are met, RTF Commissioning, Controls, and Sizing savings were removed from the project.
    - **Recommendation:** The Evaluators recommend IPC require additional documents to properly verify each of the five components for PTCS certification:
        - Collect each air source heat pump heating capacity at 17F and 47F and ensure heat pump sizing worksheets document heating load design temperature of equipment.
        - Collect equipment air flow values (CFM/BTUh) to confirm values are within 0.027 and 0.042.
        - Collect external static pressure value at 0.8 inches of water (200 Pa).
        - Require customers confirm that the equipment was installed to manufacturer's recommendations.
        - Require customers confirm that auxiliary heat does not engage when the outdoor air temperature is above 35F
- **Conclusion:** The Evaluators utilized the billing analysis results for the air source heat pump upgrades completed in PY2020 projects. The RTF deactivated the Commissioning, Controls, & Sizing workbook in January 2020. However, the RTF intends to consider other versions of this measure in the future.
    - **Recommendation:** Due to inability to claim savings from additional commissioning, controls, and sizing practices for ducted heat pump measures through the RTF while the measure is deactivated, the Evaluators recommend to continue analyzing impacts through measurement or observed billing analysis in the future. Once the RTF approves

a new measure for PTCS standards, the Evaluators recommend using the UES values presented in the new workbook.

- **Conclusion:** Contractor respondents varied greatly in their experience installing ducted heat pumps and installation procedures conducted for non-program installations. Eleven respondents indicated they sometimes install ducted heat pumps that do not receive the Heating and Cooling Efficiency Program incentive. Two contractors indicated they use Manual J calculations for all non-program installs while three contractors noted following Manual J procedures for new construction ducted heat pumps, but not for retrofits, as the program requirements are too stringent.
- **Conclusion:** The Evaluators found that the top performers in the program typically install equipment outside the program to meet the PTCS/Manual J requirements. However, many dabblers and non-participating contractors display lack of knowledge about these standards or confirm that they do not implement them for installations conducted outside of the program.
  - **Recommendation:** The Evaluators recommend that IPC provide additional efforts to provide educational training to assist in building contractor awareness of the program and the program requirements.
- **Conclusion:** The reasons for installing non-program qualified heat pumps were equipment barriers, financial barriers, and a lack of understanding regarding program and install requirements. Many contractors lack understanding of the program requirements, and therefore avoid the risk of trying to participate in the program.
  - **Recommendation:** The Evaluators recommend exploring options to provide higher incentive levels for ducted heat pump projects.
- **Conclusion:** These results indicate that savings for air source heat pump upgrade measure with PTCS standards in the program achieve 1,263 kWh savings per year, about 30% higher than the savings values presented in the RTF for air source heat pump upgrades with commissioning, controls, and sizing standards. This value includes projects for which efficient equipment displays HSPF of 8.5 or greater.
  - **Recommendation:** Because the Commissioning, Controls, & Sizing workbook from the RTF will be deactivated and unable to be used towards PY2021 projects for claimed savings, and because the projects seem to benefit from additional savings due to these additional sizing activities, the Evaluators recommend using the results of this billing analysis to quantify savings for ducted heat pump upgrades projects rebated through the program. This analysis would estimate average impacts for the air source heat pump upgrades completed and verified by IPC's Heating & Cooling Efficiency Program.

5.1.1.2 Air Source Heat Pump Conversions in HZ2/HZ3 & HSPF Baseline Research

This section summarizes the Evaluator's approach to complete the following research objectives for the air source heat pump conversions in the program:

- Understand and calculate savings for ducted air source heat pump conversions from electric forced air furnaces for Heating Zones 2 and 3
- Gain insights on whether 8.2 HSPF or 8.5 HSPF efficiency standard are more typical for measures installed within the program and outside the program
- If the RTF workbook allows, modify the RTF workbook baseline by integrating findings on typical HSPF efficiency standards outside the program

Baseline Conversion Standards (8.2 vs. 8.5 HSPF)

The program requires a minimum 8.5 HSPF efficiency in order to participate in the program. In order to understand typical HSPF baseline standards outside the program, the Evaluators included questions to the in-depth contractor surveys addressing typical HSPF efficiency baselines for conversions conducted outside the program, within the Idaho Power service territory.

The Evaluators provide the detailed results of the contractor interviews in Section 4.2.5. The Evaluators provide a brief summary of the detailed results in this section.

Table 5-5: Respondent Recall of Program and Non-Program Ducted Heat Pump Equipment

Resp	2020 Performance Category	Region	Prog. Ducted HP Experience	Non-prog. ducted HP Experience	Non-Program HSPF ≥8.5
1	Top perf.	Eastern	Yes	No	N/A
2	Non part.	Southern	No	Yes	75% Yes
3	Dabbler	Southern	Yes	Yes	Unable to answer technical questions
4	Non part.	Southern	No	Yes	100% Yes
5	Non part.	Eastern	No	No	N/A
6	Top perf.	Canyon	Yes	Yes	90% Yes
7	Top perf.	Canyon	Yes	No	100% Yes
8	Top perf.	Canyon	Yes	Yes	100% Yes
9	Dabbler	Southern	Yes	Yes	100% Yes
10	Non part.	Capital	No	No	N/A
11	Dabbler	Canyon	Yes	No	N/A
12	Dabbler	Capital	Yes	Yes	Unable to answer technical questions
13	Non par.	Capital	No	Yes	Not sure
14	Top perf.	Canyon	No	No	N/A
15	Non par.	Southern	No	Yes	95% Yes
16	Dab.	Southern	Yes	Yes	100% Yes
17	Top perf.	Capital	Yes	No	N/A
18	Top perf.	Capital	Yes	No	N/A
19	Dabbler	Capital	No	Yes	Unable to answer technical questions

Contractor respondents varied greatly in their experience installing ducted heat pumps, their experience using the program for ducted heat pump projects, and in their perspectives on the availability of efficient (HSPF ≥8.5) equipment versus less efficient (<8.5) equipment.

- Eleven respondents indicated they sometimes install ducted heat pumps that do not receive the Heating and Cooling Efficiency Program incentive. None of these respondents indicated that the non-program heat pumps meet all of Idaho Power's program equipment standards. Eight noted that the non-program heat pumps they install are HSPF ≥8.5

Top performers typically install ducted heat pumps to the same efficiency standards (8.5 HSPF) as required through the program:

- Respondent RESP6, a top performing contractor, reported the only difference between ducted units that go through the program and those outside of the program is the conditions in which they are being installed. This respondent reported that "*almost all*" ducted units are program eligible (8.5 HSPF and above). Those installed outside of the program are in housing conditions that make them ineligible to participate such as not replacing electric heat or if the house is "*huge.*" Furthermore, installation practices and procedures do not differ between program and non-program units. According to this respondent, they always do manual J calculations and the *"installers do not even know if they are completing a program or non-program project"* when they are on the job site.
- RESP7, also a top performing contractor in the program, reported there was no difference in equipment efficiency standards or installation procedures for program or non-program installations. *"Everything we do is 8.5 HSPF or above."* Projects completed outside of the program were in other service territories or in new construction.

The Evaluators found that the reasons for installing non-program qualified heat pumps were equipment barriers, financial barriers, and a lack of understanding regarding program and install requirements. In addition, HSPF efficiency practices outside the program are unable to be estimated, as contractors indicate a mix of responses for HSPF above 8.5 and HSPF below 8.5.

RTF UES Modification

Another research goal for this analysis is to determine if the RTF's UES using a 9.0 HSPF minimum and 8.5 HSPF baseline can be adjusted to fit the requirements of the program, which requires a 8.5 HSPF minimum. Although the majority of projects rebated through the program meet or exceed 9.0 HSPF, IPC would still like to provide incentives for customers who have installed an 8.5 HSPF air source heat pump, which is still more efficient than the federally required minimum of 8.2 HSPF.

Therefore, in addition to the above contractor interview questions and billing analysis, the Evaluators explored the inclusion of the HSPF proxy estimates resulting from the contractor interviews to guide RTF workbook modifications to include this changed baseline.

Due to the methodology employed by the RTF to calculate UES values for ducted heat pumps, baseline adjustments are not possible. The RTF uses simulated modeling in which the 8.2 HSPF portrays the counterfactual (baseline) to the 8.5 HSPF efficient equipment.

In addition, the findings of the contractor interview indicate that the 8.2 HSPF equipment are still widely available and remain a valid option for customers outside of the program. Therefore, the Evaluators recommend that IPC continue to use the RTF-approved UES values for ducted heat pump conversions to evaluate savings for the projects, which already define the federal minimum of 8.2 HSPF as the baseline.

Billing Analysis

The results of the billing analysis for the air source heat pump conversion measure is provided in this section. The methodology for the billing analysis is provided in Section 2.2.5.5. Table 5-6 displays customer counts for customers considered for billing analysis (i.e. customer with single-measure installations) and identifies measures that met the requirements for a billing analysis. Additional detail for this billing analysis is provided in Appendix A: Billing Analysis Results.

Table 5-6: Measures Considered for Billing Analysis, Air Source Heat Pump Conversions

Measure	Heating Zone	Measure Considered for Billing Analysis	Number of Customers w/ Isolated-Measure Installations	Sufficient Participation for Billing Analysis
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	1	✓	65	✓
	2	✓	34	✓
	3		10	
	2/3	✓	44	✓

The Evaluators attempted to estimate measure-level energy savings by Heating Zone through billing analysis regression with a counterfactual group selected via propensity score matching. The Evaluators attempted to isolate each unique measure. In doing so, the Evaluators also isolate the measure effects using the customer's consumption billing data.

A billing analysis was completed for measures that had at least 30 customers with single-measure installations. This restriction was not met by the air source heat pump conversions in Heating Zone 3. However, the Evaluators attempted to estimate a savings value for the aggregate of projects installed in Heating Zones 2 and 3, as sufficient participation exists for this group.

Therefore, the Evaluators continued with regression analysis for Heating Zones 1, 2, and 2/3. This ensured that measures would have a sufficient sample size after applying PSM data restrictions (e.g. sufficient pre- and post-period data). The billing analysis included participants in PY2018, PY2019, and PY2020 in order to acquire the maximum number of customers possible.

The Evaluators performed *t*-tests on pre-period usage by month to determine the success of PSM. The *t*-tests confirmed that PSM performed well for the measure in each Heating Zone. *T*-tests of monthly pre period usage can yield a statistically significant difference 40% of the time for one to two months out of 12. Thus, the Evaluators set a tolerance band allowing two months out of 12 to vary in pre-period usage at the 95% confidence level. All Heating Zone groups passed this threshold, indicating the groups were well matched on all included covariates.

Table 5-7 provides annual savings per customer for each Heating Zone. Model 2 (PPR) was selected as the final model for the measure as it provided the highest adjusted R-squared among the regression models. Savings are statistically significant at the 90% level Heating Zones 1 and 2. The adjusted R-squared shows the model provided an excellent fit for the data of nearly 0.7 and above.

Table 5-7: Estimated Savings, Air Source Heat Pump Conversions

Heating Zone	Treatment Customers	Control Customers	Annual kWh Savings per Customer	90% Lower CI	90% Upper CI	Adjusted R-Squared	Model
1	36	105	1,513	715	2,312	0.73	Model 1: D-n-D
2	18	54	2,609	1,289	3,929	0.79	Model 1: D-n-D
2/3	23	61	2,029	830	3,228	0.79	Model 1: D-n-D

The Evaluators were unable to complete the regression analysis for Heating Zone 3 due to low participation. However, the Evaluators provide statistically significant savings for Heating Zones 1, 2, and 2/3.

The goal of this additional research objective is to identify if the air source heat pump conversions are shown to save more energy in the colder regions (Heating Zones 2 and 3). Although Heating Zone 3 energy savings are unable to be quantified, the results of the billing analysis for Heating Zones 1, 2, and 2/3 confirm that the air source heat pump conversions display significantly higher savings in the colder regions (Heating Zone 2 and 2/3). Annual energy savings for air source heat pump conversions in Heating Zone 1, 2, and 2/3 totals 1,513 kWh per year 2,609 kWh per year, and 2,026 kWh per year, respectively. These results indicate that savings for air source heat pump conversion measures in Heating Zone 2 are, on average, 58% higher than energy savings for air source heat pump conversions in Heating Zone 1 and savings for the measure in Heating Zone 2/3 is, on average, 34% higher than in Heating Zone 1.

The RTF provides UES values for air source heat pump conversions in Heating Zone 1 between 3,711 and 8,943, depending on insulation level. The RTF provides UES values for air source heat pump conversions in Heating Zones 2 between 3,605 and 8,594, depending on the insulation level. The results of the billing analysis provide savings values significantly lower than the RTF-provided savings for this measure, regardless of Heating Zone.

The observed energy reductions through billing analysis may be low due to changes in participant energy consumption behaviors after installing more efficient equipment.

The Evaluators recommend that IPC continue to use the RTF-approved UES values for ducted heat pump conversions to evaluate savings for the projects, which already define the federal minimum of 8.2 HSPF as the baseline.

Unfortunately, the participation levels are not sufficient for providing to the RTF to assist in the RTF's calibration efforts for HZ2/HZ3 as defined by the participation requirements in the RTF's research strategy[19].

Conclusions and Recommendations

The Evaluators summarize the conclusions and recommendations for the ducted heat pumps and 8.2 vs 8.5 HSPF standards research efforts:

- **Conclusion:** According to contractor responses, barriers to completing more ducted heat pump projects in the region are: low incentive levels and availability of less efficient options.

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[19] https://nwcouncil.app.box.com/v/ASHPResearchStrategy092020

        - The incentive ($250) for replacing existing ducted heat pumps with new more efficient units is insufficient so contractors do not offer it or it is not enough to prompt a customer to act.
        - Less efficient (<8.5 HSPF) options are still seen as widely available, especially outside the Capital and Canyon areas, and those units are inexpensive enough that they still appeal to many contractors and customers.
    - **Recommendation:** Consider increasing the existing incentive amounts as well as expand measures offered, if cost-effectiveness allows. Not only was equipment cost the biggest barrier to customer participation according to interviewed contractors, but many customers surveyed suggested offering larger and more wide-reaching discounts.
    - **Recommendation:** Work with distributors and suppliers to better understand the availability of ducted heat pump units with an HSPF ≥8.5 and <8.5. Consider ways to incent distributors to push or offer higher efficient units, especially in areas outside of the Capital region.
- **Conclusion:** Annual energy savings for air source heat pump conversions in Heating Zone 1, 2, and 2/3 totals 1,513 kWh per year 2,609 kWh per year, and 2,026 kWh per year, respectively. These results indicate that savings for air source heat pump conversion measures in Heating Zone 2 are, on average, 58% higher than energy savings for air source heat pump conversions in Heating Zone 1 and savings for the measure in Heating Zone 2/3 is, on average, 34% higher than in Heating Zone 1. However, the results of the billing analysis provide savings values significantly lower than the RTF-provided savings for this measure, regardless of Heating Zone.
- **Conclusion:** The RTF workbook which calculates ducted heat pump conversion savings is unable to be modified. In addition, research indicates that 8.2 HSPF equipment are still widely available and remain a valid option for customers outside of the program.
    - **Recommendation:** The Evaluators recommend that IPC continue to use the RTF-approved UES values for ducted heat pump conversions to evaluate savings for the projects, which already define the federal minimum of 8.2 HSPF as the baseline. For the PTCS standards portion of the projects, the Evaluators recommend requiring sufficient documentation to confirm PTCS certification. In addition, due to RTF deactivation of the Commissioning, Controls, and Sizing workbook, and due to the results of the billing analysis, the Evaluators recommend IPC does not claim additional sizing savings for these projects.

5.1.1.3 ECMs, Whole House Fans, and Evaporative Coolers

This section summarizes the Evaluator's approach to:

- Verify savings and review engineering calculations and assumptions for electronically commutated motors (ECMs);
- Calculate savings relative to whole house fans and understand how customers use whole house fans relative to air conditioning; and,
- Calculate savings related to evaporative coolers and understand how customers use evaporative coolers relative to air conditioning.

Electronically Commutated Motors

The Evaluators verified savings for ECMs by conducting an engineering review of assumptions used in Idaho Power deemed savings estimates, which addressed the run mode of the baseline and ECM blower and the HVAC equipment configuration and fuel type. The Evaluators reviewed and applied the savings values derived from the University of Idaho Integrated Design Lab workpaper on Electronically Commutated Motors along with verified tracking data to estimate net program savings for this measure. The Evaluators employed the following workbook to calculate verified savings for the measure:

- University of Idaho Integrated Design Lab, Electronically Commutated Motors Literature Review, December 31, 2014.

The Evaluators reviewed the literature review workpaper and confirmed that savings values are applicable to the ECM projects completed Idaho Power service territory. Therefore, the Evaluators utilized the savings calculations derived from the Integrated Design Lab literature review workpaper for the ECM projects completed in the Idaho Power service territory.

The Evaluators provide a summary of the engineering assumptions review and the measure-level impact findings in Section 3.2.5 within the measure-level impact evaluation results.

Whole House Fans

To better understand how whole house fans are used by customers, the Evaluators included survey questions for customers who installed whole house fans to provide insights into their use compared to air conditioning. In addition, the Evaluators summarize the findings of the participant feedback regarding additional available options for cooling their home and during what circumstances they are used. The Evaluators detail the results of the survey for this measure in Section 4.3.2.3. The Evaluators briefly summarize the findings in this section.

The Evaluators were able to receive 21 responses to the survey questions for this measure. All 21 surveyed participants indicated that the whole house fan rebated under the program was still installed and functioning properly. Although all participants with a whole house also have an air conditioner, these participants indicated they use their air conditioner at least 25% less now that they have a whole house fan.

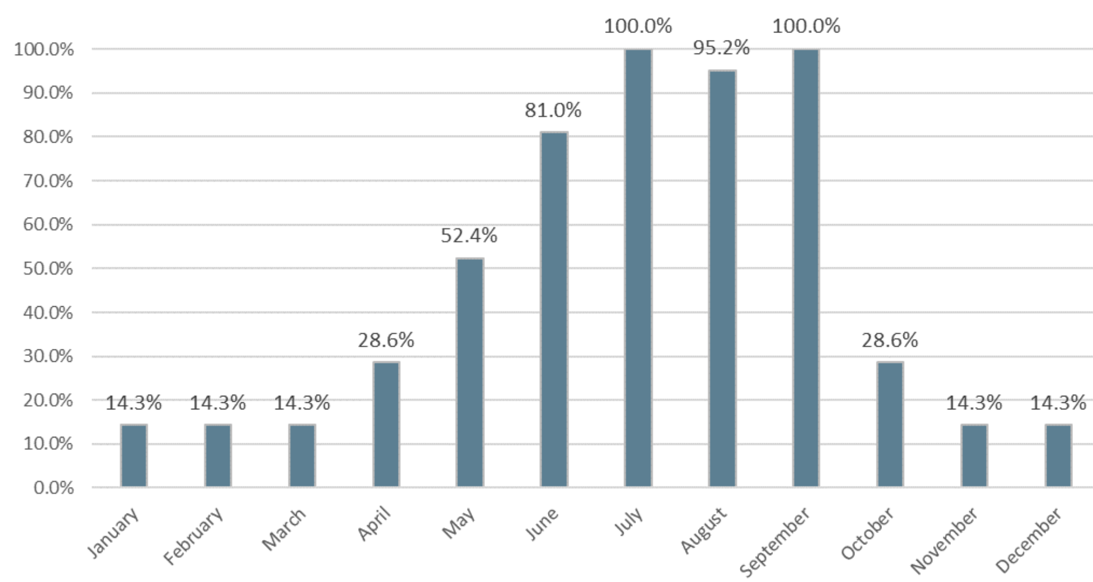
Surveys also addressed average hours of use of the whole-house fan per week during the summer cooling season and compares impacts with the rebate applications used towards whole house fan engineering calculations. Participants indicated that they use their whole house fan most June-September; about half (47.3%) of participants use their fan for four or more hours per day during summer months. Using the responses from this survey, the Evaluators estimate actual number of hours participants use the whole house fan during summer months in the table below.

Table 5-8: Estimated Annual Hours of Operation, Whole House Fans

Month	Days in Month	Estimated Hours/Day WHF Is On	Estimated Hours/Month WHF Is On	Lower Boundary (2 Hours/Day)	Upper Boundary (6 Hours/Day)
June	30	4	120	60	180
July	31	4	124	62	186
August	31	4	124	62	186
September	30	4	120	60	180
Total	120	4	488	244	731

The Evaluators estimate a lower and upper boundary for this estimate, ±2 hours each day, resulting in whole house fan annual hours of use between 244 hours and 731. It is likely that the actual estimate is closer to the lower boundary due to a portion of customers indicating that they do not use their whole house fans at all during some summer months (Figure 5-2). The estimates provided above indicates that the IDL workpapers in which 343 cooling hours per year below 78F outside air temperature available for WHF use is a reasonable estimate compared to survey responses.

Figure 5-2: Percent of Respondents Running Fan During Each Month



Evaporative Coolers

The Evaluators summarize the findings of the evaporative cooler participant feedback regarding whether the unit replaced existing refrigerated air systems or if it supplanted what would have otherwise been the purchase of a refrigerated air system.

The Evaluators employed the following New Mexico TRM section to calculate verified savings for the measure: New Mexico Technical Reference Manual, July 2021, Section 4.7 Evaporative Coolers[20].

The Evaluators reviewed the New Mexico TRM and confirmed that savings values are applicable to the Idaho Power service territory, due to similarity of cooling degree days between Boise, ID and Santa Fe,

[20] https://www.nm-prc.org/wp-content/uploads/2021/07/New-Mexico-TRM-2021-Final-03-09-2021.pdf

NM. The New Mexico TRM indicates that a NTG ratio indicating the proportion of projects which had installed the evaporative cooler to replace refrigerated air must be applied to this deemed savings value.

Two of the 9 customers who had rebated an evaporative cooler during PY2020 had responded to the survey. One of the respondents (50%) had indicated that the evaporative cooler was replacing refrigerated air (an A/C unit). This would indicate that a NTG ratio for this measure would be 50%. However, due to low response rate, the Evaluators chose to conduct a literature review and selected the NTG ratio of 44.4% calculated for Public Service Company of New Mexico (PNM) provided in the PNM 2015 impact evaluation in which a comprehensive survey effort was performed to estimate NTG for evaporative coolers. This survey effort yielded 90% confidence and ±8.3% sample precision for the evaporative cooler channel in PNM's Stay Cool Program. The Evaluators selected this NTG because the results are similar to IPC survey responses, the value summarizes a large study that met 90/10 precision for the PNM impact evaluation, and the 44.40% value represents the same service area in which the impact savings values are sourced from.

Conclusions and Recommendations

The Evaluators summarize the conclusions and recommendations for the measures researched above:

- **Conclusion:** The Evaluators reviewed the Integrated Design Lab literature review workpaper and confirmed that savings values are applicable to the ECM projects completed Idaho Power service territory.
    - **Recommendation:** The Evaluators recommend continuing to utilize the savings calculations derived from the Integrated Design Lab literature review workpaper for the evaporative cooler projects completed in the Idaho Power service territory.
- **Conclusion:** Participants indicated that they use their whole house fan most June-September; about half (47.3%) of participants use their fan for four or more hours per day during summer months. The Evaluators used these results to estimate annual hours of operation for whole house fans in the program of between 244 and 731 hours, which is consistent with the IDL workpaper estimate of 343 hours.
    - **Recommendation:** The Evaluators recommend continuing to use the IDL workpaper estimates, as they continue to portray results similar to survey responses.
- **Conclusion:** The Evaluators found that of the two respondents (50%) of customers who had rebated an evaporative cooler had indicated that the evaporative cooler was replacing refrigerated air (an A/C unit).
    - **Recommendation:** Due to low response rate for the measure, the Evaluators recommend utilizing the NTG ratio of 44.4% calculated for Public Service Company of New Mexico (PNM) provided in the PNM 2015 impact evaluation as an adjustment factor to the energy savings claimed through the PNM TRM for evaporative coolers.

5.1.1.4 Smart Thermostats

This section summarizes the Evaluator's findings for the additional research objectives for the smart thermostat measure.

Participant Survey Findings

The Evaluators provide detailed findings for the smart thermostat measure in Section 4.3.2.1. The Evaluators summarize the findings in this section.

Twenty-six percent of thermostats installed on heat pumps are self-installed and those customers are using the default manufacturer heat pump settings. There is a clear difference in the rates of self-installation of thermostats for heat pumps and non-heat pump equipment, with heat pump installations predominantly performed by contractors (74.1% of thermostats installed on a heat pump were installed by a contractor vs. 27.0% installed on other heating and cooling equipment).

Customers that are self-installing thermostats on heat pumps appear to be using the manufacturer default heat pump settings. Thirty-three respondents had installed the smart thermostats themselves. Of those, 17 (51.5%) connected it to a c-wire. One respondent stated that they changed the auxiliary heating settings but said they did not set the compressor lockout or auxiliary heating threshold temperatures.

Through the questions provided in the survey, the customers who had self-installed the smart thermostat with a heat pump indicate little knowledge about the proper installation practices and had not adjusted auxiliary heat settings or compressor lockout settings with respect to the settings from their heat pump. Instead, the majority of self-install customers with heat pump systems had installed the smart thermostat to the default settings provided by the manufacturer.

In contrast, the contractor-installed smart thermostats are installed to meet the proper auxiliary and compressor lockout settings with respect to the household's heat pump equipment settings. This research indicates that the self-installed smart thermostats may not be meeting the full potential of energy savings due to the oversight of these additional energy-saving settings. This finding is further supported by the billing analysis provided below.

In addition, the responses gathered for the smart thermostat measure indicate that About half of the 64 participants who installed a smart thermostat through the program were replacing a programmable thermostat (56.3%) and that the majority of participants with smart thermostats indicated that their thermostat was connected to the internet (85.9%). The majority (65.6%) of participants with smart thermostats have their thermostats change to away mode when they are not home. The most common reason for not switching to away mode is someone is normally home or wanting to keep the house at a comfortable temperature.

This finding indicates that customers with smart thermostats find value in keeping their homes at a comfortable temperature. Additionally, customers use energy-saving features available to them to save energy when they are not home.

Billing Analysis

The results of the billing analysis for the smart thermostat measure is provided in this section. The methodology for the billing analysis is provided in Section 2.2.5.5. Table 5-9 displays customer counts for customers considered for billing analysis (i.e. customer with single-measure installations) and identifies measures that met the requirements for a billing analysis. Additional detail for this billing analysis is provided in Appendix A: Billing Analysis Results.

Table 5-9: Measures Considered for Billing Analysis, Smart Thermostats

Measure	Measure Considered for Billing Analysis	Number of Customers w/ Isolated-Measure Installations	Sufficient Participation for Billing Analysis
Smart Thermostats – Aggregate	✓	411	✓
Smart Thermostats – Self-Installed	✓	230	✓
Smart Thermostats – Contractor-Installed	✓	181	✓

The Evaluators attempted to estimate measure-level energy savings by installation type for smart thermostat installs through billing analysis regression with a counterfactual group selected via propensity score matching. The Evaluators attempted to isolate each unique measure. In doing so, the Evaluators also isolate the measure effects using the customer's consumption billing data.

A billing analysis was completed for measures that had at least 30 customers with single-measure installations. This restriction was met by each the self-installed thermostats and contractor-installed thermostats. Therefore, the Evaluators continued with regression analysis for each measure group. This ensured that measures would have a sufficient sample size after applying PSM data restrictions (e.g. sufficient pre- and post-period data). The billing analysis included participants in PY2018, PY2019, and PY2020 in order to acquire the maximum number of customers possible.

The Evaluators were provided a considerable pool of control customers to draw upon. The Evaluators used nearest neighbor matching with a 5 to 1 matching ratio. Therefore, each treatment customer was matched to 5 similar control customers. The final number of customers in each the treatment and control group are listed in Table 5-10.

The Evaluators performed *t*-tests on pre-period usage by month to determine the success of PSM. The *t*-tests confirmed that PSM performed well for the measure in each Heating Zone. *T*-tests of monthly pre period usage can yield a statistically significant difference 40% of the time for one to two months out of 12. Thus, the Evaluators set a tolerance band allowing two months out of 12 to vary in pre-period usage at the 95% confidence level. All three groups passed this threshold, indicating the groups were well matched on all included covariates.

Table 5-10 provides annual savings per customer. Model 2 (PPR) was selected as the final model for the measure as it provided the highest adjusted R-squared among the regression models. The adjusted R-squared shows the model provided an excellent fit for the data of nearly 0.78 and above. Savings are statistically significant at the 90% level for the aggregate and self-installed groups. However, the Evaluators were unable to estimate statistically significant savings for the self-installed smart thermostats.

Table 5-10: Estimated Savings, Smart Thermostats, by Install Type

Measure	Treatment Customers	Control Customers	Annual kWh Savings per Customer	90% Lower CI	90% Upper CI	Adjusted R-Squared	Model
Smart Thermostats – Aggregate	195	975	229	59	399	0.78	Model 2: PPR
Smart Thermostats – Self-Installed	133	665	29*	-256	468	0.80	Model 2: PPR
Smart Thermostats – Contractor-Installed	62	310	470	124	818	0.78	Model 2: PPR

*Not statistically significant

The self-installed smart thermostats are unable to be quantified with current data, as indicated by the lower and upper 90% confidence interval estimates. These lower and upper 90% confidence interval displays savings range between negative and positive values, indicating that consumption differences between the treatment and control group do not reject the null hypothesis of 0. Therefore, the Evaluators are unable to provide savings estimate for this group of smart thermostats.

Although the self-installed smart thermostats cannot be quantified, the relative differences between the aggregate of smart thermostats and the contractor-installed smart thermostats provides insights on relative impacts between each group.

The billing regression results indicate that the contractor-installed smart thermostats saved 470 kWh per year, while the thermostats regardless of installation type saved 229 kWh per year. Each of these estimates are statistically significant and are derived from models with high fitness to the data. This indicates that contractor-installed thermostats save over double the amount of energy than the aggregate of smart thermostats.

The goal of this additional research objective is to identify if the contractor-installed smart thermostats save additional energy compared to the self-installed smart thermostats. Although self-installed thermostat energy savings are unable to be quantified, the results of the billing analysis for the aggregate and the contractor-installed groups confirm that the smart thermostats display significantly higher savings in the contractor-installed projects.

The RTF provides UES values for smart thermostats of between 434 kWh to 1143 kWh per unit, depending on heating zone. The results of the billing analysis for contractor-installs provide magnitudes similar to the RTF-provided savings for this measure. The Evaluators recommend continuing to use RTF UES values for this measure revisiting billing analysis to quantify differences between installation type once increased participation in a program year is achieved for self-installed projects.

Conclusions and Recommendations

The Evaluators summarize the conclusions and recommendations for the smart thermostat measure research efforts:

- **Conclusion:** The customers who had self-installed the smart thermostat with a heat pump indicate little knowledge about the proper installation practices and had not adjusted auxiliary heat settings or compressor lockout settings with respect to the settings from their heat pump. Instead, the majority of self-install customers with heat pump systems had installed the smart thermostat to the default settings provided by the manufacturer. In contrast, the contractor-installed smart thermostats are installed to meet the proper auxiliary and compressor lockout settings with respect to the household's heat pump equipment settings. This research indicates that the self-installed smart thermostats may not be meeting the full potential of energy savings due to the oversight of these additional energy-saving settings.

    - **Recommendation:** The Evaluators recommend that IPC provide instructional education or requirements for self-installed smart thermostats rebated through the program. The Evaluators recommend IPC explore options for changing incentive levels for self-installed vs. contractor-installed smart thermostats to further incentivize customers to have their equipment properly installed to their heating equipment.

- **Conclusion:** Customers with smart thermostats find value in keeping their homes at a comfortable temperature. Additionally, customers use energy-saving features available to them to save energy when they are not home.
- **Conclusion:** The Evaluators found that the contractor-installed smart thermostats saved more energy than the self-installed smart thermostats. The Evaluators were unable to estimate savings for the self-installed smart thermostats, however, the contractor-installed smart thermostats saved 470 kWh per year while the aggregate of contractor-installed and self-installed smart thermostats saved 229 kWh per year.
    - **Recommendation**: The Evaluators recommend continuing to use the RTF-approved Connected Thermostat workbook to evaluate savings for this measure. The Evaluators also recommend revisiting billing analysis when additional self-installed thermostat projects are completed and available to use in further analyses.

6. Appendix A: Billing Analysis Results

This appendix provides additional details on the billing analyses conducted for each program.

6.1 ASHP Upgrade with PTCS Billing Analysis

The results of the billing analysis for the air source heat pump upgrade measure is provided in this section. The methodology for the billing analysis is provided in Section 2.2.5.5. Table 6-1 displays customer counts for customers considered for billing analysis (i.e. customer with single-measure installations) and identifies measures that met the requirements for a billing analysis.

Table 6-1: Measures Considered for Billing Analysis, ASHP Upgrades with PTCS

Measure	Measure Considered for Billing Analysis	Number of Customers w/ Isolated-Measure Installations	Sufficient Participation for Billing Analysis
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF with PTCS standards	✓	72	✓

The Evaluators attempted to estimate measure-level energy savings through billing analysis regression with a counterfactual group selected via propensity score matching. The Evaluators attempted to isolate each unique measure. In doing so, the Evaluators also isolate the measure effects using the customer's consumption billing data.

A billing analysis was completed for measures that had at least 30 customers with single-measure installations. This restriction was not met by the air source heat pump conversions in Heating Zone 3. Therefore, the Evaluators continued with regression analysis for Heating Zones 1 and 2. This ensured that measures would have a sufficient sample size after applying PSM data restrictions (e.g. sufficient pre- and post-period data). The billing analysis included participants in PY2018, PY2019, and PY2020 in order to acquire the maximum number of customers possible.

The Evaluators were provided a considerable pool of control customers to draw upon, as shown in Table 6-2. The Evaluators used nearest neighbor matching with a 3 to 1 matching ratio. Therefore, each treatment customer was matched to 3 similar control customers. Also shown in Table 6-2, are the impact of various restrictions on the number of treatment and control customers that were included in the final regression model. The "Starting Count" displays the beginning number of customers available prior to applying the data restrictions, while the "Ending Count" displays the number of customers after applying data restrictions and final matching.

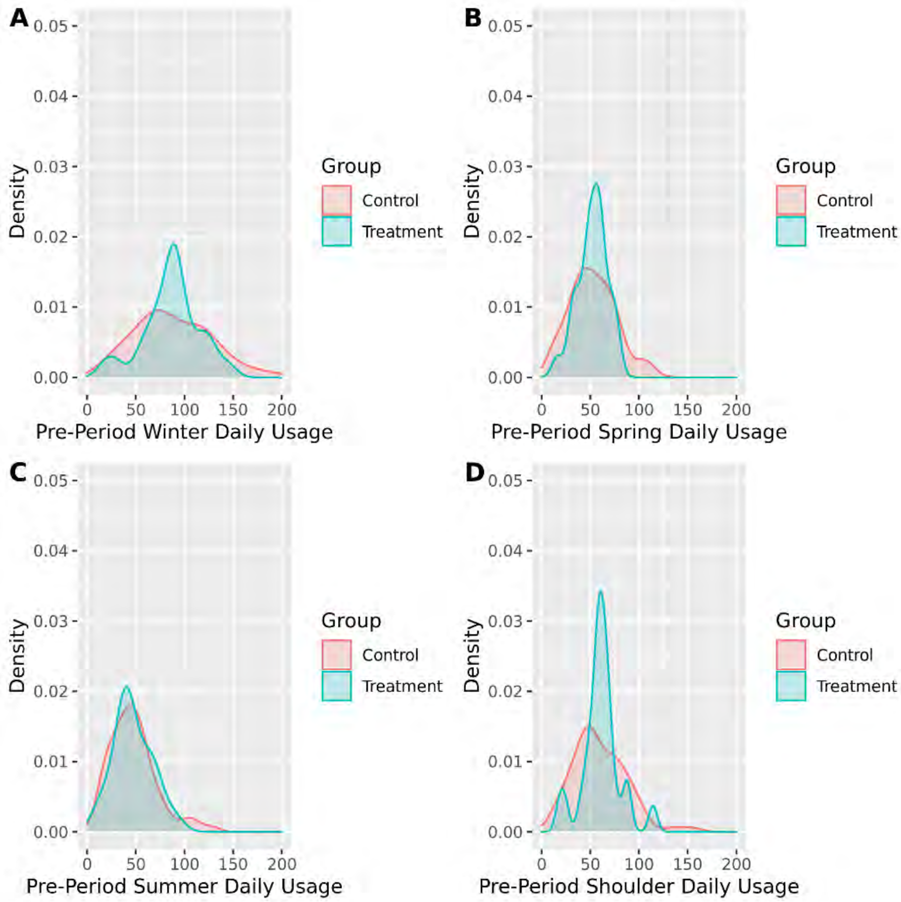
Table 6-2: Cohort Restrictions, ASHP Upgrades with PTCS

Measure	Data Restriction	Treatment Customers	Control Customers
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF with PTCS standards	Starting Count	72	7,003
	Install Date Range: 2018-11-01 to 2021-12-31	65	7,003
	Remove bills with insufficient data (< 10 days duration and 0 kWh usage)	62	6,960
	Incomplete Pre-Period and Post-Period Bills (<6 months each)	45	6,872
	Subset nonparticipants to heat pump heating type	45	1,652
	Ending Count (Matched by PSM)	24	72

The number of participants available for analysis drops significantly after removing customers without 6 months of pre-period data and 6 months of post-period data, in addition to removing customers who had not displayed pre-period billing data in each of the 4 pre-period seasons: spring, summer, fall, and winter, which were used in propensity score matching. However, the Evaluators ensured the 24 final treatment group sample was representative of the original 65 participants for the measure based on Heating Zone distribution, HSPF values, and SEER values for the equipment installed.

Figure 6-1 displays the density of each variable employed in propensity score matching for the air source heat pump upgrade measure after conducting matching.

Figure 6-1: Covariate Balance After Matching, Air Source Heat Pump Upgrades with PTCS



The distributions after matching closely overlap between the treatment and control groups in the summer, however, the remaining seasons display more sparse matches for median household usage. Nonetheless, the t-tests provide display sufficient matches for the measure, indicating valid matches for the selected treatment and control groups.

The Evaluators performed *t*-tests on pre-period usage by month to determine the success of PSM. The *t*-tests confirmed that PSM performed well for the measure in each Heating Zone. *T*-tests of monthly pre period usage can yield a statistically significant difference 40% of the time for one to two months out of 12. Thus, the Evaluators set a tolerance band allowing two months out of 12 to vary in pre-period usage at the 95% confidence level. The groups for this measure passed this threshold, indicating the groups were well matched on all included covariates.

Table 6-3 provides results for the *t*-test on pre-period usage between the treatment and control groups after matching for the air source heat pump upgrades. The Evaluators placed a threshold of two rejects for each measure as there is a 40% likelihood that one or two months may show statistical variance due to chance. The air source heat pump upgrades displayed no months in which the null hypothesis is rejected. In addition, the monthly matches display strong matches, with the majority of months p-values surpassing 0.7, indicating small differences between the treatment and control group.

Table 6-3: Pre-period Usage T-test for Air Source Heat Pump Upgrades with PTCS

Month	Average Daily Usage (kWh), Control	Average Daily Usage (kWh), Treatment	P-Value	Reject Null?
Jan	86.34	85.61	0.92	No
Feb	88.22	84.55	0.64	No
Mar	69.33	66.85	0.68	No
Apr	48.49	48.60	0.98	No
May	39.98	41.49	0.68	No
Jun	42.49	43.22	0.87	No
Jul	49.89	48.78	0.85	No
Aug	50.53	51.82	0.84	No
Sep	44.71	46.52	0.69	No
Oct	59.58	57.48	0.73	No
Nov	75.29	70.35	0.46	No
Dec	85.49	89.46	0.52	No

Table 6-4 provides customer counts for customers in the final regression model by assigned Heating Zone for the measure. In addition, weighted TMY HDD and CDD from the nearest available TMY weather station is provided. The HDD and CDD was weighted by the number of treatment customers assigned to a weather station.

Table 6-4: TMY Weather, Air Source Heat Pump Upgrades with PTCS

Measure	Treatment Customers	Weighted HDD	Weighted CDD
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF with PTCS standards	72	6,335	994

Table 6-5 provides annual savings per customer for the air source heat pump upgrades with PTCS commissioning. Model 1 (D-n-D) was selected as the final model for the measure as it provided the highest adjusted R-squared among the regression models. Savings are statistically significant at the 90% level. The adjusted R-squared shows the model provided an excellent fit for the data (0.79).

Table 6-5: Estimated Savings, Air Source Heat Pump Upgrades with PTCS

Measure	Treatment Customers	Control Customers	Annual kWh Savings per Customer	90% Lower CI	90% Upper CI	Adjusted R-Squared	Model
Air-Source Heat Pump to Air-Source Heat Pump: 8.5 HSPF with PTCS standards	24	72	1,263	198	2,328	0.79	Model 1: D-n-D

The goal of this additional research objective is to attempt to quantify incremental savings for PTCS commissioning efforts achieved by IPC and the Heating & Cooling Efficiency Program.

These results indicate that savings for air source heat pump upgrade measure with PTCS standards in the program achieve 1,263 kWh savings per year. The Evaluators are unable to separate the estimated savings between the air source heat pump upgrade savings from the equipment component and the air source heat pump upgrade savings from the PTCS commissioning component. However, the results of the billing analysis indicate that observed savings from this measure for participants in the Heating & Cooling Efficiency Program are significantly higher than currently estimated by the RTF.

6.2 ASHP Conversion HZ2/HZ3 Billing Analysis

The results of the billing analysis for the air source heat pump conversion measure is provided in this section. The methodology for the billing analysis is provided in Section 2.2.5.5. Table 6-6 displays customer counts for customers considered for billing analysis (i.e. customer with single-measure installations) and identifies measures that met the requirements for a billing analysis.

Table 6-6: Measures Considered for Billing Analysis, Air Source Heat Pump Conversions

Measure	Heating Zone	Measure Considered for Billing Analysis	Number of Customers w/ Isolated-Measure Installations	Sufficient Participation for Billing Analysis
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	1	✓	65	✓
	2	✓	34	✓
	3		10	
	2/3	✓	44	✓

The Evaluators attempted to estimate measure-level energy savings by Heating Zone through billing analysis regression with a counterfactual group selected via propensity score matching. The Evaluators attempted to isolate each unique measure. In doing so, the Evaluators also isolate the measure effects using the customer's consumption billing data.

A billing analysis was completed for measures that had at least 30 customers with single-measure installations. This restriction was not met by the air source heat pump conversions in Heating Zone 3. However, the Evaluators attempted to estimate a savings value for the aggregate of projects installed in Heating Zones 2 and 3, as sufficient participation exists for this group.

Therefore, the Evaluators continued with regression analysis for Heating Zones 1, 2, and 2/3. This ensured that measures would have a sufficient sample size after applying PSM data restrictions (e.g. sufficient pre- and post-period data). The billing analysis included participants in PY2018, PY2019, and PY2020 in order to acquire the maximum number of customers possible.

The Evaluators were provided a considerable pool of control customers to draw upon, as shown in Table 6-7 through Table 6-9 for each Heating Zone. The Evaluators used nearest neighbor matching with a 3 to 1 matching ratio to match on pre-period spring, summer, winter, and fall usage, as well as exact matching for Heating Zones between groups. Therefore, each treatment customer was matched to 3 similar control customers. Also shown in Table 6-7 through Table 6-9, are the impact of various restrictions on the number of treatment and control customers that were included in the final regression model. The "Starting Count" displays the beginning number of customers available prior to applying the data restrictions, while the "Ending Count" displays the number of customers after applying data restrictions and final matching.

Table 6-7: Cohort Restrictions, Air Source Heat Pump Conversions in HZ1

Measure	Data Restriction	Treatment Customers	Control Customers
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF, HZ1	Starting Count	65	5,325
	Install Date Range: 2018-11-01 to 2021-12-31	65	5,325
	Remove bills with insufficient data (< 10 days duration and 0 kWh usage)	65	5,304
	Incomplete Pre-Period and Post-Period Bills (<6 months each)	47	5,268
	Subset nonparticipants to ER heating type	65	647
	Ending Count (Matched by PSM)	36	105

Table 6-8: Cohort Restrictions, Air Source Heat Pump Conversions in HZ2

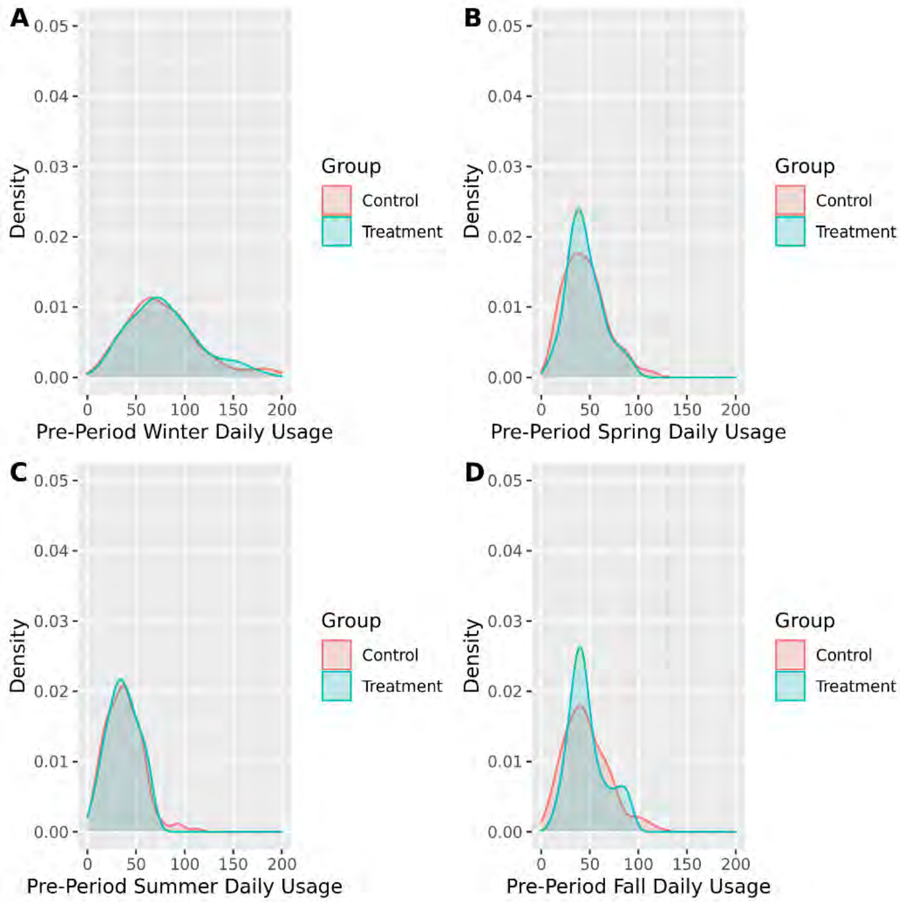
Measure	Data Restriction	Treatment Customers	Control Customers
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF, HZ2	Starting Count	34	1,003
	Install Date Range: 2018-11-01 to 2021-12-31	34	1,003
	Remove bills with insufficient data (< 10 days duration and 0 kWh usage)	34	996
	Incomplete Pre-Period and Post-Period Bills (<6 months each)	22	981
	Subset nonparticipants to ER heating type	34	229
	Ending Count (Matched by PSM)	18	54

Table 6-9: Cohort Restrictions, Air Source Heat Pump Conversions in HZ2/HZ3

Measure	Data Restriction	Treatment Customers	Control Customers
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF, HZ2	Starting Count	44	1,678
	Install Date Range: 2018-11-01 to 2021-12-31	44	1,678
	Remove bills with insufficient data (< 10 days duration and 0 kWh usage)	44	1,678
	Incomplete Pre-Period and Post-Period Bills (<6 months each)	31	1,596
	Subset nonparticipants to ER heating type	31	239
	Ending Count (Matched by PSM)	23	61

Figure 6-2 displays the density of each variable employed in propensity score matching for the air source heat pump conversion measure after conducting matching.

Figure 6-2: Covariate Balance After Matching, Air Source Heat Pump Conversions



The distributions after matching closely overlap between the treatment and control groups in pre-period summer and winter, however, the shoulder season usage in the spring and fall display more sparse matches. Nonetheless, the t-tests provide display sufficient matches for each Heating Zone, indicating valid matches for the selected treatment and control groups.

The Evaluators performed *t*-tests on pre-period usage by month to determine the success of PSM. The *t*-tests confirmed that PSM performed well for the measure in each Heating Zone. *T*-tests of monthly pre period usage can yield a statistically significant difference 40% of the time for one to two months out of 12. Thus, the Evaluators set a tolerance band allowing two months out of 12 to vary in pre-period usage at the 95% confidence level. Both Heating Zone groups passed this threshold, indicating the groups were well matched on all included covariates.

Table 6-10 through Table 6-12 provides results for the *t*-test on pre-period usage between the treatment and control groups after matching for Heating Zones 1 and 2 for the air source heat pump conversions. The Evaluators placed a threshold of two rejects for each measure as there is a 40% likelihood that one or two months may show statistical variance due to chance. The air source heat pump conversions for both Heating Zones displayed no months in which the null hypothesis is rejected.

Table 6-10: Pre-period Usage T-test for Air Source Heat Pump Conversions, HZ1

Month	Average Daily Usage (kWh), Control	Average Daily Usage (kWh), Treatment	P-Value	Reject Null?
Jan	77.13	74.74	0.70	No
Feb	75.97	75.37	0.92	No
Mar	59.20	58.85	0.94	No
Apr	40.22	40.10	0.97	No
May	34.13	34.22	0.97	No
Jun	37.15	37.37	0.93	No
Jul	44.27	44.59	0.92	No
Aug	44.02	42.99	0.75	No
Sep	36.74	35.49	0.67	No
Oct	44.47	44.00	0.91	No
Nov	60.17	66.33	0.30	No
Dec	72.01	75.39	0.51	No

Table 6-11: Pre-period Usage T-test for Air Source Heat Pump Conversions, HZ2

Month	Average Daily Usage (kWh), Control	Average Daily Usage (kWh), Treatment	P-Value	Reject Null?
Jan	87.04	92.60	0.61	No
Feb	85.09	85.97	0.93	No
Mar	69.45	68.59	0.91	No
Apr	44.80	43.18	0.76	No
May	32.34	32.72	0.92	No
Jun	30.53	29.99	0.90	No
Jul	34.53	35.64	0.84	No
Aug	35.24	29.95	0.30	No
Sep	31.83	26.85	0.27	No
Oct	47.24	41.68	0.35	No
Nov	62.77	69.24	0.43	No
Dec	83.67	93.55	0.25	No

Table 6-12: Pre-period Usage T-test for Air Source Heat Pump Conversions, HZ2/HZ3

Month	Average Daily Usage (kWh), Control	Average Daily Usage (kWh), Treatment	P-Value	Reject Null?
Jan	84.04	87.14	0.76	No
Feb	82.40	81.44	0.92	No
Mar	67.65	64.95	0.71	No
Apr	44.12	41.18	0.55	No
May	31.64	31.77	0.97	No
Jun	29.14	28.56	0.87	No
Jul	33.01	33.13	0.98	No
Aug	33.37	28.60	0.27	No
Sep	30.57	26.80	0.31	No
Oct	45.36	40.40	0.34	No
Nov	59.96	64.22	0.57	No
Dec	80.51	85.38	0.53	No

Table 6-13 provides customer counts for customers in the final regression model by assigned Heating Zone for each measure. In addition, weighted TMY HDD and CDD from the nearest available TMY weather station is provided. The HDD and CDD was weighted by the number of treatment customers assigned to a weather station.

Table 6-13: TMY Weather, Air Source Heat Pump Conversions

Measure	HZ	Treatment Customers	Weighted HDD	Weighted CDD
Electric Heating System to Air-Source Heat Pump: 8.5 HSPF	1	65	6,094	1,019
	2	34	6,696	956
	2/3	44	6,935	925

Table 6-14 provides annual savings per customer for each Heating Zone. Model 1 (D-n-D) was selected as the final model for the measure as it provided the highest adjusted R-squared among the regression models. Savings are statistically significant at the 90% level Heating Zones 1, 2, and 2/3. The adjusted R-squared shows the model provided an excellent fit for the data of 0.7 and above.

Table 6-14: Estimated Savings, Air Source Heat Pump Conversions

Heating Zone	Treatment Customers	Control Customers	Annual kWh Savings per Customer	90% Lower CI	90% Upper CI	Adjusted R-Squared	Model
1	36	105	1,513	715	2,312	0.73	Model 1: D-n-D
2	18	54	2,609	1,289	3,929	0.79	Model 1: D-n-D
2/3	23	61	2,029	830	3,228	0.79	Model 1: D-n-D

The Evaluators were unable to complete the regression analysis for Heating Zone 3 due to low participation. However, the Evaluators provide statistically significant savings for Heating Zones 1 and 2. Although Heating Zone 3 energy savings are unable to be quantified, the results of the billing analysis for Heating Zones 1 and 2 confirm that the air source heat pump conversions display significantly higher savings in the colder regions (Heating Zone 2).

Annual energy savings for air source heat pump conversions in Heating Zone 1 totals 1,513 kWh per year while annual energy savings for the measure in Heating Zone 2 totals 2,609 kWh per year. These results indicate that savings for air source heat pump conversion measures in Heating Zone 2 are, on average, 58% higher than energy savings for air source heat pump conversions in Heating Zone 1.

6.3 Smart Thermostat Billing Analysis

The results of the billing analysis for the smart thermostat measure is provided in this section. The methodology for the billing analysis is provided in Section 2.2.5.5. Table 6-15 displays customer counts for customers considered for billing analysis (i.e. customer with single-measure installations) and identifies measures that met the requirements for a billing analysis.

Table 6-15: Measures Considered for Billing Analysis, Smart Thermostats

Measure	Measure Considered for Billing Analysis	Number of Customers w/ Isolated-Measure Installations	Sufficient Participation for Billing Analysis
Smart Thermostats – Aggregate	✓	411	✓
Smart Thermostats – Self-Installed	✓	230	✓
Smart Thermostats – Contractor-Installed	✓	181	✓

The Evaluators attempted to estimate measure-level energy savings by installation type for smart thermostat installs through billing analysis regression with a counterfactual group selected via propensity score matching. The Evaluators attempted to isolate each unique measure. In doing so, the Evaluators also isolate the measure effects using the customer's consumption billing data.

A billing analysis was completed for measures that had at least 30 customers with single-measure installations. This restriction was met by each the self-installed thermostats and contractor-installed thermostats. Therefore, the Evaluators continued with regression analysis for each measure group. This ensured that measures would have a sufficient sample size after applying PSM data restrictions (e.g.

sufficient pre- and post-period data). The billing analysis included participants in PY2018, PY2019, and PY2020 in order to acquire the maximum number of customers possible.

The Evaluators were provided a considerable pool of control customers to draw upon, as shown in Table 6-16 through Table 6-18 for each installation type. The Evaluators used nearest neighbor matching with a 5 to 1 matching ratio. Therefore, each treatment customer was matched to 5 similar control customers. Also shown in the tables below are the impact of various restrictions on the number of treatment and control customers that were included in the final regression model. The "Starting Count" displays the beginning number of customers available prior to applying the data restrictions, while the "Ending Count" displays the number of customers after applying data restrictions and final matching.

Table 6-16: Cohort Restrictions, Smart Thermostats, Aggregated

Measure	Data Restriction	Treatment Customers	Control Customers
Smart Thermostats – Aggregate	Starting Count	411	7,003
	Install Date Range: 2018-11-01 to 2021-12-31	401	7,003
	Remove bills with insufficient data (< 10 days duration and 0 kWh usage)	395	6,958
	Incomplete Pre-Period and Post-Period Bills (<6 months each)	309	6,867
	Ending Count (Matched by PSM)	195	975

Table 6-17: Cohort Restrictions, Smart Thermostats, Self-Installed

Measure	Data Restriction	Treatment Customers	Control Customers
Smart Thermostats – Self-Installed	Starting Count	230	7,003
	Install Date Range: 2018-11-01 to 2021-12-31	229	7,003
	Remove bills with insufficient data (< 10 days duration and 0 kWh usage)	228	6,958
	Incomplete Pre-Period and Post-Period Bills (<6 months each)	196	6,867
	Ending Count (Matched by PSM)	133	665

Table 6-18: Cohort Restrictions, Smart Thermostats, Contractor-Installed

Measure	Data Restriction	Treatment Customers	Control Customers
Smart Thermostats – Contractor-Installed	Starting Count	181	7,003
	Install Date Range: 2018-11-01 to 2021-12-31	172	7,003
	Remove bills with insufficient data (< 10 days duration and 0 kWh usage)	167	6,958
	Incomplete Pre-Period and Post-Period Bills (<6 months each)	113	6,867
	Ending Count (Matched by PSM)	62	310

The number of participants available for analysis drops significantly after removing customers without 6 months of pre-period data and 6 months of post-period data, in addition to removing customers who had not displayed pre-period billing data in each of the 4 pre-period seasons: spring, summer, fall, and winter, which were used in propensity score matching. However, the Evaluators ensured the final treatment group sample was representative of the original group of participants for the measure.

Figure 6-3 through Figure 6-5 displays the density of each variable employed in propensity score matching for the smart thermostat measure after conducting matching, for each installation type.

Figure 6-3: Covariate Balance After Matching, Smart Thermostats, Aggregate

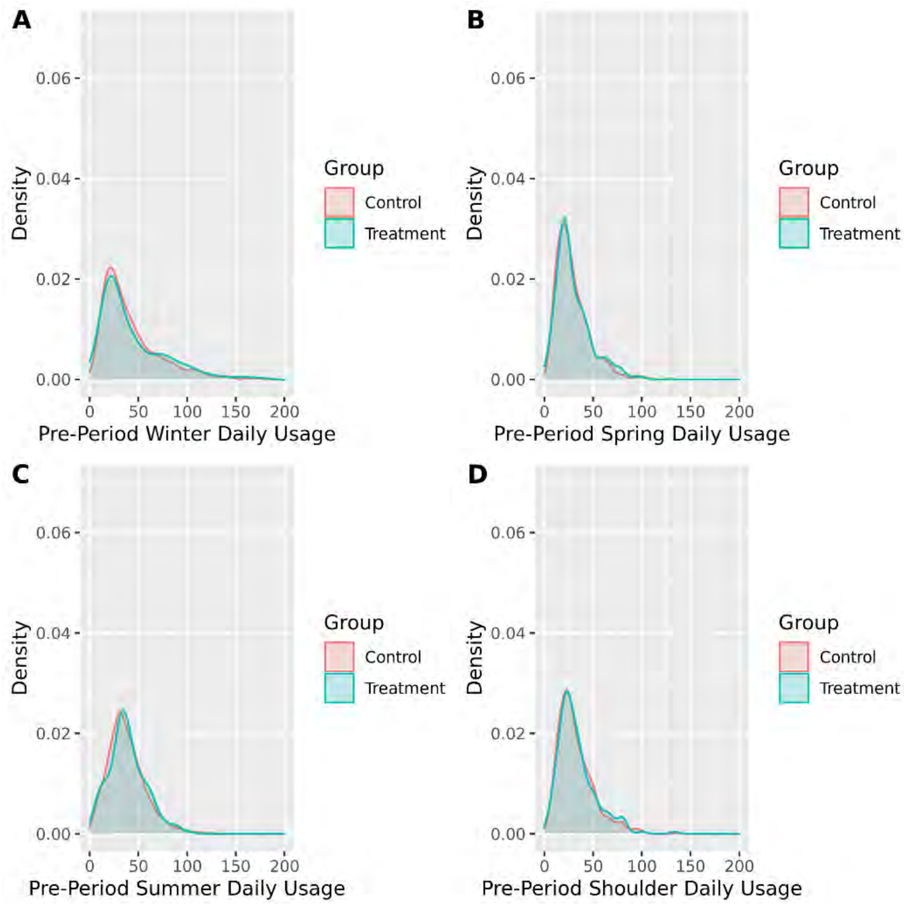


Figure 6-4: Covariate Balance After Matching, Smart Thermostats, Self-Installed

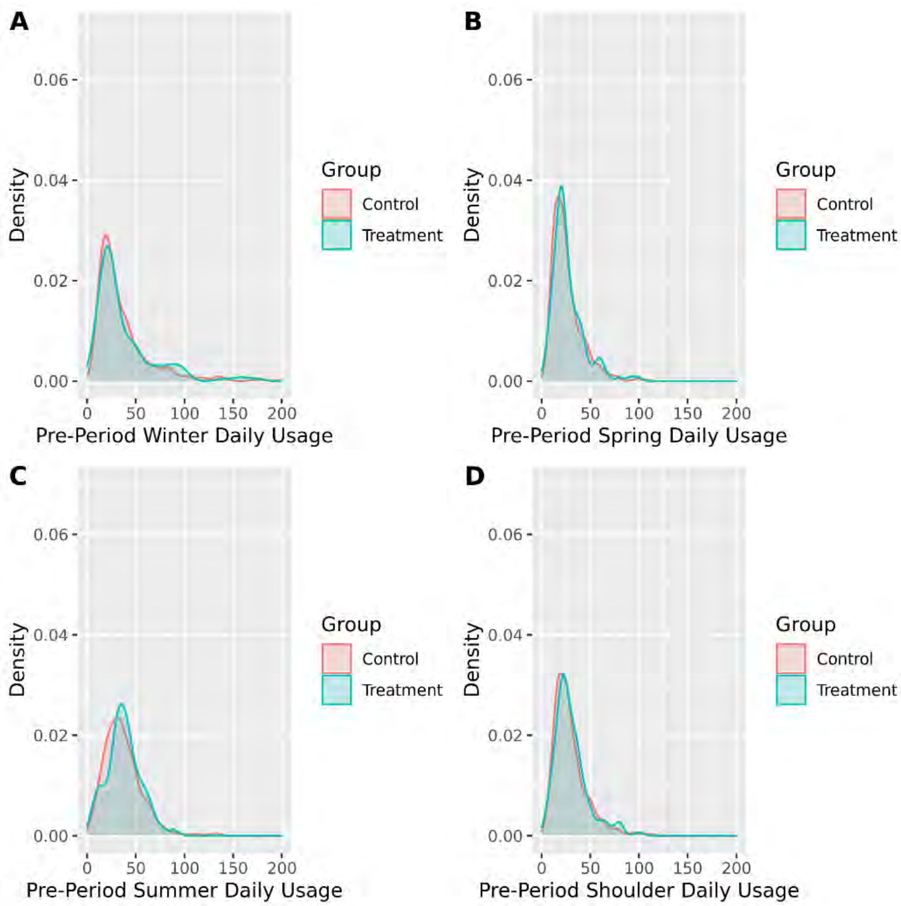
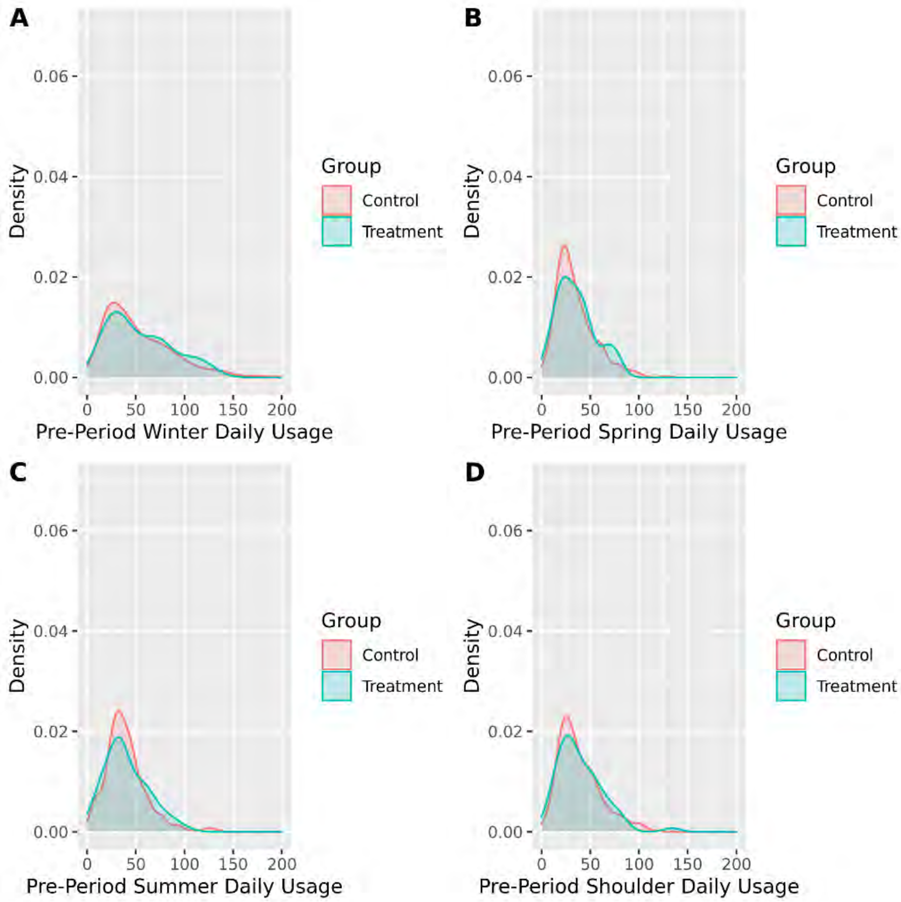


Figure 6-5: Covariate Balance After Matching, Smart Thermostats, Contractor-Installed



The distributions after matching closely overlap between the treatment and control groups in pre-period for all seasons. The contractor-installed matched control group displays slightly higher densities in the median daily usage for each season. Nonetheless, the t-tests provide display sufficient matches for each installation type, indicating valid matches for the selected treatment and control groups.

The Evaluators performed *t*-tests on pre-period usage by month to determine the success of PSM. The *t*-tests confirmed that PSM performed well for the measure in each Heating Zone. *T*-tests of monthly pre period usage can yield a statistically significant difference 40% of the time for one to two months out of 12. Thus, the Evaluators set a tolerance band allowing two months out of 12 to vary in pre-period usage at the 95% confidence level. All three groups passed this threshold, indicating the groups were well matched on all included covariates.

Table 6-19 through Table 6-21 provides results for the *t*-test on pre-period usage between the treatment and control groups after matching for each installation type for the smart thermostat measure. The Evaluators placed a threshold of two rejects for each measure as there is a 40% likelihood that one or two months may show statistical variance due to chance. The smart thermostat measure for all installation types displayed no months in which the null hypothesis is rejected.

Table 6-19: Pre-period Usage T-test for Smart Thermostats, Aggregate

Month	Average Daily Usage (kWh), Control	Average Daily Usage (kWh), Treatment	P-Value	Reject Null?
Jan	40.97	42.37	0.57	No
Feb	39.18	41.28	0.40	No
Mar	33.07	35.00	0.33	No
Apr	26.81	27.39	0.65	No
May	26.65	26.57	0.94	No
Jun	32.28	33.41	0.39	No
Jul	40.59	41.93	0.41	No
Aug	40.92	41.35	0.78	No
Sep	31.12	31.50	0.75	No
Oct	29.96	31.74	0.27	No
Nov	35.25	38.52	0.12	No
Dec	42.10	45.99	0.15	No

Table 6-20: Pre-period Usage T-test for Smart Thermostats, Self-Installed

Month	Average Daily Usage (kWh), Control	Average Daily Usage (kWh), Treatment	P-Value	Reject Null?
Jan	35.02	36.68	0.55	No
Feb	34.00	35.68	0.55	No
Mar	28.68	30.96	0.31	No
Apr	24.07	24.99	0.52	No
May	24.93	25.04	0.93	No
Jun	30.87	31.58	0.63	No
Jul	39.54	40.44	0.63	No
Aug	39.73	40.98	0.50	No
Sep	29.69	29.96	0.84	No
Oct	26.73	27.95	0.46	No
Nov	30.55	33.40	0.22	No
Dec	36.09	40.56	0.17	No

Table 6-21: Pre-period Usage T-test for Smart Thermostats, Contractor-Installed

Month	Average Daily Usage (kWh), Control	Average Daily Usage (kWh), Treatment	P-Value	Reject Null?
Jan	51.95	54.30	0.61	No
Feb	50.33	53.09	0.56	No
Mar	41.97	43.59	0.67	No
Apr	32.25	32.55	0.90	No
May	29.96	30.19	0.92	No
Jun	34.59	36.50	0.45	No
Jul	42.14	44.53	0.44	No
Aug	42.35	41.99	0.90	No
Sep	34.66	34.32	0.89	No
Oct	37.17	38.87	0.60	No
Nov	45.12	48.76	0.38	No
Dec	52.51	56.45	0.41	No

Table 6-22 provides customer counts for customers in the final regression model by assigned Heating Zone for each measure. In addition, weighted TMY HDD and CDD from the nearest available TMY weather station is provided. The HDD and CDD was weighted by the number of treatment customers assigned to a weather station. All three treatment groups displayed similar weighted HDD and CDD values.

Table 6-22: TMY Weather, Smart Thermostats, by Install Type

Measure	Treatment Customers	Weighted HDD	Weighted CDD
Smart Thermostats - Aggregate	413	6,366	992
Smart Thermostats – Self-Installed	231	6,389	990
Smart Thermostats – Contractor-Installed	182	6,336	993

Table 6-23 provides annual savings per customer for each Heating Zone. Model 2 (PPR) was selected as the final model for the measure as it provided the highest adjusted R-squared among the regression models. The adjusted R-squared shows the model provided an excellent fit for the data of nearly 0.78 and above. Savings are statistically significant at the 90% level for the aggregate and self-installed groups. However, the Evaluators were unable to estimate statistically significant savings for the self-installed smart thermostats.

Table 6-23: Estimated Savings, Smart Thermostats, by Install Type

Measure	Treatment Customers	Control Customers	Annual kWh Savings per Customer	90% Lower CI	90% Upper CI	Adjusted R-Squared	Model
Smart Thermostats – Aggregate	195	975	229	59	399	0.78	Model 2: PPR
Smart Thermostats – Self-Installed	133	665	29*	-256	468	0.80	Model 2: PPR
Smart Thermostats – Contractor-Installed	62	310	470	124	818	0.78	Model 2: PPR

*Not statistically significant

The self-installed smart thermostats are unable to be quantified with current data, as indicated by the lower and upper 90% confidence interval estimates. These lower and upper 90% confidence interval displays savings range between negative and positive values, indicating that consumption differences between the treatment and control group do not reject the null hypothesis of 0. Therefore, the Evaluators are unable to provide savings estimate for this group of smart thermostats.

Although the self-installed smart thermostats cannot be quantified, the relative differences between the aggregate of smart thermostats and the contractor-installed smart thermostats provides insights on relative impacts between each group.

The billing regression results indicate that the contractor-installed smart thermostats saved 470 kWh per year, while the thermostats regardless of installation type saved 229 kWh per year. Each of these estimates are statistically significant and are derived from models with high fitness to the data. This indicates that contractor-installed thermostats save over double the amount of energy than the aggregate of smart thermostats.

7. Appendix B: Residential Participant Survey

This section provides a copy of the residential survey sent to participants of the Heating & Cooling Efficiency Program in 2020.

Client: Idaho Power

Program(s): Heating and Cooling Efficiency Program

Overview

Programming directions are in Bold 11pt blue font

[PREPOPULATED VARIABLES ARE IN ALL CAPS ENCLOSED IN BRACKETS]

(INTERVIEWER INSTRUCTIONS ARE IN ALL CAPS ENCLOSED IN PARANTHESES)

Recruitment Text

Subject Line

Provide Feedback to Idaho Power

Email Body

Dear [FirstName],

Thank you for participating in Idaho Power's Heating and Cooling Efficiency Program in 2020. Through this program you received a cash incentive for purchasing high efficiency heating and cooling equipment or services.

Idaho Power is committed to providing you with excellent customer service and would love your feedback for program improvement.

You are invited to take a survey administered by ADM Associates, a Service Provider to Idaho Power. The survey takes about 10-15 minutes to complete and your valuable feedback will be held in confidence.

To thank you for your time we are offering a $10 Tango Rewards e-gift card, which can be redeemed online at a variety of retailers or as a charitable donation, to the first [Sample Size Target] customers that complete the survey.

[redacted] [Displays as Take the Survey]

You can also copy and paste the link below into your browser to access the survey.

${l://SurveyURL}

If you have any question regarding the survey, please contact Idaho Power customer service at [redacted]. You may also contact [redacted]

Thank you and we look forward to hearing from you.

Sincerely,

ADM Associates

Service Provider to Idaho Power

Survey Variables

Variable	Definition
INSTALLED_MEASURES	
CONTRACTOR	1 if worked with contractor, else 0
TSTAT_HP	1 if a connected thermostat was rebated and installed on a heat pump, else 0
TSTAT_OTHER	1 if a connected thermostat was rebated and installed on equipment that is not a heat pump, else 0
WH_FAN	1 if a whole house fan was rebated and installed, else 0
EC	1 if an evaporative cooler was rebated and installed, else 0
HP	1 if any heat pump was rebated and installed, else 0
HP_TYPE	If HP = 1, one of the following: ductless heat pump ducted air source heat pump ducted open loop heat pump else: 0
HP_DUCT	1 if ducted, 2 if ductless
ECM	1 if an electronically commutated motor was rebated and installed, else 0
HPWH	1 if a heat pump water heater was rebated and installed, else 0

Introduction and Screening

Welcome! Thank you for taking this survey to tell us about your experience with Idaho Power's Heating & Cooling Efficiency Program. Your feedback is very important to us and will help us improve our program for customers like you. This survey should take 10-15 minutes. Your responses are confidential and will be used for research purposes only. As a thank you for taking the survey, we will provide you a $10 Tango Rewards e-gift card, which can be redeemed online at a variety of retailers.

1. Our records indicate you participated in Idaho Power's Heating & Cooling Efficiency Program by receiving a cash incentive for the following equipment or service through the program:

[LIST INSTALLED MEASURES]

2. Does that sound about right?

[FORCE RESPONSE]

1. Yes
2. No **[DISPLAY Q3 THEN TERMINATE WITH THIS MESSAGE: Thank you for that information. We are interested in hearing from customers who received an incentive for energy saving heating and cooling equipment. Have a good day.]**
98. Not sure **[TERMINATE WITH THIS MESSAGE: Thank you for that information. We are interested in hearing from customers who received an incentive for energy saving heating and cooling equipment. Have a good day.]**

3. What is incorrect about our records?

Program Awareness and Motivations

4. Why did you decide to participate in the Heating & Cooling Efficiency program by installing energy efficient equipment? Please select all that apply.

[FORCE RESPONSE]

1. To lower energy and save money on your utility bill
2. To improve comfort
3. **[DISPLAY IF HPWH =0]** To improve indoor air quality
4. To replace old, outdated home equipment
5. To replace broken home equipment
6. To help the environment
7. It was recommended to me
8. Because an Idaho Power incentive was available
9. For some other reason (Please describe)
98. Not sure

[DISPLAY IF MORE THAN ONE SELECTED IN Q4]

5. Of the following reasons for participating in the program that you mentioned, which was the most influential in your decision to participate? Please select one.

[SHOW SELECTION FROM Q4]

Smart Thermostats

[DISPLAY SECTION IF TSTAT_HP or TSTAT_OTHER =1]

The next few questions are about the smart thermostat that you got an incentive for.

6. Is the thermostat still installed and working?

   1. Yes
   2. No

7. [DISPLAY IF Q6 = 2] Can you tell us what happened to the thermostat?

[SKIP TO END OF BLOCK IF Q6=2]

8. Is the thermostat connected to the internet?

   1. Yes
   2. No

9. What type of thermostat(s) did the smart thermostat replace?

   1. A programmable thermostat that allowed you to schedule the temperature settings for different times of the day
   2. A non-programmable thermostat that let you set only the current home temperature desired
   3. An existing smart thermostat
   4. It was a newly constructed home and didn't replace a thermostat
   5. It was a new heating installation
   98. Not sure

10. What brand of smart thermostat do you have?

   1. Nest
   2. Ecobee
   3. Honeywell
   4. Lennox I Comfort
   5. Trane
   6. Emerson
   7. Bryant
   8. Carrier
   9. Other (Which brand?)
   98. Don't know

11. Did you install your smart thermostat yourself, or did a contractor install your smart thermostat?

    1. Self-installed
    2. Contractor-installed
    3. Other (Please describe)

12. Do you have your thermostat set to automatically change to "away mode" to use less heating and cooling when you are not home?

    Your thermostat may refer to this feature by another name such as "home away assist," "smart away mode," or "smart away."

    1. Yes
    2. No
    3. I am not aware of an "away mode" setting
    98. Don't know

[Display if Q12 = 2]

13. Why do you have "away mode" (or the similarly named featured on your smart thermostat) disabled? Please select all that apply.

    1. I want my home to keep a comfortable temperature while I am gone
    2. I am worried about privacy
    3. I have pets that need to stay comfortable
    4. I can't figure out how to set it up
    5. I have had problems with "away mode"
    6. "Away mode" requires a smart phone connection and there are other people in my home who do not have phones connected to the thermostat
    7. Someone is normally home
    8. Other (Please describe)

[DISPLAY IF Q12 = 1]

14. What temperature is your "away" setting for heating during the colder months?

[DISPLAY IF Q12 = 1]

15. What temperature is your "away" setting for cooling during the warmer months?

[DISPLAY IF Q12 = 1]

16. How is your thermostat set up to detect if you are home?

    1. Thermostat occupancy sensor
    2. Smart phone location (also known as geofencing)
    3. Both occupancy sensor and smart phone location
    98. I don't know

[Display if Q11 = 1]

17. Did you connect a C-wire to your thermostat when you installed it?

    1. Yes
    2. I used an adapter kit
    3. No
    98. Don't know

Smart Thermostats Heat Pump Settings for Non-Nest Thermostats [Asked if self-installed a thermostat that isn't a Nest on a heat pump]

[DISPLAY SECTION IF TSTAT_HP =1 and Q11 = 1 and Q10 <> 1]

18. The following questions refer to the auxiliary heat on your heat pump system. Auxiliary heat is sometimes called backup, supplemental, or emergency heat. Auxiliary heating assists the heat pump in meeting the thermostat temperature setting when the outdoor temperature drops to a temperature at which the heat pump will not keep up by itself.

19. Have you changed the settings on your thermostat that control the use of auxiliary heat?

    1. I have changed the settings
    2. Another person such as an HVAC technician/contractor has changed the settings
    3. It is set to the manufacturer default settings
    4. I do not know what that setting is
    5. I do not know what the backup temperature lock out setting should be set to

[DISPLAY IF Q19= 1]

20. If you changed your heat pump's backup/supplemental heat temperature lock out setting on your smart thermostat, do you know what your heat pump balance point temperature was?

    1. Yes
    2. No
    3. I did not change the heat pump's backup/supplemental heat temperature lock out setting

[DISPLAY IF Q20 = 1]

21. What is the balance point temperature for your heat pump? In other words, at what outdoor winter temperature will your heat pump not keep up with your thermostat temperature setting and require backup/supplemental heat to turn on?

    1. ___F
    98. Don't recall

[DISPLAY IF Q19= 1 and Q10 = 2] Self installed an Ecobee and changed settings

22. What option have you changed your threshold settings for auxiliary heat to?

    1. Minimum
    2. Basic
    3. Balanced
    4. Super
    5. Maximum
    6. I manually set the auxiliary heat / compressor lockout temperature settings
    7. I did not change the factory default
    98. I do not know

[DISPLAY IF [[Q10 = 3- 9 and Q19 = 1] or [Q22 =6]] Manually set Ecobee or installed other manufacturer thermostat

23. What compressor lockout outdoor temperature setting did you program as the lowest temperature at which the compressor will be allowed to operate?

    1. ____F
    2. Did not change compressor lockout

[DISPLAY IF [[Q10 = 3- 9 and Q19 = 1] or Q22 =6]] and Q23 <>2] Manually set Ecobee or installed other manufacturer thermostat

24. How did you decide what compressor lockout winter temperature setting to program?

[DISPLAY IF [[Q10 = 3- 9 and Q19 = 1] or Q22 =6]] Manually set Ecobee or installed other manufacturer thermostat

25. What winter outdoor temperature setting was used as the threshold at which you will allow backup/supplemental/auxiliary heat to operate? In other words, how cold does it need to get before you allow backup/supplemental/auxiliary heat to turn on?

    1. ____F
    2. Did not change auxiliary heat lockout

[DISPLAY IF [Q10 = 3- 9 and Q19 = 1] or Q22 =6 and Q25 <>2] Manually set Ecobee or installed other manufacturer thermostat

26. How did you decide what outdoor temperature to program for backup/supplemental heat?

Smart Thermostats Heat Pump Settings for Nest Thermostats [Asked if self-installed a Nest thermostat on a heat pump]

[DISPLAY SECTION IF TSTAT_HP =1 and Q11 = 1 and Q10 = 1]

27. Have you changed the heat pump balance setting on your Nest?

    1. I have changed the setting
    2. Another person such as an HVAC technician/contractor has changed the settings
    3. It is set to the manufacturer default setting
    4. I do not know what that setting is

28. What option have you changed your heat pump balance setting to on your Nest?

    1. Max Comfort
    2. Max Savings
    3. Balanced
    4. Off
    5. I did not change the factory default
    98. I do not know

Whole House Fans

[DISPLAY SECTION IF WH_FAN = 1]

29. Is the whole house fan still installed and working?

    1. Yes
    2. No

30. [DISPLAY IF Q29 = 2] Can you tell us what happened to the whole house fan?

[SKIP TO END OF BLOCK IF Q29=2]

31. What months do you typically use your whole house fan? Please select all that apply.
[Select all that apply]
1. January
2. February
3. March
4. April
5. May
6. June
7. July
8. August
9. September
10. October
11. November
12. December

32. On average, during the summer how many hours do you run your whole house fan during a typical 24-hour day?
0. 0
1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10
11. 11
12. 12 or more

33. Do you have air conditioning in your home as well as a whole house fan?
1. Yes
2. No

[DISPLAY IF Q33 = 1]

34. Since getting your whole house fan, how has your air conditioner usage changed?
1. I use the air conditioner more
2. I use the air conditioner the same amount
3. I use the air conditioner less
98. I don't know

[DISPLAY IF Q34 = 3]

35. How much less do you run your air conditioner since installing the whole house fan?

1. I use the air conditioner about the same amount as before
2. About 25% less
3. About 50% less
4. About 75% less
5. I don't use my air conditioner at all

[DISPLAY IF Q33 = 1]

36. Which of the following best describes why you use the whole house fan?

1. I primarily use it to make my home more comfortable
2. I primarily use it so that I can use the air conditioner less

Evaporative Coolers

[DISPLAY SECTION IF EVCOOL = 1]

37. Is the evaporative cooler still installed and working?

1. Yes
2. No

[DISPLAY IF Q37= 2]

38. Can you tell us what happened to the evaporative cooler?

[SKIP TO END OF BLOCK IF Q37=2]

39. Why did you purchase the evaporative cooler?

1. To replace an old evaporative cooler
2. To replace an existing central A/C system
3. To replace an existing window unit A/C system
4. I installed an evaporative cooler instead of installing a central A/C system
5. I installed an evaporative cooler instead of installing a window unit A/C system
6. I installed an evaporative cooler and did not have a prior existing cooling system
7. To supplement the cooling provided by my air conditioner
8. For some other reason (Please explain)
98. I do not know

40. In addition to the evaporative cooler, which of the following do you use to cool your home? Please select all that apply.

1. Central A/C
2. Heat Pump
3. Window unit A/C
4. Portable A/C
5. Ceiling fans
6. Whole house fan
7. Other fans
8. Do not use any of these

[DISPLAY IF Q40=1-8]

41. Would you say that the evaporative cooler is the main way that you cool your house?

1. Yes
2. No

[DISPLAY IF Q41=2]

42. What is the main way you cool your home?

1. Central A/C
2. Heat Pump
3. Window unit A/C
4. Portable A/C
5. Ceiling fans
6. Whole house fan
7. Other fans
8. Other: ________________

[DISPLAY IF Q40=1-4]

43. Which of the following best describes why you use the evaporative cooler? (single select)

1. I primarily use it to make my home more comfortable
2. I primarily use it so that I can use the air conditioner less

Electronically Commutated Motors

[DISPLAY SECTION IF ECM = 1]

44. Is the high efficiency air handler/blower motor in your central heating system, also called an electronically commutated motor. still installed and working? *

1. Yes
2. No

[DISPLAY IF Q44= 2]

45. Can you tell us what happened to the electronically commutated motor?

[SKIP TO END OF BLOCK IF Q44=2]

46. Which months of the year, if any, do you have your thermostat set to “fan on” or “continuous fan” mode for any part of the day?

    This setting keeps the fan running even when the home isn’t being cooled or heated.

[Select all that apply]

0. I don’t typically use fan on/continuous fan at any time of the year [Exclusive]
1. January
2. February
3. March
4. April
5. May
6. June
7. July
8. August
9. September
10. October
11. November
12. December

[DISPLAY IF ANY IN Q46= 1 -12 ARE SELECTED]

47. For the months you have your thermostat set to “fan on” or “continuous fan”, how many hours a day, on average, is the fan on?

    Please enter a number ranging from 1 – 24 for each month shown.

[For each display if the month was selected in Q46]

1. January
2. February
3. March
4. April
5. May
6. June
7. July
8. August
9. September
10. October
11. November
12. December

Heat Pumps

[Display if HP=1]

48. Is the [HP_TYPE] still installed and working?

    1. Yes
    2. No

[DISPLAY IF Q49 = 2]

49. Can you tell us what happened to the heat pump?

[SKIP SECTION IF Q48=2]

[Display if HP_DUCT=2 (Ductless heat pump)]

50. How often do you clean the filter of the indoor wall mounted unit(s) of the ductless heat pump?

    1. Monthly
    2. Every other month
    3. Quarterly
    4. Twice per year
    5. Once per year
    6. Less than once a year
    7. Never
    98. Don't know

[Display if HP_DUCT=1 (Ducted heat pump)]

51. How often do you change the heat pump air handler/system filter?

    1. Monthly
    2. Every other month
    3. Quarterly
    4. Twice per year
    5. Once per year
    6. Less than once a year
    7. Never
    98. Don't know

Heat Pump Water Heater Section

DISPLAY IF HPWH=1

52. Is the heat pump water heater still installed and working?

    1. Yes
    2. No

[DISPLAY IF Q52 = 2]

53. Can you tell us what happened to the heat pump water heater?

[SKIP SECTION IF Q52=2]

54. Did the heat pump water heater replace an electric resistance storage tank water heater?

    1. Yes
    2. No
    98. Don't know

Customer Experiences

55. Next, please answer a few questions about your experience with the Heating & Cooling Efficiency program.

56. Did you fill out the program application yourself, or did someone else help you?

    1. I filled it out myself
    2. My contractor helped me
    3. Someone from Idaho Power helped me
    4. Someone else helped me (please specify)
    98. Not sure

[ASK IF AND Q56=1]

57. How easy was it for you to fill out and submit the incentive application and forms to receive your incentive?

    1. Very difficult
    2. Somewhat difficult
    3. Neither easy nor difficult
    4. Somewhat easy
    5. Very easy

[ASK IF Q57 < 3]

58. What was difficult about completing the forms?

[ASK IF CONTRACTOR = 1]

59. How did you select the contractor who you worked with through the Heating & Cooling Efficiency Program?

    1. It was a contractor I've worked with before
    2. Word of mouth or recommendation from someone I know
    3. I found the contractor using Idaho Power's online list
    4. The contractor contacted me
    5. Other (Please describe)

60. Thinking about your experience with the Heating & Cooling Efficiency Program, did you interact or communicate with a representative from Idaho Power at any point?

    1. Yes
    2. No

[ASK IF Q60= 1]

61. What was the purpose of this interaction? (Please select all that apply)

[Multiselect]

    1. To learn about the incentives available
    2. To get information on how to apply for incentives or complete the application
    3. To find out when my incentive would be paid
    4. To find a contractor to work with
    5. For some other reason (Please describe)

62. Have you noticed any changes in your electric bill since participating in the program?

    1. Yes, my electric bill increased
    2. Yes, my electric bill decreased
    3. No, my electric bill stayed the same
    4. Not sure

63. Other than changes in your electricity use, have you noticed any benefits of the energy efficiency equipment you installed through the Heating & Cooling Efficiency Program?

    1. Yes
    2. No

[ASK IF Q63= 1]

64. What benefits have you noticed?

Overall Satisfaction

65. Please rate your satisfaction with each of the following aspects of Idaho Power's Heating & Cooling Efficiency Program using the scale below.

	Very Dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied	Not applicable
a. The amount of the incentive	1	2	3	4	5	97
b. [	1	2	3	4	5	97
c. The time it took to receive your incentive check	1	2	3	4	5	97
f. [IF CONTRACTOR = 1] Your experience with your contractor	1	2	3	4	5	97
g. The energy efficient items /improvements you installed / made through the program	1	2	3	4	5	97
h. [IF Q60=1] Your communications with an Idaho Power representative	1	2	3	4	5	97
j. Your experience with Idaho Power's Heating & Cooling Efficiency Program overall	1	2	3	4	5	97

[LOOP THROUGH Q66 FOR EACH QUESTION WHERE Q65 = 1 or 2]

66. Why did you rate your satisfaction with [TEXT FROM Q65] that way? [OPEN END]

67. Have you recommended Idaho Power's Heating & Cooling Efficiency Program to anyone?

    1. Yes
    2. No

68. From your perspective, what could be done to improve Idaho Power's Heating & Cooling Efficiency Program?

69. How would you rate your satisfaction with Idaho Power as your utility provider?

    1. Very dissatisfied
    2. Somewhat dissatisfied
    3. Neither satisfied nor dissatisfied
    4. Somewhat Satisfied
    5. Very Satisfied

70. How would you say your participation in the program influenced your satisfaction with Idaho Power?

    1. The program decreased my satisfaction with Idaho Power
    2. The program did not influence my satisfaction with Idaho Power
    3. The program increased my satisfaction with Idaho Power

[IF Q70= 1 or 3]

71. How did the program influence your satisfaction with Idaho Power?

Home Characteristics

[Display if HP = 0 and TSTAT_HP = 0]

72. What is the main type of heating equipment used to provide heat to your home?

    1. Central furnace (electric, natural gas, propane, oil)
    2. **[Display if ECM = 0]** Steam or hot water system with floor standing radiators or hydronic baseboards
    3. Central heat pump
    4. **[Display if ECM = 0]** Ductless heat pump, also known as a "mini-split"
    5. **[Display if ECM = 0]** Electric walls units, ceiling cable, baseboards, or electric radiant floors
    6. **[Display if ECM = 0]** Built-in room heater burning natural gas, propane, or oil
    7. **[Display if ECM = 0]** Wood or pellet stove
    8. **[Display if ECM = 0]** Portable electric heaters
    9. **[Display if ECM = 0]** None
    98. Don't know

[Display if Q72 = 1]

73. What is the fuel used by the central furnace?

    1. Electricity
    2. Natural gas
    3. Propane
    4. Fuel oil
    5. Other (Please specify)
    98. I don't know

8. Appendix C: Participating Contractor Interview Guide

This section provides a copy of the interview guide used to interview participating contractors about their experience with the Heating and Cooling Efficiency Program.

Client: Idaho Power
Program(s): Heating & Cooling Efficiency Program
Interview Date:

Recruitment

Initial Recruitment Email (If email is available)

Hi [Contact],

ADM Associates is an independent research firm conducting research on behalf of Idaho Power.

As part of this research, we would like to talk with contractors that participate in their Heating and Cooling Efficiency Program.

We'd like to invite you to participate in an interview to be scheduled sometime the week of [XXX] over phone or video call. The discussion will take about 30-45 minutes, and in appreciation for your time you will receive a $50 Tango Rewards e-gift card, which can be redeemed online at a variety of retailers. Please reply to this email with some times that work for you.

Your feedback is greatly appreciated and will help Idaho Power improve its Heating and Cooling Efficiency Program.

If you have any question regarding this interview request, please contact Idaho Power customer service [redacted]

We look forward to hearing back from you,

[redacted]

ADM Associates

Follow-up or Initial (if email is not available) Recruitment Phone Call

Hi, my name is [NAME]. Is [CONTACT NAME] available? [IF NO: leave a voicemail]

[IF EMAIL SENT] I'm following up on an email I sent the other day about a study we are conducting related to Idaho Power's Heating and Cooling Efficiency Program.

[IF EMAIL NOT SENT] I am contacting you from ADM Associates an independent research firm conducting research on behalf of Idaho Power. We would like to talk with contractors that participate in their Heating and Cooling Efficiency Program.

We are offering a $50 e-gift card to those that complete an interview with us – we expect the interviews to last about 30 to 45 minutes. Your input could help improve Food Service program offerings in your region.

Would you be willing to schedule a time to chat with us?

[IF YES: schedule the call and get an email to schedule. If email is not available, generate the Teams meeting and provide the telephone number.]

[IF NO] Thank you for your time. Is there someone else at your organization that might be available for an interview?

[IF NO: Thank and terminate]

[IF YES: Ask to be connected, explain the study, and repeat the interview ask]

[IF NEEDED at any time] This is not a sales call. I work for a company called ADM Associates. We are an independent research firm that primarily works in the energy efficiency industry. We were hired by Idaho Power to evaluate their Heating and Cooling Efficiency Program. As part of this research, we are reaching out to contractors that have experience working with the program to talk with them about their perspectives on the program and typical installation practices

[IF NEEDED at any time] If you have any question regarding this interview request, please contact Idaho Power customer service at [redacted]

Scheduling Email

Hi [FIRST NAME],

Thank you for scheduling a time to talk about Idaho Power's Heating and Cooling Efficiency Program.

You will be speaking with Nathaniel Albers on **[INSERT INTERVIEW DATE AND TIME].**

The discussion will take place over the phone or your computer using Teams an online phone conferencing tool. You can participate from your computer by clicking the link below or dial in using the instructions below. If you have any questions or concerns, please reply to this email.

If you need to reschedule, please call or email me with other times that would work for you.

Thank you for your time!

[INSERT TEAM LINK]

Best,

[redacted]

ADM Associates

Roles & Responsibilities

Background Information:
Contractor name: ${e://Field/FirstName}
Contractor business: ${e://Field/Business%20Name}
Performance tier: ${e://Field/Tier}

Introduction

Thank you for taking the time to talk with us today. My name is [INTERVIEWER NAME] and I work for ADM Associates. We are speaking today so that I can better understand your role in Idaho Power's Heating & Cooling Efficiency Program. Our discussion will contribute to our understanding and evaluation of that incentive program.

Please be as open as possible. The information you share will help us evaluate the effectiveness of the program.

I would like to record our discussion so that I have something I can refer to when drafting my notes from the interview. Is it all right if I record this discussion? Do you have any questions before we begin?

1. Before we start, I want to make sure I understand your work with Idaho Power in 2021. My program data shows that you completed [INTERVIEWER: REVIEW PROGRAM DATA FOR RESPONDENT] projects that went through the program last year. Does that sound right to you?

- ○ Active (Completed 4 or more program projects)
- ○ Dabbled (Completed 1 to 3 program projects)
- ○ Inactive (Completed zero projects)

How many of those heat pumps have been ducted vs. ductless heat pumps?

- ☐ ________ Ducted
- ☐ ________ Ductless

2. To begin, can you tell me about your role and responsibilities in Idaho Power's Heating & Cooling Efficiency Program?

Role/Responsibilities
How long have you been a part of the program?
How long have you been a contractor?

3. How many other staff from your company are involved in Idaho Power's Heating & Cooling Efficiency Program?

4. Do you or your business install heat pumps in commercial businesses as well? [IF YES] Some of our questions are about heat pump installation practices. For these questions we are just asking about residential installations.

- ○ Yes
- ○ No

Motivation for Participation

5. Why were you interested in being a contractor for Idaho Power's Heating & Cooling Efficiency Program?

6. What benefits, if any, do you receive for participating?

Customer Interactions

Thanks for that information! Now I have a few questions about your interactions with customers when completing program projects.

7. Can you briefly tell me about your discussions with customers about installing program qualified heat pumps? Do you present standard efficiency heat pumps as an option to them, or do you primarily push the program-qualified equipment? At what point, if at all, do you mention the program incentives?

8. What kind of information do you provide residential customers about the heat pumps you install and how to operate them?

Q (late edition).
Finally, we have a question about the installations completed thorough the program.
For the rebated heat pumps installed through the program, do you typically measure the total external static pressure and provide documentation for that value?
How often would you say that heat pumps installed and rebated through the program display external static pressures greater than 0.8" of water?

Heat Pump Efficiency Market Standards

We would like to know about the efficiency levels of the heat pumps that you install in the region that do not receive an incentive from the program.

9. About what percentage of those installations involve the installation of heat pumps with a heating season performance factor (HSPF) under 8.5 such as the federal minimum of 8.2?

10. What percent involve the installation of equipment that has an HSPF rating of 8.5 or higher?

Performance Tested Comfort Standards

Although Idaho Power has a good understanding of heat pump installation practices for installations that receive program incentives, they are interested in understanding what the installation practices are for heat pumps that **do not** receive program incentives.

Our understanding is that some contractors think some of the program requirements are burdensome and we would like to get your honest feedback on your typical installation practices for heat pumps that do not receive a rebate through the program.

We are not interested in auditing your company's installation practices, we are interested in understanding what the common installation practices are for heat pumps installed outside of the program. This information will provide important feedback on the program requirements and how they may differ from non-program installations.

We will keep your responses confidential, and we will not associate your name or your business's name with your responses in any public reporting or reporting provided to Idaho Power.

11. Do you install heat pumps that DO NOT go through the Heating & Cooling Efficiency Program?

- ○ Yes
- ○ No
- ○ Click to write Choice 3

12. What winter temperature balance point do you ultimately use when selecting the heat pump? If greater than 30 degrees F ask, why do you use use that balance point.

13. To begin with, how do you typically size a system for non-program installations? Do you perform a heating and cooling load calculation (Manual J)? If so, what winter outdoor air design temperature do you use in that calculation?

14. What capacity of auxiliary heating would you typically install as a percent of the heating design load? Why do you install that sized auxiliary heating system? Do you install a sequencer to stage the onset of auxiliary heat?

i. What outdoor temperature setting do you use as the highest temperature for use of auxiliary heating? (PTCS/program requirement is 35F)

ii. What compressor lockout outdoor temperature setting do you use as the lowest temperature for use of the compressor? (PTCS/program requirement is 0 - 5 degrees F)

iii. For systems with multiple stages, what is the lowest supply air temperature that you typically see before the next stage is activated? (PTCS/program requirement is 85F). What is the outdoor air temperature lock out setting for auxiliary heat set at?

iv. How do you verify supply air flow? (PTCS/program requirement is 350 CFM/Ton of capacity)

v. How do you verify refrigerant charge? (PTCS/program requires sub-cooling verification).

vi. Do you measure supply/return temperature split (delta T)?

15. Do your non-program rebated installations typically follow the program requirements for duct work installation when you need to install ducting?

1. How do your non-program rebated installations those installations differ from the program requirements?

2. Do you typically test for duct leakage or perform visual inspection of the ducts for non-program installations?

16. Are there any other program requirements that you would typically not follow when doing a non-program installation that we haven't talked about yet?

17. What would you say are the most important reasons why you would not follow the program requirements when installing equipment that does not get an incentive? *Probe for any issues related to the company not having staff with technical expertise/meeting training requirements, material availability issues, homeowner requirements.*

18. How often do you install heat pumps on behalf of Idaho Power customers that meet the program equipment standards, but do not receive an incentive because they do not meet the program installation requirements? *[Probe for an estimated number per year]*

If any installs, what program requirements are the biggest barrier to qualifying for the program

Barriers and Satisfaction

19. What, if anything, do you communicate about with ID Power?

20. How do you typically communicate with ID Power (e.g. Email, phone, in-person)?

21. How often do you communicate with Idaho Power?

22. What, if any, types of training have you received from Idaho Power?

23. Your company is one of Idaho Power's top performers. What do you think has made you successful in completing program projects?

24. What do you see as the biggest barriers to completing more heat pump installations through the program?

25. What, if anything, could the program do the program could do to increase the number of heat pump installations that receive program incentives

26. Are there occasions when an installation of a heat pump meets the program equipment and installation requirements and would qualify for a program incentive, but does not get a program incentive?

How common is that?

Why would these installations not get a program incentive?

Conclusion

27. Have you received any feedback from residents about the performance of the heat pumps you have installed through the program?

28. One goal of the Heating & Cooling Efficiency Program is to help customers save money on their heating and cooling bills. Knowing that, what changes would you make to the program to further maximize benefits to the residents?

What changes would you make to maximize benefits to fellow contractor

29. What, if any, suggestions do you have any other suggestions for improving the program?

30. Is there anything else you'd like to add?

As noted at the beginning of the call, we are providing a $50 electronic gift card as a thank you for providing your feedback about the program.

31. Can you provide me an email address that I can send the gift card too?

- ○ [ ] Yes
- ○ Refused electronic gift card

32. If they will not accept an electronic card please record the physical address here.

Street 1	
Street 2	
City	
Zip	
State	

All gift cards will be sent around the first of February. Please keep an eye on your inbox then and contact us if you do not receive it. Also, look in your junk/spam folder because occasionally these gift cards will get routed to the junk/spam folder.

Thanks again for your help and have a good day.

OTHER REPORTS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2021 Flex Peak Program End-of-Season Annual Report	Commercial/Industrial	Idaho Power	Idaho Power	Other
2021 Irrigation Peak Rewards Program Report	Irrigation	Idaho Power	Idaho Power	Other
Historical DSM Expense and Performance, 2002–2021	Residential, Commercial/Industrial, Irrigation	Idaho Power	Idaho Power	Other
Home Energy Reports Summary	Residential	Harris Utility Consumer Analytics	Harris Utility Consumer Analytics	Other
Idaho Power Commercial Energy-Saving Kit Program Summary Report 2021	Commercial/Industrial	AM Conservation Group	AM Conservation Group	Other
Idaho Power Energywise Program Summary Report 2020-2021	Residential	AM Conservation Group	AM Conservation Group	Other

2021 Flex Peak Program
End-of-Season Annual Report

January 10, 2022

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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 2021 Program season, the Company's seventh year of operating the Program. In its seventh year, the Program had an increase in load reduction and realization rates from the prior year (2020). There was one new site added, and overall participation resulted in the highest hourly load reduction for the season of 30.6 megawatts (MW). The average realization rate for the five load reduction events that occurred in the 2021 Program season was 78%. Enrollment in the Program decreased slightly for the 2021 Program season and 99% of previously participating sites re-enrolled in the Program. The total Program costs through December 31, 2021 were $501,973. The cost of having this resource available was $16.40 per kilowatt (kW) based on the maximum demand reduction of 30.6 MW achieved on June 28, 2021. The maximum capacity for the program in 2021 was 36 MWs as that was the highest nomination during the program season and event results in the past have sometimes showed that reduction can sometimes meet or exceed nominations.

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-

[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).

of-season report detailing the results of the Program. In compliance with the reporting requirements, the annual end-of-season report includes the following:

- Number of participating customers
- Number of participating sites
- MW of demand response under contract
- MW of demand response realized and incented per dispatch
- Percent of nominated MW achieved in each dispatch event by participant
- Cost analysis of the Program
- Number of events called
- Total load dropped for each event
- Event duration
- Total capacity payments made
- Total energy payments made
- Number of customers who failed to meet their load
- Number of Program applications denied due to Program subscription limit
- 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.

[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.

- 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.

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 2021 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 five load reduction events in 2021. This was the first Summer since the Settlement agreement in 2014 that the program has called more than the three minimum events which occurred back in 2012. The first event occurred on June 28, the second on July 16, the third on July 26, the fourth on July 29 and the fifth on August 12. The maximum realization rate achieved during the season was 106% during the event on June 28 and the average for all five events combined was 78%. The realization rate is the percentage of load reduction achieved versus the amount of load reduction committed for an event. The highest hourly load reduction achieved was during the June 28 event at 30.6 MW.

Participants had a committed load reduction of 36 MW in the first week of the Program season. This was a small increase from the 2020 season at 35.8 MW. This weekly commitment, or “nomination”, was comprised of customers participating in the Program totaling 139 sites. All but one of these sites participated in the 2020 season. The committed load reduction at the end of the season was 29.7 MW. The maximum available capacity of the program came from a nominated amount in week one at 36MW. 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 Monday, June 28. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 28.9 MW. The average load reduction was 28.9 MW. The highest hourly load reduction was 30.6 MW during hour two. The realization rate for this event was 100%.

The second event was called on Friday, 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 30.1 MW. The average load reduction was 20.4 MW. The highest hourly load reduction was 22.6 MW during hour two. The realization rate for this event was 68%.

The third event was called on Monday, July 26. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 28.2 MW. The average load reduction was 18.3 MW. The highest hourly load reduction was 20.3 MW during hour two. The realization rate for this event was 65%.

The fourth event was called on Thursday, July 29. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 28.2 MW. The average load reduction was 21 MW. The highest hourly load reduction was 23.1 MW during hour one. The realization rate for this event was 75%.

The fifth event was called on Thursday, August 12. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 29.7 MW. The average load reduction was 24.5 MW. The highest hourly load reduction was 25.8 MW during hour one. The realization rate for this event was 83%.

Enrollment specific to the Oregon service area included six participants totaling nine sites enrolled. These nine sites had an average nominated capacity for the season of 5.6 MW and achieved a maximum reduction during the season of 11.6 MW during hour one on the August 12 event.

Participation

The number of sites enrolled in the Program for 2021 was 139 from 61 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 138 of the 139 sites participating from the prior season re-enrolled. Two sites did not re-enroll from the 2020 season. Both these sites came from the same customer and the demand for their product was overwhelming and they could not continue in the demand response program. There were additionally two mores from another customer that disenrolled midway through the 2021 season due to excessive pressures on their business which kept them from curtailing when events were called.

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 2020 season with the largest quantity of sites falling within both the 0-50 kW and 51-200 kW segments. The Company did not deny any Program applications in 2021.

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).

[5] *In the Matter of the Continuation of Idaho Power Company's A/C Cool Credit, Irrigation Peak Rewards, and FlexPeak Demand Response Programs for 2014 and Beyond*, Case No. IPC-E-13-14, Order No. 32923.

[6] *In the Matter of Idaho Power Company, Staff Evaluation of the Demand Response Programs*, UM 1653, Order No. 13-482.

Figure 1.

Figure 2 represents the enrolled capacity (total nominations) that were enrolled in 2021 and the distribution by Idaho Power's regional service areas.

Figure 2.

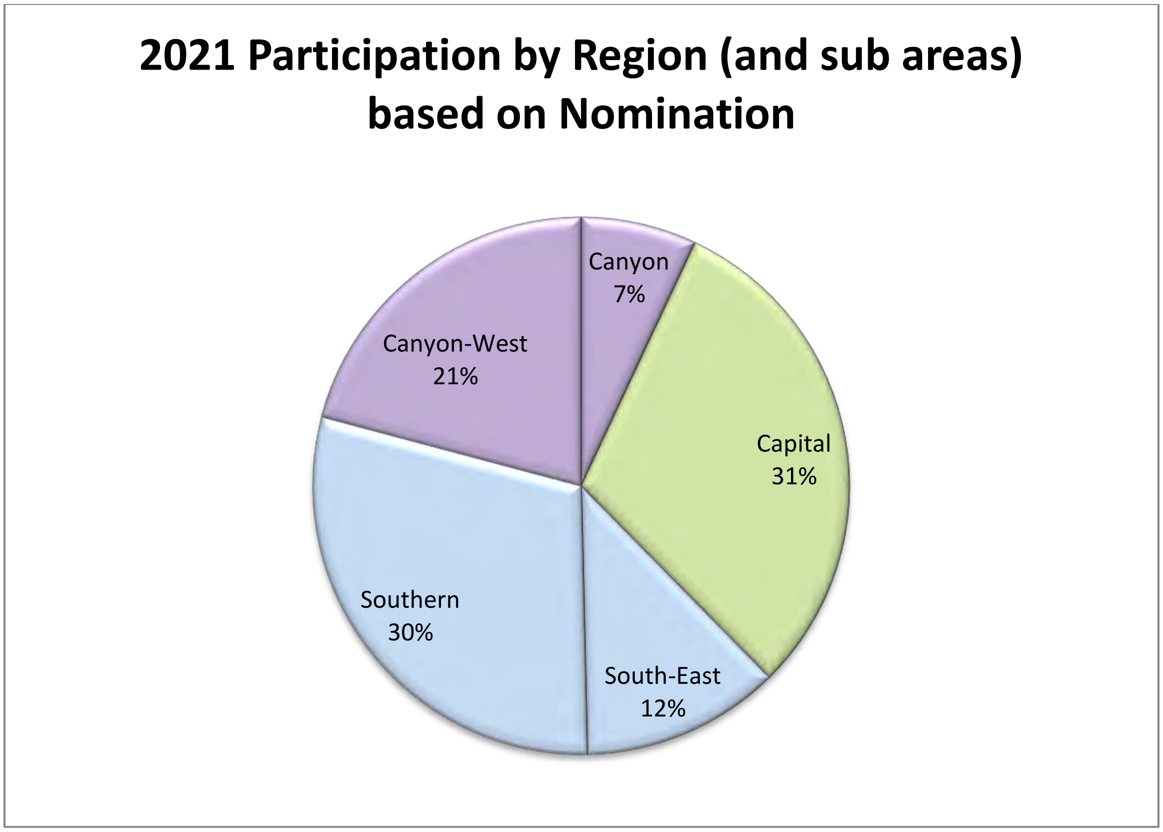
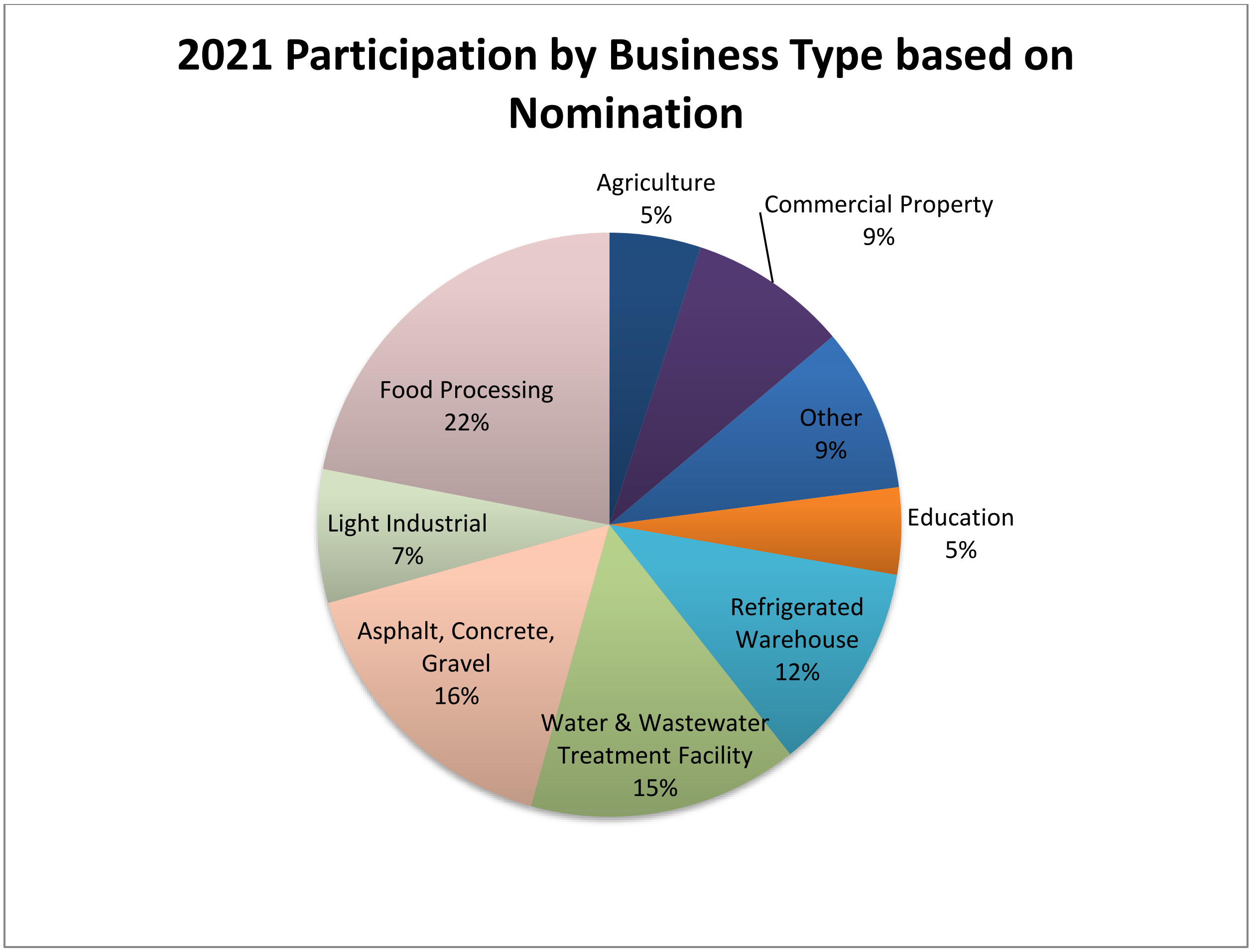


Figure 3 represents the enrolled capacity in 2021 and the diversity based on business type.

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 2021 was conducted by a third party- Tetra Tech. The goal of the review was to calculate the load reduction in MW for the Program. The analysis also verified load reduction per site and per event as well as realization rate.

The baseline methodology used in 2021 is the same methodology utilized in prior seasons. The baseline that 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 and 51-200 kW range, accounting for approximately 75% of the sites.

Figure 4.

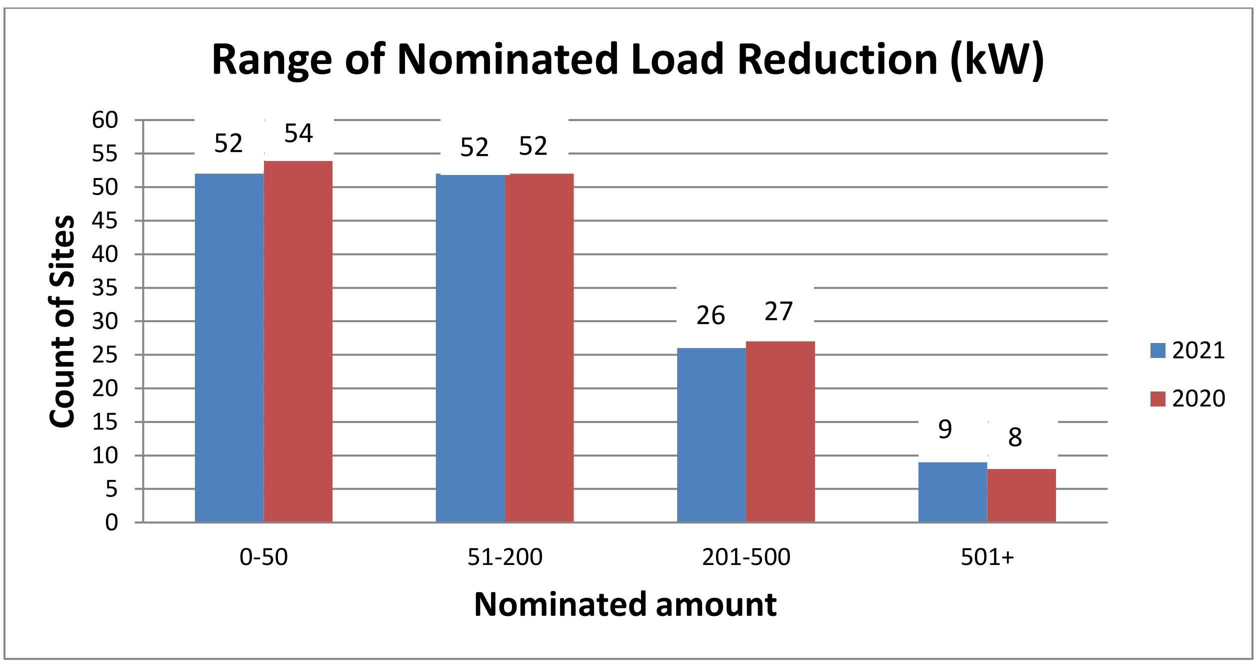


Table 2 shows the Program realization rates for 2021 based on average load reduction per event.

Table 2.

Curtailment Event	**Event Timeframe**	**Nominated Demand Reduction**	**Average Demand Reduction (MW)**	**Max Demand Reduction (MW)**	**Realization Rate***
June 28	4-8 pm	28.9	28.9	30.6	100%
July 16	4-8 pm	30.1	20.4	22.6	68%
July 26	4-8 pm	28.2	18.3	20.3	65%
July 29	4-8 pm	28.2	21	23.1	75%
August 12	4-8 pm	29.7	24.5	25.8	83%
Average		29	22.6	24.5	78%

** Based on average reduction*

Figure 5 below shows both the average and peak demand reduction achieved during each of the five curtailment events. The maximum demand reduction achieved ranged from a low of 20.3 MW for the July 26 event to a high of 30.6 MW for the June 28 event. The July 26 event's average of 18.3 MW reduction achieved a realization rate of 65%, while the July 26 event's average of 28.9 MW reduction achieved a realization rate of 100%. Combined, the five events had an average realization rate of 78%.

Event performance and realization rates for the 2021 season were somewhat reduced due to the impact of COVID-19 on customer's operations and ability to reduce load but not near as significant as 2020 results. Typically, we achieve a realization rate of 85% in past seasons. COVID19 has changed the operations of some businesses and this will have an ongoing effect on how businesses can curtail load. Additionally, this was the first season in seven years that had more than three events called which could have also had an impact on customers operations. More events may have resulted in some participants being less able to participate in all events as the season progressed.

Figure 5.

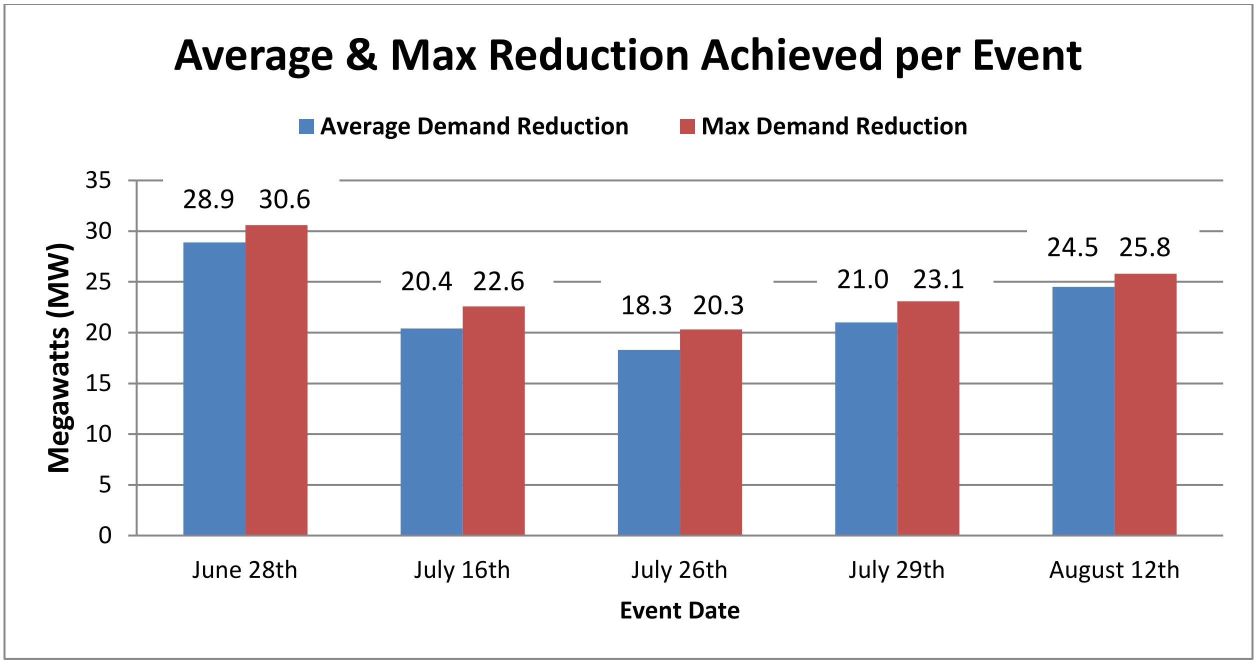


Table 3 shows the realization rate for each participant in the Program for 2021. Idaho Power headquarters location not included.

Table 3.

Participant Number	June 28 Event Realization	July 16 Event Realization	July 26 Event Realization	July 29 Event Realization	August 12 Event Realization	Season Realization
1	53%	30%	104%	69%	0%	51%
2	29%	6%	16%	3%	29%	16%
3	41%	26%	56%	45%	101%	54%
4	58%	67%	87%	42%	0%	51%
5	127%	75%	73%	87%	190%	110%
6	43%	19%	0%	12%	6%	16%
7	Opted out	124%	93%	118%	132%	117%
8	20%	24%	45%	30%	70%	38%
9	80%	150%	104%	110%	141%	117%
10	105%	132%	117%	33%	75%	92%
11	1%	0%	0%	0%	0%	0%
12	71%	71%	84%	68%	49%	69%
13	9%	16%	3%	53%	38%	24%
14	65%	53%	46%	39%	26%	46%
15	0%	0%	1%	0%	72%	15%

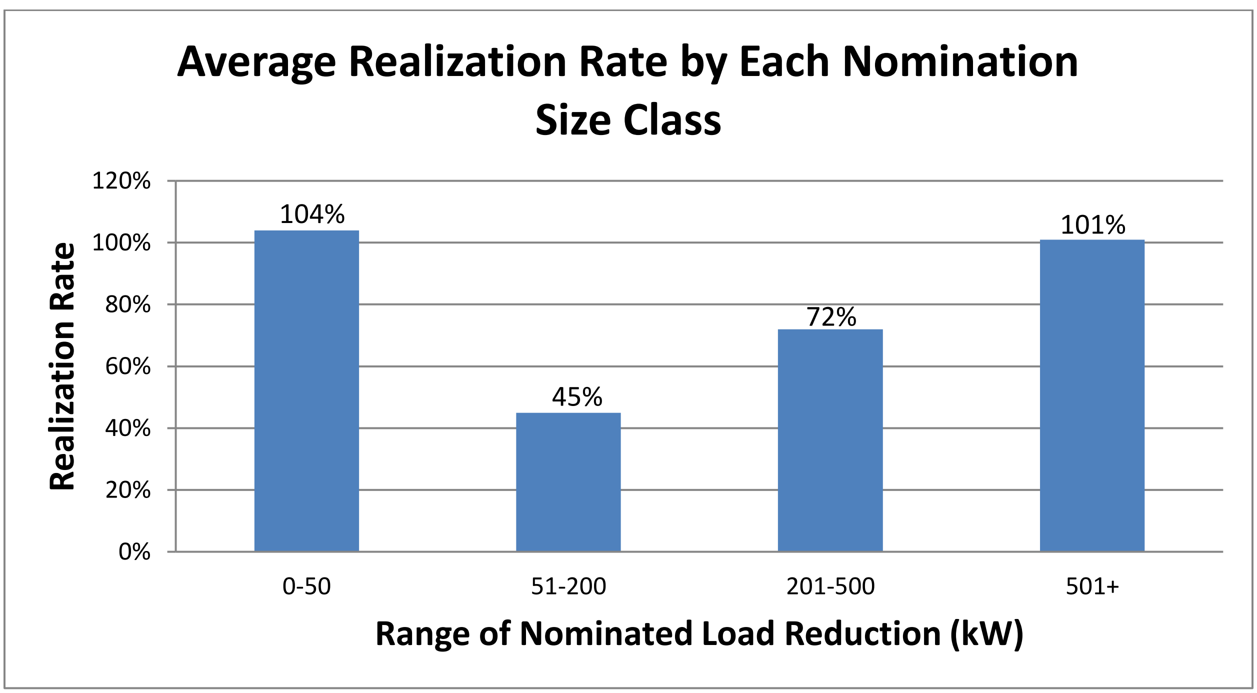
16	17%	0%	14%	11%	14%	11%
17	410%	333%	167%	59%	0%	194%
18	150%	168%	193%	32%	0%	109%
19	199%	207%	238%	272%	188%	221%
20	14%	55%	42%	38%	46%	39%
21	14%	8%	1%	16%	86%	25%
22	104%	128%	0%	0%	148%	76%
23	0%	1%	0%	2%	4%	2%
24	28%	13%	36%	40%	33%	30%
25	111%	38%	0%	0%	1%	30%
26	81%	36%	41%	4%	0%	32%
27	98%	16%	14%	14%	6%	29%
28	44%	56%	35%	54%	48%	48%
29	0%	0%	24%	233%	80%	67%
30	186%	280%	10%	128%	210%	163%
31	49%	0%	114%	158%	32%	71%
32	109%	112%	121%	107%	91%	108%
33	2573%	654%	335%	216%	69%	769%
34	58%	0%	0%	53%	7%	24%
35	6%	10%	5%	33%	2%	11%
36	77%	52%	70%	75%	124%	90%
37	42%	12%	95%	651%	35%	167%
38	34%	0%	5%	4%	148%	38%
39	36%	71%	0%	30%	0%	27%
40	211%	18%	53%	53%	50%	77%
41	0%	37%	210%	139%	112%	100%
42	53%	9%	9%	69%	47%	37%
43	13%	8%	7%	6%	9%	9%
44	0%	236%	153%	118%	0%	101%
45	11%	56%	55%	42%	29%	39%
46	206%	100%	1%	27%	86%	84%
47	27%	7%	5%	1%	0%	8%
48	87%	319%	88%	0%	23%	103%
49	89%	52%	56%	95%	86%	76%
50	147%	81%	Opted out	Opted out	10%	80%
51	1%	11%	Disenrolled	Disenrolled	Disenrolled	6%
52	41%	25%	43%	36%	36%	36%
53	29%	13%	21%	7%	40%	22%
54	138%	109%	114%	1%	124%	97%
55	85%	95%	128%	120%	81%	102%
56	105%	90%	133%	157%	115%	120%
57	57%	22%	2%	12%	21%	23%
58	89%	97%	22%	71%	59%	68%

59	72%	111%	167%	107%	140%	119%
60	3%	0%	0%	0%	2%	1%

Broken out across four size segments, the sites with the smallest nominated load reduction, 0–50 kW, achieved a realization rate across the five events at 104%. The 0-50 kW tied the 21-200 kW group for the largest portion of sites enrolled in the Program, at 52 sites each which accounted for 75% of total enrolled sites combined. The 51–200 kW achieved the lowest average realization rate of all groups at 45%. The 201-500 kW group had 26 sites enrolled and achieved a realization rate of 72%. The largest size class, 501+ kW, had nine sites enrolled and achieved the highest average realization rate across the three events at 101%. 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 five events. To calculate the results, each site's average load reduction (across five events) was divided by its average nomination across the five events and then grouped by size.

Figure 6.



Program Costs

Program costs for 2021 totaled $501,973. Incentive payments were the largest expenditure comprising approximately 78% of total costs.

The incentive payments from the five events called during the 2021 Program season were broken down as follows: the fixed capacity payments total was $370,864 and the variable energy payment total was $24,509. Variable energy payments were made during the season based off the fourth and fifth events kilowatt hour reductions.

The total Program costs for 2021 are estimated to be $16.40 per kW based on the maximum demand reduction of 30.6 MW, or $22.21 per kW, based on average load reduction for the season of 22.6MW.

Table 4 below displays the 2021 Program costs by expense category.

Table 4.

Expense Category	2021 Program Costs
Materials & Equipment	$17,034
Marketing & Administration	$89,566
Incentive payments	$395,373
Total	**$501,973**

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 *2019 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 2019 IRP to be $19.6 million.

In 2021, the cost of operating all three of Idaho Power's DR programs was $8.27 million. It is estimated that if the three programs were dispatched for the full 60 hours, the total costs would have been approximately $11.44 million, which is below the total annual costs agreed upon in the Settlement as revised in the 2019 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 called five load reduction events during the 2021 Program season which is the first time this has occurred since 2012. This past season was extremely hot and dry across the West with capacity constraints across the Pacific Northwest which impacted the ability to important energy resulting in the program being utilized more. In all five 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. The total variable incentives paid in 2021 for the 4th an 5th events were $24,509.

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 2021 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. This past fall the Company filed with both the Idaho and Oregon Public Utilities Commissions to adjust parameters of the program based on the Integrated Resource Plan identifying a need for a change in the program resources. With this change, the prior settlement agreement will no longer apply and Idaho Power plans to market the program as needed in the future to increase program capacity.

Customer Satisfaction Results

Idaho Power did not conduct a post-season survey this year as one was conducted in 2019 and the program conducts surveys on a three-year cycle.

Program Activities for 2022

The primary improvement Idaho Power and the Program could benefit from is increased capacity with more enrollment. The Company will continue to communicate the value proposition and market the program to customers prior to the 2022 season. Recruitment efforts for the 2022 season will begin in the first quarter of 2022 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 2022 season with an increased focus on enrolling national chain stores and other targeted customers within our service area.

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, newsletters, My Account and radio advertising. There will also be an increased focused on recruitment using Idaho Power Energy Advisors targeting customers that are a good fit for the program and a targeted email recruitment campaign. The Company will continue to target enrollment of national chain customers within our service area.

For the upcoming season the company has proposed both operational and incentive changes to the program. The filling is currently at the Public Utility Commission waiting on a final decision. In preparation for program changes the company fielded a survey about the possible changes to current participants as well as held a webinar to share the proposals to get their feedback.

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 $22.21 per kW based on average reduction (22.6 MW) for the season.

2021 Irrigation Peak Rewards Program Report

January 2022

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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 succe ss 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 can span a seven-hour timeframe with four groups being dispatched and each group overlapping 1 hour. Each group is off for four hours and a minimum of three four-hour events. If four or more events are dispatched during the season, any pump participating in the additional events will receive additional variable payment of $0.148 per kilowatt (kW) x 4 hours . Participants enrolled the 9 p.m. option are eligible for an extended variable payment at $0.198 per kW billed x 4 hours . Participants were organized into four group categories and labeled groups A, B, C, and D:

- Group A—Eastern region participants
- Group B—Southern region partcipants
- Group C—Western, Canyon and Capital regions, participants included C1 and C2 as subgroups of group C. Subgroups C1 and C2 included a small subset of the manual dispatch option. SubgroupC1 shut off expected two hours before Group C, and subgroup C2 shut off expected one hour before Group C.
- Group D— participants enrolled in the 9 p.m. option and located throughout the service area

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 99% 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 one percent of automatic dispatch 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. Late 2020 and spring 2021 contracted electricians exchanged many of the cell devices to a DRU due to substation upgrades that added AMI capabilitis through the 2020 year. The removed cell devices were retired.

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. 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 kW available and anticipated 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 bill for 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 higher variable credit. In 2021 group C experienced a total of four events and groups A, B and D experienced five events which caused the variable payments to be initiated.

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 2021 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 per hour($/billing kW)	Extended Variable Energy per hour Credit* ($/billing kW)
$5.00	$0.0076	$0.148	$0.198

* 5to 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 during the first three events (the opt out fee for events from 4 on is $1 per 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 before the end of the event (four hours) Interval metering data and the horsepower rating are used to determine an inexplicit opt-out after the event data has been collected and analyzed.

PARTICIPATION

In February 2021, IPC mailed IPR enrollment packets to all customers with past participanting service points. The packets included an enrollment worksheet included estimated credits for participation, contact worksheets, and an IPR brochure.

In 2021, IPC did not have the opportunity to communicate program details at the four agricultural shows due to safety precautions related to COVID-19. IPC continued to encourage past participants to enroll through one-on-one conversations in person and on the phone.

Nominated billing demand was 402.83 megawatts (MW) with 2,235 pumps enrolled for the 2021 season. The annual participation has remained relatively steady over the past several 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

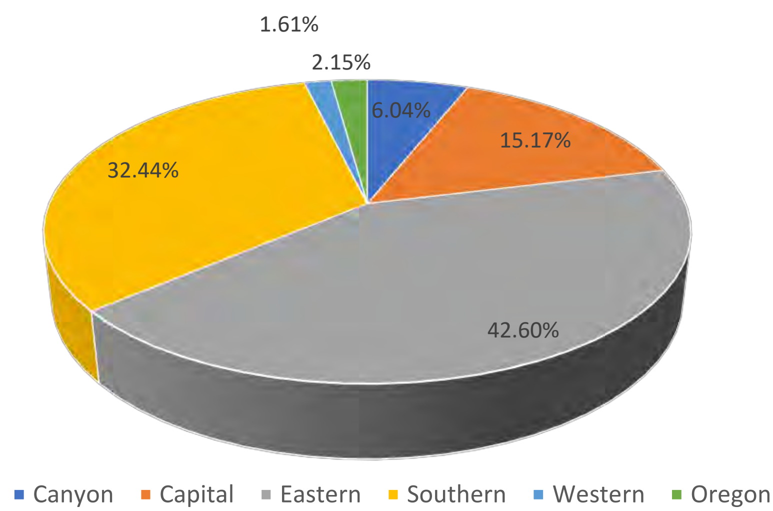


Figure 2. 2021 dstribution of participants by service area

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	10	125	135	82.32%	35.72
Capital	379	30	309	339	89.45%	94.18
Eastern	1126		952	952	84.55%	135.44
Southern	980	5	720	725	73.98%	125.33
Western	62		36	36	58.06%	2.49

Oregon	63	3	45	48	76.19%	9.66
Totals	2,774	48	2,187	2,235	80.57%	402.82

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 a command through the power line.

AMI technology allows IPC to analyze the interval metering data of participating pumps during load-control events. Interval metering reports provide data to help determine which DRUs functioned properly and which pumps turned off and stayed off during the event. During the 2021 season 2,527 DRUs were active and installed at 2,100 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 end of 2020 and the spring of 2021 many of the cellular devices were exchanged for the DRU due to an AMI substation expansion project. Only 20 pump locations remain with 20 cellular devices. The main reason for the exchange is the interval metering data on more pump locations allowing for detailed analysis of over 99% of the pumps enrolled.

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 provided weekly, a work order may be created and 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.

Several issues with DRUs and cell devices have been identified, including:

- Inoperable
- Damaged
- Device missing a fuse
- DRU serial number or cell device IP address and/or SG number had been recorded inaccurately and the system could not find the correct communication path
- New panel install at the pump site requiring a new device install on the new panel

- Water damage to the device
- Device—no longer at the pump location

Data Gathering and Processing

Troubleshooting, electrician work orders and load reducstion calculations 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 is then separated into three data sets:

1. Pumps with AMI technology and interval metering 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 four primary sources:

1. Program participant list
2. Interval metering data
3. Cellular device communication data from event days
4. Total system load data for event days and surrogate days

The IPR participant data for each event day includes the following:

- Pump number
- Device Location
- 2021 dispatch option
- 2021 dispatch group
- Nominated kW
- Cellular device or DRU serial number or identified as a 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 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 before 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. Table 3 displays the load reduction results for each event day. The load reduction at generation level includes a 9.7 percent line loss.

- Baseline hours are calculated using the average of the first four hours of the five hours before 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 and the group average is extrapolated and applied to the error set.
- Load reduction for automaticdispatch option with interval metering data is calculated and then extrapolated to represent all load including those with errors and without interval metering data.
- Load reduction for the automatic cell dispatch option is calculated using the automatic dispatch option percentage extrapolated to represent the load reduction of sites with cell devices.
- Load reduction for manual dispatch option is calculated using interval metering data from AMI, MV-90 and manual data loggers without errors.
- 2215 pump locations have interval data, representing 99.1% of the total enrolled pump locations.

Table 3. Hourly demand reduction results (MW) for each event and groups called, including line losses

Event Date	Groups	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.
6/18/2021	B, C	7.28	92.95	173.30	173.30	166.02	80.35	
6/28/2021	A, C, D	8.83	22.01	203.03	255.52	246.69	233.51	52.49
7/12/2021	A, D			60.45	103.89	103.89	103.89	43.43
7/16/2021	B, C	8.08	21.18	181.99	181.99	173.91	160.81	
7/26/2021	A, B, D		37.84	90.82	121.13	121.13	83.28	30.31
7/29/2021	B, C	3.78	16.98	131.49	131.49	127.71	114.50	
7/30/2021	A, D			69.32	69.32	69.32	69.32	
8/12/2021	A, B, D			86.16	117.32	117.32	117.32	31.16

Table 4. Oregon hourly demand reduction results (MW) on season peak reduction event day

Event Date	Groups	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.
6/28/2021	C,D	0.00	0.00	8.08	8.38	8.38	8.39	.30

Event Day Highlights

June 18

Idaho Power's service area experienced a hot and dry spring and the irrigation load on IPC system was over 800 MW on June 17. The first event, a Friday, was three days into the program season and the anticipated load reduction was 150 MW with groups B and C being called for shut off. IPC received eight explicit opt-outs. The Bruneau Bridge Substation (BUBG) had strained communication for approximately one week overlapping the date of the event. BUBG did not have reliable communication during this timeframe due to the remote nature and no Verizon cell service to the gear. They had technicicans working on a solution. All event notifications fired perfectly and on time as expected.

June 28

The second event occurred on a Monday following an record high heat wave in the northwest including heat cones over Seattle and Portland. The anticipated load reducation was 165 MW including groups A, C and D. IPC called all three demand response programs on June 28 due to the forecasted peak load. The event started at 4:00 p.m. and experienced 44 explicit opt-outs. All commands to the DRUs were successful and all substations involved were communicating as expected. The scheduler called to discuss canceling Group D but then moved forward as scheduled. Some participants were surprised by the 4:00 p.m. shut off as they had gone earlier in previous years of enrollment.

July 12

The third event occurred on a Monday. The anticipated load reduction was 117 MW and groups A and D were called. The event started at 4:00 p.m. and temperatures were 105° F in Boise. For this event, there were 21 opt-outs and many of them were the same as the previous event. The opt-outs reasons noted were "must have the water, too dry, can't catch up, water just came back on and I cannot have it go off again now". Part of the reason to call an event on this day was due to system generation being down for maintenance or down unexpectedly. The notifications to participants went out as designed and the communication to the DRUs and cell devices occurred without delays.

July 16

The fourth event occurred on a Friday. IPC had called IPR on Monday of this same week however the two opposite groups. No group ended up off twice in the same week. The anticipated load reduction was 136 MW with groups B and C participating. The event started at 4:00 p.m. with 12 explicit opt-outs. The notifications to participants went out as designed and the communication to the DRUs and cell devices occurred without delays. Overall the event went smoothly with only a little feedback from the participants.

July 26

The fifth event occurred on a Monday. The anticipated load reduction was 135 MW with groups A, B and D participating. The event started at 3:00 p.m. and 19 pumps explicitly opted-out. It seems the stress for irrigators has lessened due to later in the season, some crops are off entirely and others have a mature canopy and four hours of no water is less of an issue. A few of the opt-out calls indicated the pump/water had been off in the past week and they were unable to participate due to just getting the water back up. No calls received after the event timeframe indicating issues with getting the pumps back on. The actual load was below the forecasted load all day on the system load curve.

July 29

The sixth event occurred on a Thursday and was the fourth event for groups B and C participants. The event started at 4:00 p.m. with an anticipated load reduction of 130 MW. IPC called all three demand response programs on this day. Ninety six pumps explicitly opted-out. Due to the high number of opt-outs in Group C – approximately30 %, Group B was dispatched at 2:00 p.m. instead of the four-hour notification timeframe. The notification system did not know how to handle the short notification timeline and sent the shut off to groups A and D as well. This caused confusion with participants in addition to many callers stating, “I thought we already had three events”. Participating pump locations were eligible for a variable credit payment based on billed kW.

July 30

The seventh event occurred on a Friday and was the fourth event for groups A and D participants. Th e event started at 4:00 p.m. with an anticipated load reduction of 70 MW. Ten pumps explicitly opted-out. The notifications to participants went out as designed and the communication to the DRU’s and Cell devices occurred without delays. The system load dropped all throughout the afternoon, likely due to the overcast skies and slightly windy conditions. The temperatures also ended up being lower than forecasted. Participating pump locations were eligible for a variable credit payment based on billed kW.

August 12

The eighth event occurred on a Thursday and was the fifth event for groups A, B and D. Participating pump locations were eligible for another variable credit payment based on billed kW. The event started at 4:00 p.m. Temperatures were over 100° F in Boise and Portland, Oregon was forecasted to hit 104° F. All over the northwest the hot temperatures drove increased system load and strained the electrical system. Twenty-two pumps explicitly opted-out. The notifications to participants went out as designed and the communication to the DRUs and cell devices occurred without delays. 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	Device Failure	Explicit Opt Out	Inexplicit opt out	Small Load	Average MW on during an event
6/18/2021	15.49%	0.54%	0.15%	1.37%	17.55%
6/28/2021	7.26%	0.95%	2.66%	1.67%	12.55%
7/12/2021	9.62%	1.36%	2.24%	1.69%	14.92%
7/16/2021	4.40%	0.81%	1.62%	1.07%	7.89%
7/26/2021	7.23%	1.14%	2.61%	0.95%	11.92%
7/29/2021	5.24%	1.90%	7.38%	1.11%	15.62%
7/30/2021	9.91%	2.00%	1.41%	0.75%	14.07%
8/12/2021	7.37%	1.73%	2.85%	1.45%	13.40%

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 13.29% for the 2021 season. The average of 13.29% was weighted by event day and group and applied to the highest irrigation load during the season, June 24, 2021. 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. 2021 IPR season potential realization rate per day (all days except for Sundays and July 4)

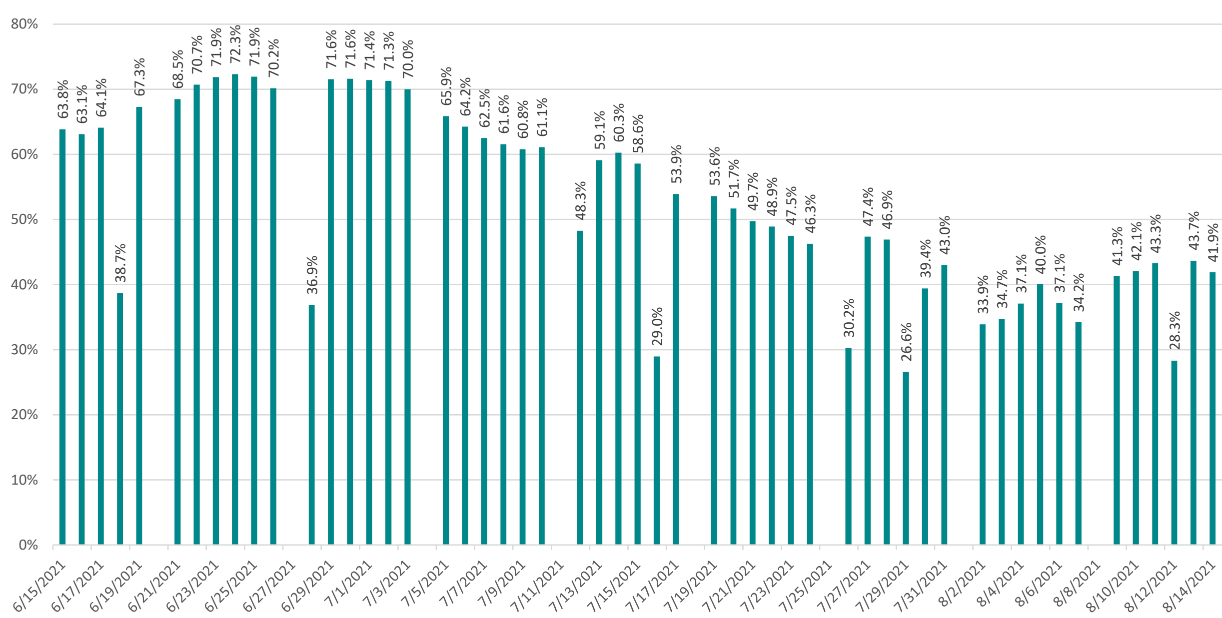
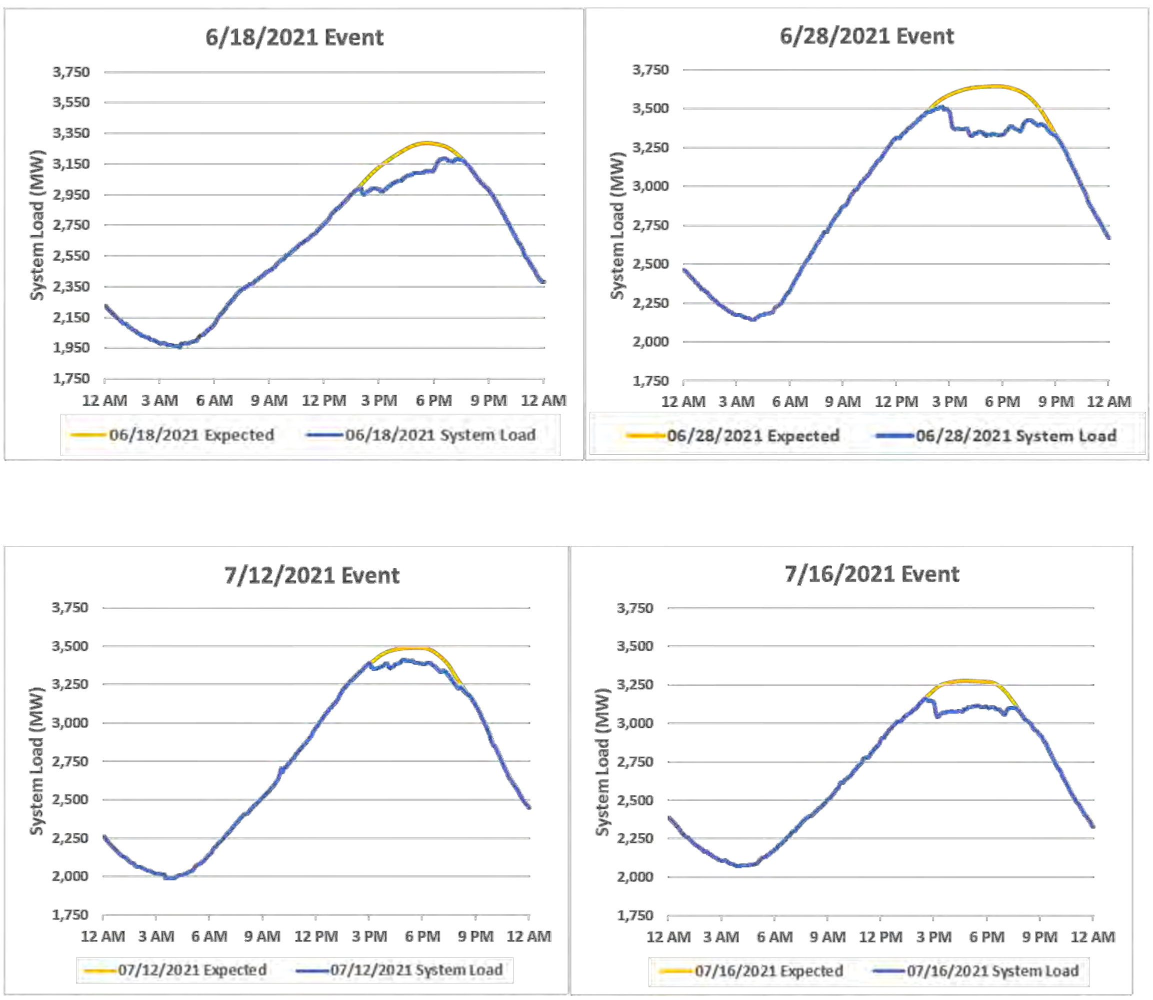


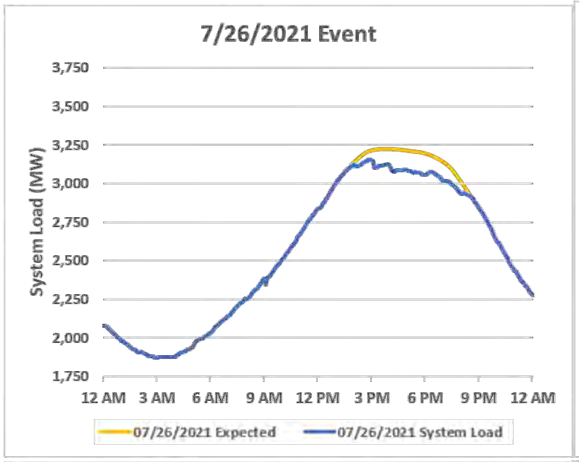
Figure 3. 2021 potential realization rate

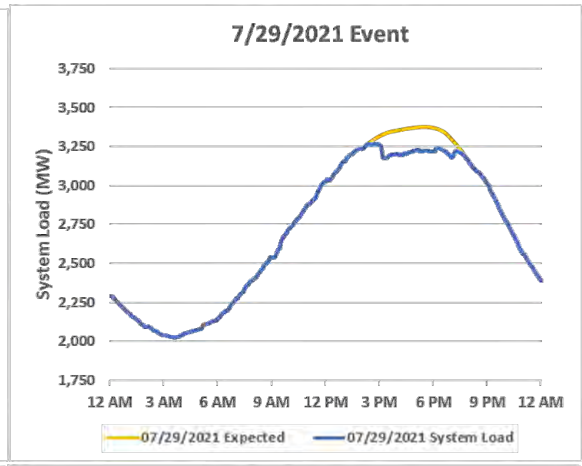
The 2021 maximum potential realization rate of 72.31% on June 24, results in a maximum potential load reduction for IPR of 319.53 MW for the 2021 IPR season. The realization rate is typically the highest at the end of June and the beginning of July when a larger percentage of irrigation pumps are operating 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. Also note in figure 3, that days when events where actually called show a low potential realization because participants in the event are off due to the event.

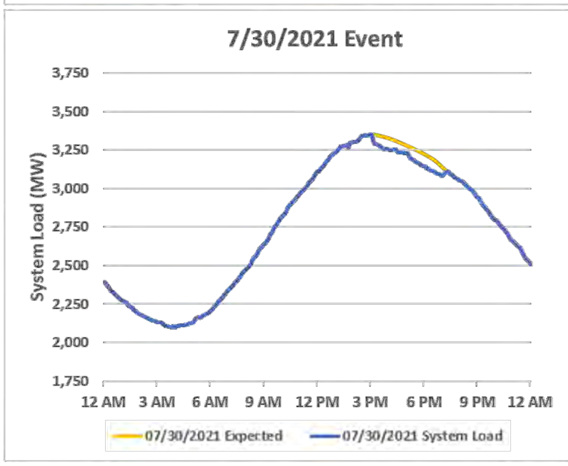
Load Reduction Results—Total System Load Data

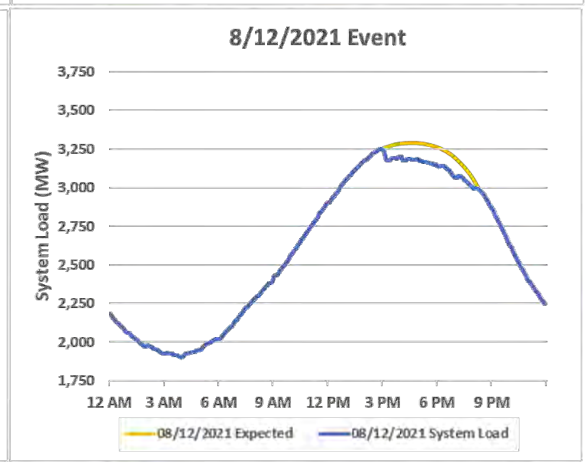
The graphs shown below by event date represent IPC system load in five-minute intervals and the Peak Participant load reduction based on the total system load data and the interval metering data used to calculate event performance. Figure 4 shows each load reduction event day in 2021 showing the system load and participant load reduction.











COSTS

IPR spent a total of $7,013,315 with incentives being the largest portion at 96.3% of total program costs. Incentives paid for the 2021 season total $6,755,596, including variable incentives. The participants had 4 or 5 events each and were paid variable payments of a total of $332,803. The estimated maximum cost of variable incentives of running the program at the full 60 hours for was an additional $2.67 million.

Table 6. Annual program costs by category

Expense Item	2021 Total Cost
Materials & Equipment	$49,134
Purchased Service	$89,267
Other Expense	$35,301
Incentives	$6,755,596
Labor/Administrative Expense	$84,016
Total	$7,013,315

CUSTOMER SATISFACTION

The general sentiment of IPR 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 IPR participants, IPC mailed a letter to each participant with a summary of the fixed and variable peak credit totals for the 2021 season.

CONCLUSIONS

Highlights from the 2021 season include the following:

- 2,235 service points enrolled
- 402.83 MW of enrolled billing demand
- Maximum potential realization rate of 319.53 MW including line losses
- Event 1: June 18 – actual reduction 173.3 MW including line losses
- Event 2: June 28 – actual reduction 255.52 MW including line losses
- Event 3: July 12 – actual reduction 103.89 MW including line losses
- Event 4: July 16 – actual reduction 181.2 MW including line losses
- Event 5: July 26 – actual reduction 121.13 MW including line losses
- Event 6: July 29 – actual reduction 131.49 MW including line losses
- Event 7: July 30 – actual reduction 69.32 MW including line losses
- Event 8: August 12 – actual load reduction 117.32 MW including line losses
- 2,527 active AMI DRUs
- 20 active IPC cellular devices
- 80.57 percent of eligible pump locations signed up to participate in 2021
- Peak Season Summary letter mailed to all participants showing the opt outs if applicable and fixed and variable credits for 2021.
- Variable Credits for the fourth and fifth events totalled $332,803
- The cost of running the program for eight events this season was $7.01 million

- The cost of having this resource available was $21.94 per kW, based upon the maximum potential kW reduction in 2021.
- The estimated cost of running the program for the maximum of 60 hours in 2021 is an additional $2.67 million

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 four 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, MV-90 interval data or data logger interval metering 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:

$$\text{Total Program DR} = DR_{MDO} + DR_{Group}$$

Historical DSM Expense and Performance

2002–2021

An IDACORP Company

		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			
2021	20,846	751,989	751,989		27			
Total		**$ 30,584,085**	**$ 30,584,086**					
Flex Peak Program								
2009	33	528,681	528,681		19			
2010	60	1,902,680	1,902,680		48			
2011	111	2,057,730	2,057,730		59			
2012	102	3,009,822	3,009,822		53			
2013	100	2,743,615	2,743,615		48			
2014	93	1,563,211	1,563,211		40			
2015	72	592,872	592,872		26			
2016	137	767,997	767,997		42			
2017	141	658,156	658,156		36			
2018	140	433,313	433,313		33			

		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	145	626,823	626,823		31			
2020	141	542,480	542,480		24			
2021	139	501,973	501,973		31			
Total..........................		**$ 15,929,351**	**$ 15,929,351**					
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			
2021	2,235	7,013,315	7,013,315		255			
Total..........................		**$ 112,516,330**	**$ 112,516,330**					
Residential Efficiency								
Ductless Heat Pump Pilot								
2009	96	202,005	451,605	409,180		18	0.031	0.086
2010	104	189,231	439,559	364,000		20	0.044	0.103
2011	131	191,183	550,033	458,500		20	0.028	0.081
2012	127	159,867	617,833	444,500		20	0.024	0.094
2013	215	237,575	992,440	589,142		15	0.032	0.132
2014	179	251,446	884,211	462,747		15	0.042	0.148
Total..........................	**852**	**$ 1,231,307**	**$ 3,935,681**	**2,728,069**		15	**$ 0.044**	**$ 0.138**

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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
2021	0	145,827	145,827	0		3	n/a	n/a
Total	**7,406**	**$ 853,636**	**$ 853,636**	**1,392,934**		**9**	**$ 0.082**	**$ 0.082**
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
2021	47,027	449,790	449,790	2,931,280		10	0.019	0.019
Total	**514,161**	**$ 15,908,553**	**$ 15,908,553**	**77,276,804**		**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
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

		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	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
2021	0	43,631	43,631	0		14	n/a	n/a
Total	**15,232,422**	**$ 28,616,040**	**$ 60,739,317**	**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
2020	51	46,352	46,352	56,944		16	0.075	0.075
2021	11	18,257	18,257	14,985		18	0.105	0.105
Total	**12,441**	**$ 5,932,191**	**$ 5,932,191**	**15,513,297**		**19**	**$ 0.032**	**$ 0.032**

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
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

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
2021	1,048	635,182	2,246,011	1,365,825		15	0.044	0.157
Total	**6,664**	**$ 6,999,599**	**$ 18,489,318**	**16,395,607**		**17**	**$ 0.038**	**$ 0.100**
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	142,649	31,938		12	0.448	0.490
2021	37	70,448	75,461	3,768		11	2.173	2.328
Total	**2,689**	**$ 1,730,140**	**$ 1,951,694**	**1,085,801**		**11**	**$ 0.185**	**$ 0.209**
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
2021	115,153	970,197	970,197	15,929,074		1	0.057	0.057
Total	**291,181**	**$ 2,264,618**	**$ 2,264,618**	**38,083,540**		**1**	**$ 0.056**	**$ 0.056**
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**

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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
2021	0	68,973	68,973	0		11	n/a	n/a
Total	**2,133**	**$ 722,502**	**$ 722,502**	**1,797,404**		**11**	**$ 0.047**	**$ 0.047**
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	n/a	n/a
2021	0	4,595	4,595	0		45	n/a	n/a
Total	**109**	**$ 89,523**	**$ 177,635**	**126,713**		**28**	**$ 0.050**	**$ 0.099**
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

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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
2021	88	173,193	309,790	235,004		45	0.046	0.083
Total	**1,456**	**$ 1,631,532**	**$ 3,370,074**	**5,745,743**		**38**	**$ 0.018**	**$ 0.038**
Residential New Construction 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
2016	110	142,158	297,518	150,282		36	0.051	0.107

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2017	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
2021	90	247,600	524,876	389,748		61	0.039	0.082
Total	**5,524**	**$ 6,569,401**	**$ 12,072,298**	**10,203,828**		**35**	**$ 0.043**	**$ 0.078**
Shade Tree Project								
2014	2,041	147,290	147,290					
2015	1,925	105,392	105,392					
2016	2,070	76,642	76,642					
2017	2,711	195,817	195,817					
2018	2,093	162,995	162,995	35,571		20	0.307	0.307
2019	2,063	147,750	147,750	35,727		30	0.235	0.235
2020	0	28,490	28,490	52,662		30	0.038	0.038
2021	2,970	184,680	184,680	44,173		40	0.269	0.269
Total	**15,873**	**$ 1,049,056**	**$ 1,049,056**	**168,133**		31	**$ 0.428**	**$ 0.428**
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**

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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	0.338	0.338
2021	7	57,656	57,656	12,591		30	0.317	0.317
Total	**1,432**	**$ 10,284,457**	**$ 10,296,666**	**5,385,434**		**24**	**$ 0.144**	**$ 0.144**
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
2013	245	1,336,742	1,984,173	657,580		25	0.150	0.223

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
2021	161	1,177,366	1,668,566	289,353		30	0.253	0.371
Total	**5,732**	**$ 23,018,369**	**$ 34,442,360**	**30,918,313**		**25**	**$ 0.055**	**$ 0.082**
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		
2021	1	9,473	21,586	1,752		30	0.375	0.854
Total	**248**	**$ 732,871**	**$ 1,091,809**	**1,102,845**		**25**	**$ 0.049**	**$ 0.073**

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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	**6,152**	**$ 23,926,511**	**$ 35,864,361**	**32,682,015**		**25**	**$ 0.054**	**$ 0.081**
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
2021	906	74,617	74,617	296,751		11	0.029	0.029
Total	**6,566**	**$ 1,155,774**	**$ 1,155,774**	**1,566,883**		**10**	**$ 0.092**	**$ 0.092**
New Construction								
2004		28,821	28,821					
2005	12	194,066	233,149	494,239		12	0.043	0.052

		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)
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
2021	95	2,691,171	4,160,999	17,536,004		12	0.017	0.026
Total	**1,355**	**$ 28,027,144**	**$ 62,112,565**	**199,091,234**		**12**	**$ 0.015**	**$ 0.034**
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
2019	1,033	6,281,056	17,700,769	42,674,418		12	0.013	0.037

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
2020	630	3,587,277	11,964,431	20,965,215		12	0.019	0.063
2021	787	3,826,750	11,486,766	21,181,022		12	0.020	0.059
Total	**17,330**	**$ 61,035,591**	**$ 146,247,776**	**417,193,025**		**12**	**$ 0.016**	**$ 0.038**
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					
2021	3	4,401	4,401					
Total	**241**	**$ 117,671**	**$ 117,671**					

		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
2021	452	1,032,056	1,032,056	2,421,842		11	0.062	0.062
Total	**591**	**$ 1,371,886**	**$ 1,371,886**	**3,202,102**		**11**	**$ 0.050**	**$ 0.050**
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
2021	135	8,608,903	22,552,383	53,728,267		13	0.017	0.044
Total	**2,401**	**$ 123,461,560**	**$ 270,191,198**	**832,332,884**		**13**	**$ 0.015**	**$ 0.034**
Green Motors Rewind—Industrial								
2016	14			123,700		7		
2017	13			143,976		7		

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
2018	25			64,167		7		
2019	12			117,223		8		
2020	10			56,012		8		
2021	4			20,430		8		
Total	**78**	**$ 0**	**$ 0**	**525,508**		**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
2021	1,019	2,607,200	19,138,043	9,680,497		19	0.023	0.166
Total	**14,653**	**$ 39,621,447**	**$ 180,910,170**	**228,647,637**		**9**	**$ 0.023**	**$ 0.106**
Green Motors Rewind—Irrigation								
2016	23			73,617		19		
2017	27			63,783		19		
2018	26			67,676		19		
2019	34			44,705		20		

		Total 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	23			36,147		20		
2021	12			19,352		21		
Total	**145**	**$ 0**	**$ 0**	**305,280**		**19**		
Other Programs								
Building Operator Training								
2003	71	48,853	48,853	1,825,000		5	0.006	0.006
2004	26	43,969	43,969	650,000		5	0.014	0.014
2005	7	1,750	4,480	434,167		5	0.001	0.002
Total	**104**	**94,572**	**97,302**	**2,909,167**		**5**	**0.007**	**0.007**
Comprehensive Lighting								
2011		2,404	2,404					
2012		64,094	64,094					
Total		**$ 66,498**	**$ 66,498**					
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					

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
2020		1,811,869	1,811,869					
2021		2,226,910	2,226,910					
Total		**$ 12,151,498**	**$ 12,151,498**					
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					

		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)
2006		56,727	56,727					
2007								
2008		150,917	150,917					
2009		193,653	193,653					
2010		222,092	222,092					
2011		159,645	159,645					
2012		174,738	174,738					
2013		416,166	416,166					
2014	6,312	423,091	423,091	1,491,225		11		
2015		149,903	149,903					
2016		290,179	290,179					
2017		223,880	223,880					
2018		172,215	172,215					
2019		160,851	160,851					
2020		223,731	223,731					
2021		483,067	483,067					
Total..........................		**$ 3,508,353**	**$ 3,508,353**	**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				

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
2010		2,391,217	2,391,217	21,300,366				
2011		3,108,393	3,108,393	20,161,728				
2012		3,379,756	3,379,756	19,567,984				
2013		3,313,058	3,313,058	20,567,965				
2014		3,305,917	3,305,917	26,805,600				
2015		2,582,919	2,582,919	23,038,800				
2016		2,676,387	2,676,387	24,352,800				
2017		2,698,756	2,698,756	24,440,400				
2018		2,500,165	2,500,165	25,666,800				
2019 [1]		2,721,070	2,721,070	18,368,135				
2020		2,789,210	2,789,210	17,614,323				
2021		2,977,678	2,977,678	17,869,518				
Total		**$ 42,491,479**	**$ 42,491,479**	**393,349,387**				
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			

		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		49,354,064	100,230,772	198,432,599				
2021		37,056,897	79,194,093	143,971,237				
Total Direct Program		**$ 593,424,386**	**$ 1,078,213,083**	**2,582,802,923**				
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		$741,287						
2014		1,065,072						
2015		1,891,042						
2016		2,263,893						
2017		2,929,407						
2018		1,335,208						
2019		1,194,640						
2020		1,202,238						
2021		1,296,605						
Total		**$ 21,322,022**						
Total Expenses								
2002		2,061,375						
2003		2,528,685						
2004		3,969,550						
2005		6,700,972						
2006		11,484,013						

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2007		15,662,377						
2008		21,193,521						
2009		34,846,766						
2010		45,832,851						
2011		46,266,252						
2012		49,326,859						
2013		26,841,378						
2014		36,713,333						
2015		39,040,935						
2016		42,763,463						
2017		47,757,496						
2018		44,262,080						
2019		48,584,696						
2020		50,556,303						
2021		38,353,503						
Total 2002–2021........		**$ 614,746,408**						

[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.

Utility Consumer Analytics, Inc

Adaptive Consumer Engagement

Idaho Power Corporation
Home Energy Report 2021
Final Program Summary

Version 1.3

Updated: 3/2/2022

HARRIS UCA UTILITY CONSUMER ANALYTICS

www.adaptiveconsumerengagement.com

Table of Contents

Revision History

Date	Version	Description	Author/Editor
2-15-2022	1.0	Initial Draft	Thea Winch
2-27-2022	1.1	Additional edits/comments	Thea Winch
3-1-2022	1.2	Final Version	Thea Winch
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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:	
Client Name:	
Name, Title:	
Signature:	
Date:	
Utility Consumer Analytics, Inc.	
Name, Title	
Signature:	
Date:	

Executive Summary

1. HOME ENERGY REPORT PROGRAMS: HOW SAVINGS ARE DERIVED

Energy savings due to behavioral changes in the home have traditionally been difficult to measure. Home Energy Report (HER) programs rely on a randomized controlled trial (RCT) structure to calculate energy savings and ensure program results are both unbiased and precise. The RCT approach is the most commonly used approach for implementing HER programs in North America.

With this approach, we identify an eligible pool of customers based on the desired program outcome, and then randomly allocate a subset of customers into the treatment group who will receive the behavioral intervention (Home Energy Reports), and the remainder into the control group who will not receive the intervention.

We estimate average customer-level savings from the behavioral program by measuring the difference in the average energy usage among the treatment group relative to the control group. Program energy savings are the average customer-level savings multiplied by the number of active treatment group participants

Program Group refers to customers that are in the treatment group and are actively being treated with reports. These customers by default are also part of the evaluation group.

Evaluation Group refers to customers that are in the treatment or control group and are factored into the savings evaluations. Treatment customers in this group may or may not be actively receiving reports.

2. 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. Prior to the start of pilot year 2, customers with factors correlated with low savings were removed from the program and evaluation group. The sixty percent of households with the lowest energy use in T5, and about 15 percent of households from across T3, T4, and T5 who were saving less energy than the rest of the group, were removed. The same factors were applied to their respective control groups. We refer to this as "optimization" which was done to improve the performance of these groups. 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.

In February of 2020 the program was expanded and extended through December 31, 2023, contingent on continued cost-effectiveness. After applying a number of screening filters, 108,424 additional residential customers were identified as eligible to be added to the program as treatment

[1] Uplight in this case is formerly known as Ecotagious. Ecotagious was acquired by Uplight in August 2019.

participants and 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

3. RESULTS AND FINDINGS

Main takeaways from 2021 are as follows.

Collectively, all treatment groups saved .98%

In 2021, total savings calculated are 16,666,871 kWh. Collectively, the savings for all waves combined are statistically significant. 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 16,767,446 kWh.

Using a weighted average calculation, the treatment group saved 1% or 151.50 kWh per customer without T5 residual savings factored into the evaluation group. With residual savings from T5 included, the weighted average savings for all treatment groups was .98%.

Collectively savings per customer is up from 2020, but not all groups were statistically significant in 2021

Unlike 2020, all program groups, save T5, received treatment throughout the entire year. This is the first full year where everyone was on the same report schedule, and thus, we are beginning to look at the program group more holistically. The savings for T3, T4, and T6 were statistically significant, but savings for T1, T2, and T5 were not.

- T1: 0.17% or 35.71 kWh per customer
    - not statistically significant

- T2: 1.09% or 219.80 kWh per customer
    - not statistically significant
- T3: 1.74% or 264.32 kWh per customer
- T4: 1.84% or 302.97 kWh per customer
- T5: 0.33% or 24.12 kWh per customer
    - not statistically significant
- T6: 0.98% or 144.28 kWh per customer

Note: T5 was removed from the program group in May, 2020, but we are still calculating residual savings for T5 on an annual basis at the end of the program year.

See section 1.3 for definitions of the treatment group.

T6, the newest wave, continues to ramp up

It typically takes new waves 3 to 18 months to mature or "ramp up." The T6 wave was launched in 2020 and 2021 was the first year that T6 customers in the Program Group were treated throughout the entire year. We saw an increase in savings percentage and kWh savings per customer. In 2020 the savings percentage for T6 was .56% or 39.67 kWh per customer. In 2021 the savings percentage for T6 increased to .98% or 144.28 kWh per customer.

Email Adoption Rates Remain Low

- 15 total pilot customers (T1, T2, T3, T4) switched to email (0.1%)*
- 151 total new customers (T6) switched to email (0.14%)*
- 507 total emails were sent in 2021

**from the start of the program through the end of 2021*

Opt-Out Rates Stayed Below 0.25%

In 2021, 157 participants opted out of the program – a 0.12% opt-out rate. The overall program opt-out rate was 0.11% in year 3, 0.22% in year 2, and 0.64% in year 1.

Reports Delivered in 2021

	Recipients	# Email Reports	# Paper Reports
February	T1, T2, T3, T4, T6	106	115,153
May	T1, T2, T3, T4, T6	122	112,929
August	T1, T2, T3, T4, T6	126	110,054
November	T1, T2, T3, T4, T6	153	107,198
		507	**445,334**

1. Program Overview

1.1 Team Structure

The IPC Home Energy Report program has been a joint effort between Idaho Power Company, N. Utility Consumer Analytics | Harris Computer Corporation (formerly Aclara), and Uplight (formerly Ecotagious) since 2017. Uplight acquired Ecotagious in July of 2019. In June 2021, N. Harris Computer Corporation acquired Adaptive Consumer Engagement (ACE) from Aclara Technologies.

1.2 Objectives

1.2.1 2021 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 going forward to determine if combining them with the rest of the treatment population could yield additional combined savings. Because the T5 customers received reports through February of 2020, 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 2021 increases the cumulative savings from 16,666,871 kWh to 16,767,446 kWh. This is an increase of 100,575 kWh. The weighted average savings per customer is 146.85 kWh with T5 and 151.50 kWh without T5.

1.3 Treatment Groups Defined

1.3.1 DEFINING PROGRAM TERMINOLOGY

In 2021 we made an effort to define program terminology and consistently use that new terminology when discussing program participation and M&V. This helped to avoid confusion as we conversed about the nuances of the program groups. Below is an overview of the definitions we developed. Please keep these terms in mind as you read through the 2021 Program Summary Report.

Program Group

The program group is the term we use to refer to customers that are in the treatment group and are actively being treated with reports. These customers by default are also part of the evaluation group.

Evaluation Group

The evaluation group is the term we use to refer to customers that are in the treatment or control group and are factored into the savings evaluations. Treatment customers in this group may or may not be actively receiving reports.

1.3.2 2020 PROGRAM GROUPS

In May of 2020, customers from T1, T2, T3, and T4 that had not been removed through attrition continued to receive reports. All T5 and C5 customers were removed from the program 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.

Table 1 – 2021 Report Delivery Schedule by Cohort

	2021											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6		✓			✓			✓			✓	

1.3.3 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:

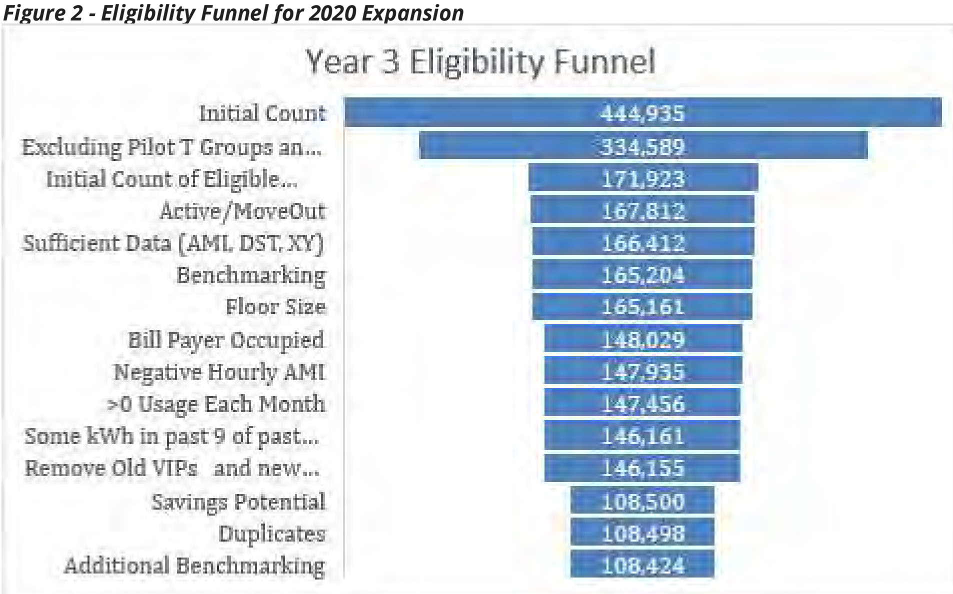
- All non-individual accounts
- Accounts with less than 12 months active history
- Do not contact list
- Net Metering (I84), Master metered accounts (I03) and Time-of-Day (I05)
- Known language barriers
- Built prior to 1860, more than 6 bathrooms, more than 8 bedrooms, homes with <350 ft^2 or >7000 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

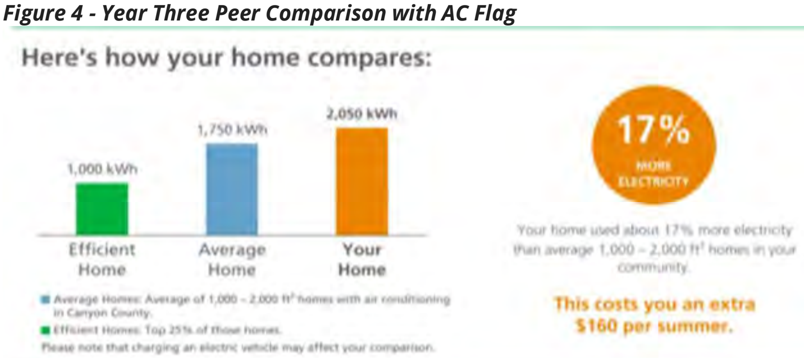
1.5 Additional Benchmarking Flags (AC and ESH)

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. 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. 2021 Program Results

2.1 Objectives: Findings

2.1.1 ENERGY SAVINGS

Cumulative Savings During Treatment Period

In total, we saw an average of 151.50 kWh savings per treatment customer. This added up to a total combined savings of 16,666,871 kWh across all treatment groups as of December 31, 2021. Savings calculations from T3, T4 and T6 were statistically significant. See table 5 for savings per cohort. The aggregate savings with all groups combined were statistically significant

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 2021, including the T5 post-treatment period, showed a total combined savings of 16,767,446 kWh. See table 6 for the treatment and persistence savings for the T5 group; and table 7 for combined savings including T5.

In tables 5, 6, and 7 we included the Avg kWh Savings per Customer, Average savings percent, and the Cumulative Aggregate Savings (kWh), with IO6 customers included in the Evaluation Group. In 2021, we started including IO6 customers in our Evaluation Group for yearly reporting.

Table 5 – 2021 Cumulative Savings by Cohort
T12346 Treatment Period: Jan 1, 2021 - Dec 31, 2021

Cohort	Avg kWh Savings per Customer w/ IO6	Average Savings Percent w/ IO6	95% Confidence Margin of Error w/ IO6	One-Sided Null Hypothesis P-Value w/IO6	Cumulative Aggregate Savings (kWh) w/ IO6
Winter Heating – T1	35.71	0.17%	351.76	0.421146834	183,325
Winter Heating – T2	219.80	1.09%	363.30	0.117844183	981,868
Year-Round - T3	264.32	1.74%	176.04	0.001625822	1,378,427
Year-Round - T4	302.97	1.84%	161.34	0.000116435	740,448
Expansion - T6	144.28	0.98%	56.01	2.21754E-07	13,382,802
					16,666,871

Table 6 – 2021 Cumulative Savings by T5
T5 Persistent Period: Jan 1, 2021 - Dec 31, 2021

Cohort	Avg kWh Savings per Customer w/ IO6	Average Savings Percent w/ IO6	Cumulative Aggregate Savings (kWh) w/ IO6
Year-Round - T5	24.12	0.33%	100,575

Table 7 – 2021 Combined cumulative Savings for all Treatment Groups including T5

Cohort	Avg kWh Savings per Customer w/ IO6	Average Savings Percent w/ IO6	Cumulative Aggregate Savings (kWh) w/ IO6
T123456	146.85	0.98%	16,767,446

2.1.2 MONTHLY SAVINGS BY TREATMENT GROUP

- Monthly Average kWh Savings per Cohort

	T1	T2	T3	T4	T6
Jan 2021	38.61	51.75	19.11	36.48	13.87
Feb 2021	26.94	45.94	14.22	26.41	13.06
Mar 2021	-11.05	58.92	11.34	18.89	15.01
Apr 2021	-26.91	41.30	12.56	21.12	9.21
May 2021	5.07	28.01	19.08	23.95	12.37
Jun 2021	9.84	-8.91	9.17	28.99	11.28
Jul 2021	18.93	13.47	35.88	32.23	9.90
Aug 2021	12.53	0.07	17.11	23.76	10.65
Sep 2021	6.95	-6.46	20.97	22.56	9.38
Oct 2021	-1.40	5.69	24.42	11.87	9.58
Nov 2021	-2.75	-6.40	19.80	17.42	9.47
Dec 2021	17.83	32.81	24.24	34.39	11.55

- Note: Monthly Savings by Treatment Group includes IO6 customers, but not optimized customers in the Evaluation Group

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.

Pilot 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.

Pilot 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.

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 randomly removed from these four control groups to free them up for inclusion in the T6 experimental design—that is freed up to be randomly allocated to T6 and C6 during the 2020 expansion. 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 wave was created with 108,498 in the treatment group (T6) and 14,744 in the control group (C6) based on eligibility criteria applied to the remaining population.

Program Year 2021

In 2021, changes were made to the way move outs were included in the evaluations group based on a suggestion from DNV Consultant, Craig Williamson.

Old Method - Prior to the Q3 2021 QMR, only customers that were active through the end of the analysis period were included in the evaluation group. This means that if a customer moved out in the third month of the quarter, their savings for the first two months of the quarter were not measured.

New Method - Starting in Q3 2021, data for customers who moved out during the analysis period are included up until the date they moved out. This is done consistently for both treatment and control groups.

Impact - Customers with less than three months will have lower consumption. This (appropriately) leads to a slightly lower average savings per customer, but it increases the total savings, since we are multiplying that average by the total count of customers who were active for any part of the quarter.

We used the same approach for the 2021 PSR analysis. Customers were included in the evaluation group up until the date they moved out.

2.1.4 COMBINED SAVINGS FOR NEW CUSTOMERS (T6) VS. EXISTING CUSTOMERS (T1234)

The T6 group is much larger than other treatment groups and more closely represents the entire Idaho Power customer base than any other group. T6 alone accounts for over 80% of the total treatment group, whereas T1-T5 combined account for under 20%. Savings for T6 have ramped up and are performing well.

An analysis of savings within the new customer group compared to the existing customer group found that in 2021, T6 saved an average of 144.28 kWh per customer. T1, T2, T3, and T4, saved an average of 190.27 kWh per customer and T5 had a residual average savings of 24.12 kWh per customer. The combined average savings for all treatment groups was 146.85 kWh per customer.

2021 was the first full year where all waves were on the same report schedule, and thus, we are beginning to look at the program group more holistically.

2.2 Email Reports

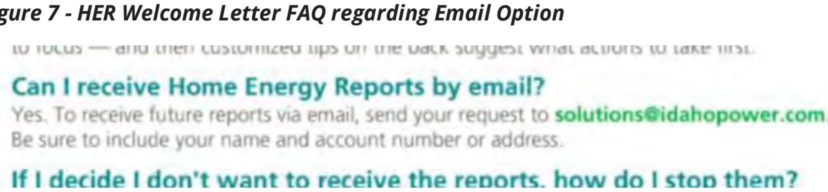
2.2.1 ENROLLMENT

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, 2021, 153 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 2021, a total of 507 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 507 emails were successfully delivered, and a total of 374 were opened. This is a 74% open rate which is stronger than average. This is likely due to the opt-in nature of the email reports. The total clickthrough rate (that is, the rate of clicks on links contained within the emails) was 9.4 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	2021
Total Calls	411	246	1,087	660
Opt-Out Calls	0.64%	0.22%	0.12%	0.17%

In 2021, IPC customer solutions advisors (CSAs) received 660 calls related to the HER program, compared to 1,087 calls in 2020, 246 calls in 2019, and 411 calls in 2018. The 2021 opt-out rate was 0.17 percent compared to 0.12 percent in 2021, 0.22 percent in pilot year two, and 0.64 percent in pilot year one.

From January to December 2021, CSAs classified each call they received into one of eight categories:

- General
- Profile Update
- Opt-Out
- Escalation
- Non-Program-Related
- Switching to Email Reports
- Switch to Paper
- Other

Table 11 – Reasons for Calls to CSAs in 2021 by Category

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
General	2	45	4	2	34	6	2	16	2	1	24	2	140
Profile Update	3	46	8	2	29	4	1	19	5	1	13	1	132
Opt Out	3	43	1	0	20	0	0	18	0	13	16	1	115
Escalation	0	2	0	0	0	0	0	0	0	0	1	0	3
Non-Program-Related	13	22	7	5	37	13	9	35	11	7	28	3	190
Switch to Email	4	15	0	0	13	1	0	23	9	0	5	1	61
Switch to Paper	0	0	0	0	0	0	0	1	0	0	0	0	1
Other	1	23	4	0	21	4	2	9	1	2	9	0	76
Total Reasons*	26	196	24	9	144	28	14	121	28	24	96	8	718

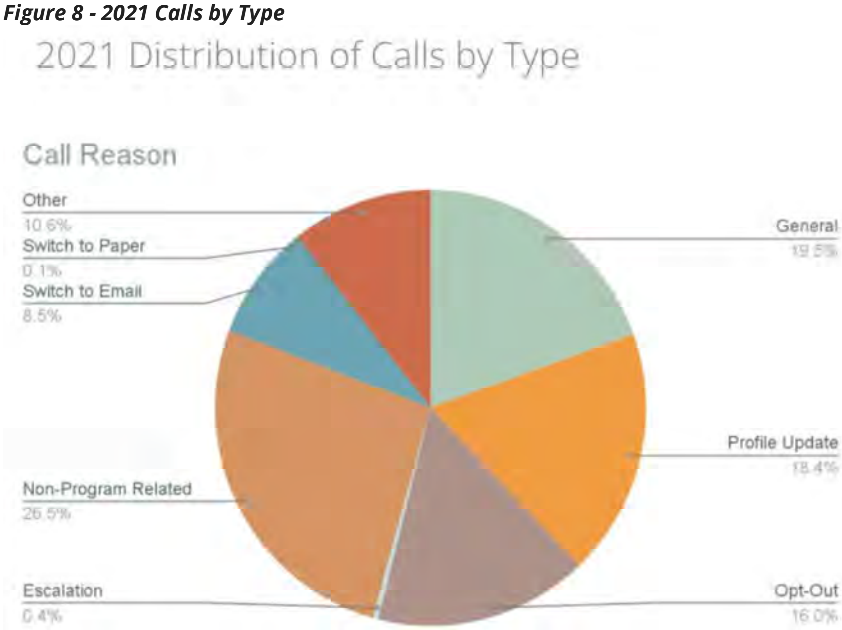
indicates report month

	2018	2019	2020	2021
Total Calls*	411	246	1,087	660

Some customers call in for more than one reason which is why there is a variance in Total Reasons and Total Calls.

- Other

Figure 8 - 2021 Calls by Type



Following are some sample notes from CSAs regarding phone calls from customers about the HER program:

- *“Energy efficiency incentive questions and application help”*
- *“customer liked the report and called in for EE recommendations”*
- *“[Customer] HER high bill all electric discussed ways to save, and encouraged her to fill our Home & App profiles. Family is working and schooling from home plus kids game on computers.”*
- *“Customer prefers to receive information via email”*
- *“[Customer] called about HER..discussed her appliances and all the ways she uses energy..she is very efficient except for the heating..has ceiling cable..slowly moving to mini splits so that will help for sure”*
- *“Customer knows she is a high electric user, has things like oxygen on 24/7 - does not feel the information is helpful as she does not have a lot of options to use less”*
- *“[Customer], likes the reports, find the tips helpful and provides good reminders. Was just 2ppl here now 9, 12,000 sqft, 2 story, full basement, 3 furnaces, 1 is a boiler, 3 AC, heated floors, in home biz x2, salon, 2 laundry rooms, 14ftx7ft 4ft deep heated swim spa. Filled out home profile to capture this info for next report.”*
- *“[Customer] HER Report Appliances & Lights Report wanted to know how calculated, based on usage and mathematical algorithm. Recommended My Acct sign up and completing home profile. We compared past reports and I verified sq ft for home is correct. 10 rooms have electric heat in 3 and rest is propane.”*
- *“Daughter called and said the reports upset her 86 year old mother. Daughter said the reports are insensitive because they do not consider elderly use of oxygen 24/7. She requested to be removed from the program.”*
- *“Wanted to know if there are any medical discount for running oxygen.”*
- *“EE questions to help reduce bill, and also gave her EA numbers”*

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	4	22	32	22	42	14	2	10	52	76	183	92	551
Total Clicks	4	27	32	22	45	14	2	16	53	76	184	92	567
Unique Page Views	10	65	5	10	40	10	2	38	10	8	49	25	272
Total Page Views	10	72	5	14	42	18	2	41	17	8	50	26	305

🗎 ***indicates report month***

From January 1, 2021 to December 31, 2021, there were a total of 272 unique page views (that is, people who navigated to the site) and 552 unique clicks within the site.

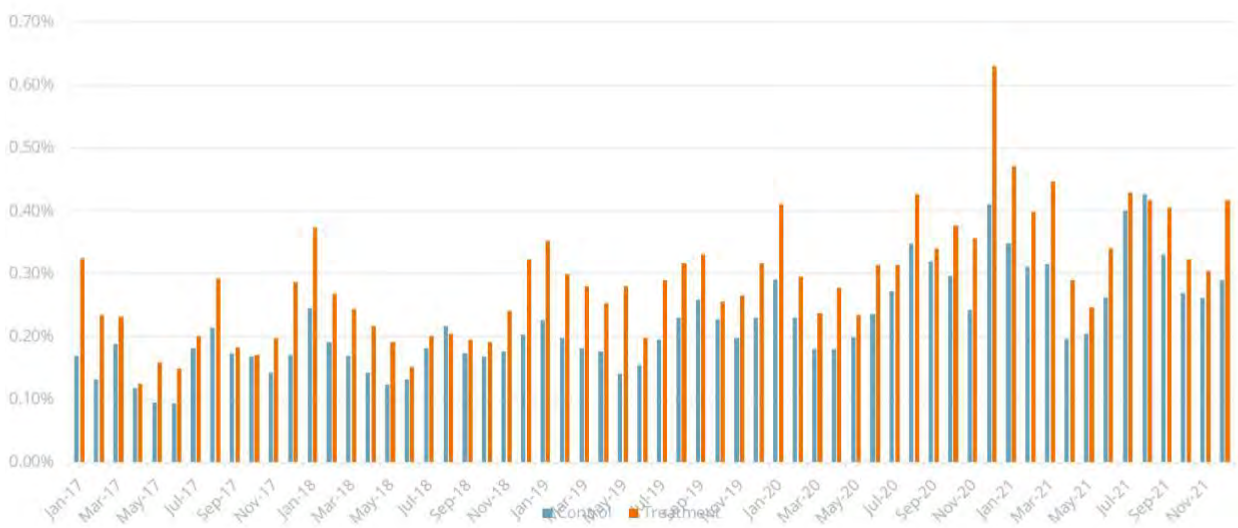
Low microsite usage is to be expected, as the site serves only to supplement the HER program and does not offer extra value to customers beyond answering basic FAQs. It is not a venue for customers to update their home profiles or opt out of the program; it functions primarily to help reduce call volumes.

The microsite link — http://idahopower.com/homeenergyreport — is available from HER reports.

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 0.07 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 2021 was 7.82% with 10,546 customers either opting out or being permanently removed for one of the following reasons: move-outs, incompatible location type, or incompatible property type. This is down from 2020 when permanent attrition rate was 9.4% with 11,850 customers either opting out or being permanently removed. Non-deliverables were removed prior to July 2021 but were kept in post July 2021.

NEW CUSTOMER (T6) ATTRITION RATES

Table 13 - T6 Attrition Rates in 2021

T6	Feb	May	Aug	Nov	Total
Permanent Removals					
Move Outs	1,501	1,702	2,199	2,265	7,667
Location	377	0	0	0	377
Property	5	14	24	8	51
Opt Outs	38	38	21	28	125
Temporary Removals					
AMI Insufficient/Negative Usage	513	374	901	996	2,784
USPS - Non Deliverables[2]	314	0	0	0	314
Total Removals	2,748	2,146	3,150	3,915	11,959
Insufficient Benchmarking	377	18	5	19	419
Reports Delivered	**98,238**	**96,277**	**93,791**	**91,233**	**379,539**

[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. In May of 2021 we started treating the undeliverable customers again which is why you see the USPS-Non Deliverables count drop to 0 starting in May.

EXISTING CUSTOMER (T12345) ATTRITION RATES

Table 14 - T1234 Attrition Rates in 2021

T12345	Feb	May	Aug	Nov	Total
Permanent Removals					
Move Outs	269	214	298	271	1,052
AMI Insufficient/Negative Usage/Unsupported Rate Code (IO6)	0	0	0	103	103
Location	0	0	0	0	0
Property	0	0	57	0	57
Opt Outs	4	7	1	1	13
Temporary Removals					
AMI Insufficient/Negative Usage	65	48	132	105	350
USPS - Non Deliverables	47	0	0	0	47
Total Removals	485	225	356	375	1,441
Insufficient Benchmarking	100	4	2	4	110
Reports Delivered	**16,915**	**16,652**	**16,263**	**15,965**	**65,795**

3. Process Improvements, Lessons Learned, and Future Considerations

3.1 Process Improvements

Process Opt-Outs Before the End of the Quarter

In 2021 we realized that there was a discrepancy between the number of opt-outs coming through the CSA reporting system (currently captured through Surveygizmo) and the number opt-outs captured in Uplight's backend system. This discrepancy was due to the timing of when the opt-outs were processed vs when the opt-outs were being captured in the CSA Report.

Historically opt-outs were processed in batches right before the next quarterly report was sent. For example, if a new opt-out was tracked in the CSA Report after the November 2020 report, the opt-out wouldn't be processed until right before the next report was sent in February of 2021. As a result, the quarterly opt-out numbers pulled from the CSA Report wouldn't match the quarterly opt-out numbers pulled from Uplight's backend system. This only affected reporting and did not impact whether customers were successfully opted out of the program in a timely manner.

Starting in Q4 of 2021, we began addressing this difference by processing all opt-outs received through Surveygizmo at the end of the quarter. This approach should sync up the opt-out data.

Improved Home Size Data

In the HER approval process, IPC noticed a relatively high number of samples were missing home size information. This was a concern as one of the eligibility filters used in the expansion should have removed all new participants without home size data. As a result, Uplight ran a report and found that 14,838 customers had unknown HomeSize—expressed in square feet. Although it's still unclear why these customers were included in the expansion, we wanted to improve the accuracy of the reports and improve the customer experience. To accomplish this, we implemented a multi-step solution to reduce the number of customers without HomeSize data. The first step was to ingest supplemental home size data from IPC. This brought the unknown HomeSize count down to 7,238 customers. From there, Uplight added additional 3rd party data, bringing it down to 5,020 customers. We then included an insert with the August HERs and followed up directly to customers through an email campaign on 9/22. This brought the unknown HomeSize count down to 4,763 customers.

Through these efforts, we were able to reduce the number of customers with unknown HomeSize by 67.9%.

Clarifying Language to Help Reduce Risk with Program Support Changes

In 2021 we saw numerous changes in the program's support with the unexpected passing and departure(s) of key program support team members. As new team members were onboarding, we realized there were inconsistencies and ambiguity in the terminology we use to discuss the program. To help reduce confusion and risk, we began clarifying and documenting our program terminology.

Example: The 2021 PSR defines Program Group and Evaluation Group. We also started defining these terms at the beginning of each quarterly monitoring report (QMR) as a refresher.

Included NCOA group (USPS undeliverables) in Program Group

Prior to May of 2021, customers flagged as NCOA/USPS undeliverable were moved out of the Program Group. Since they were retained in the Evaluation Group but no longer received reports, this created potential for diluting savings. In April, IPC compared the NCOA list with the mailing addresses in IPC's system and found no explicable reason they should have been removed. At IPC's request, Uplight developed a solution that allowed us to deliver reports to these participants and keep them in the Program Group.

From the May report throughout 2021, Uplight paid first class postage and worked with IPC and the printer to break these customers into their own send list so they could continue receiving reports. Immediately after implementing, this process improvement allowed us to treat an additional 128 customers in May 2021. To-date, IPC has not received HERs marked "return to sender" in any notable quantity.

3.2 Lessons Learned

In 2021 there were several lessons learned. These learnings serve as a way to identify future program improvement opportunities.

Two Filters Were Missed During the April 2020 T6 and C6 Customer Eligibility Selection

While preparing the extracts, Uplight discovered two filters had not been applied during the April 2020 eligibility process for selecting T6 and C6 customers. That resulted in 3,323 service point IDs that were previously removed from C1, C3, C4 due to optimization in 2018 and insufficient benchmarks in 2017, being selected into groups T6 and C6.

It's important to note that the "Optimization" and "Insufficient Benchmark" customers who made it into T6/C6 are all from C1, C3, and C4, so they are all customers who have never received treatment until they were added to T6/C6, meaning experimentally, that's still valid.

Additional context on "Insufficient Benchmark" and "Optimization":

> "Insufficient Benchmark": The "Insufficient Benchmark" applied to customers that did not have sufficient data to treat back in 2017. We now have enough data to treat these

customers. In terms of customer experience, these customers will have the same report experience as other customers in T6 and C6.

“Optimization": Back in 2018 Uplight identified attributes that could potentially lead to lower savings, then removed those customers from the T&C group to optimize savings. For a full explanation of optimization, reference year 2 of the Program Summary Reports posted February 26, 2020.

In terms of next steps, we recommend that both groups of customers remain in the evaluation group. As mentioned above, since the customers did not receive treatment prior to being added to T6/C6, so experimentally, they are still valid.

Updating Profiles with More Than One SPID

In 2021 we received a handful of customer inquiries about profile updates not appearing on their reports. After digging into the accounts, we discovered that these customers all had more than one SPID. In each case, the customer was updating the profile for the wrong service address. We are now aware of this issue and IPC has conducted training with the Customer Solutions Advisors (CSAs) who respond to HER inquiries.

No Statistically Significant Difference Between Including and Not Including Net Metering (IO6) Customers in Evaluation Group

Although IPC filtered out net metering customers during the expansion phase in 2020, there has been and will continue to be a significant number of customers who choose to install new customer generation (CG). Late in 2020, IPC decided to remove new CG customers from the Program Group. The HER team spent a significant amount of time deciding how to handle these customers in relation to the Evaluation Group. As a test, 2021 savings were calculated with and without IO6 customers included in the Evaluation Group.

When results were compared, we found that there was no statistically significant variance. All treatment groups were within the 95% confidence margin of error. With that in mind, we recommend including IO6 customers in the Evaluation Group moving forward to keep the integrity of the trial.

3.3 Future Considerations

Based on the findings from 2021, Utility Consumer Analytics/Uplight has the following recommendations for enhancing the program in 2021 and beyond:

Utility Consumer Analytics/Uplight to Implement Smart Notifications for CSA Escalations

Overall, the number of HER escalations is quite low - we’ve seen 23 escalations since 2017 and only 3 of those were in 2021. However, one escalation call received in 2021 brought an opportunity to light. Essentially, when customers call in with a HER related escalation, the CSA inputs notes on the call into a CSA survey. From there, the only way that the IPC Program Specialist knows about the escalation is through the weekly CSA Report that captures all CSA surveys. Escalations should be responded to quickly, and since the current process relies on a CSA Report which is pulled once a week, there may be a delay between when the escalation call takes place and when the IPC Program Specialist can act on the escalation.

The team concurs it's in IPC's best interest to reconfigure the CSA survey with "smart notification" so that an email is immediately sent to the IPC Program Specialist when an escalation is submitted to **Utility Consumer Analytics/Uplight** through a CSA survey. This will allow the Program Specialist to quickly respond within one business day to any calls marked as an escalation. Uplight is currently investigating the practicality of implementing this change.

Send eHERs All Customers with Emails

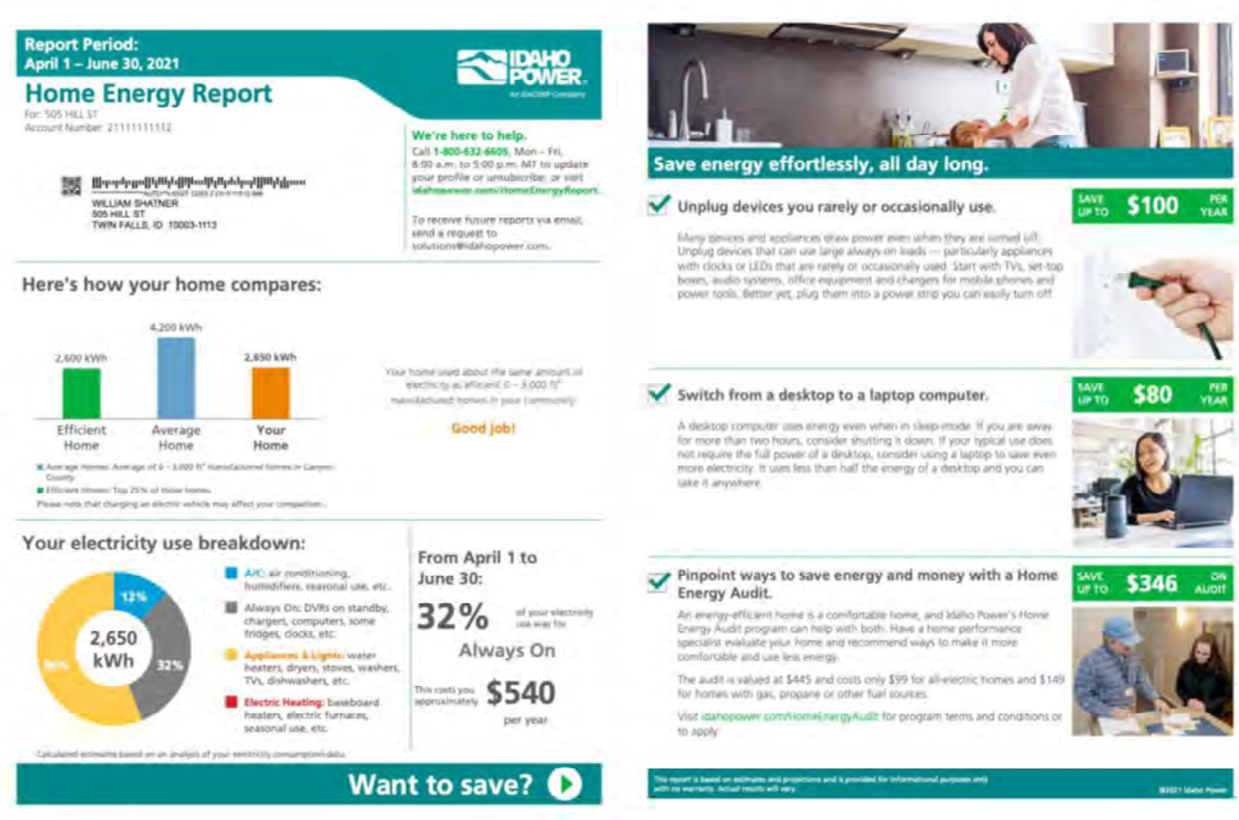
Currently only customers that opt-out of paper reports and into email reports receive emails. Uplight has the ability to start sending eHERs to all customers with email addresses. IPC could opt to send email reports in addition to paper reports. Customers would still be able to opt-into only receiving email reports if that is their preference.

Making this change would allow for an additional low-cost touch point for customers. Due to the current email reports being opt-in only, we would expect that proactively sending email reports to all customers would decrease the email open rate and click-through-rate but increase the overall email engagement.

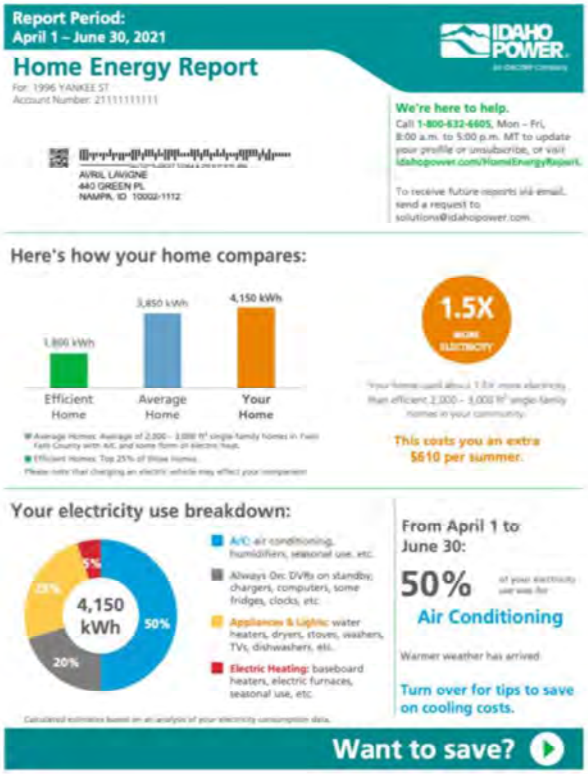
4. Appendices

3.1 Appendix A: Sample Home Energy Reports

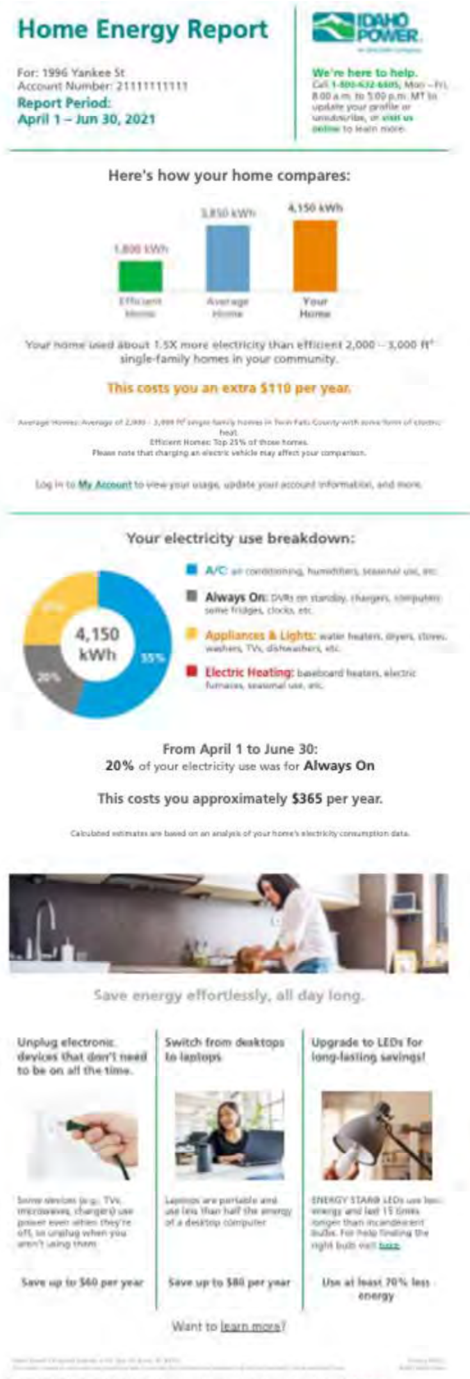
A-1. Sample Print HER — Always-On Tips



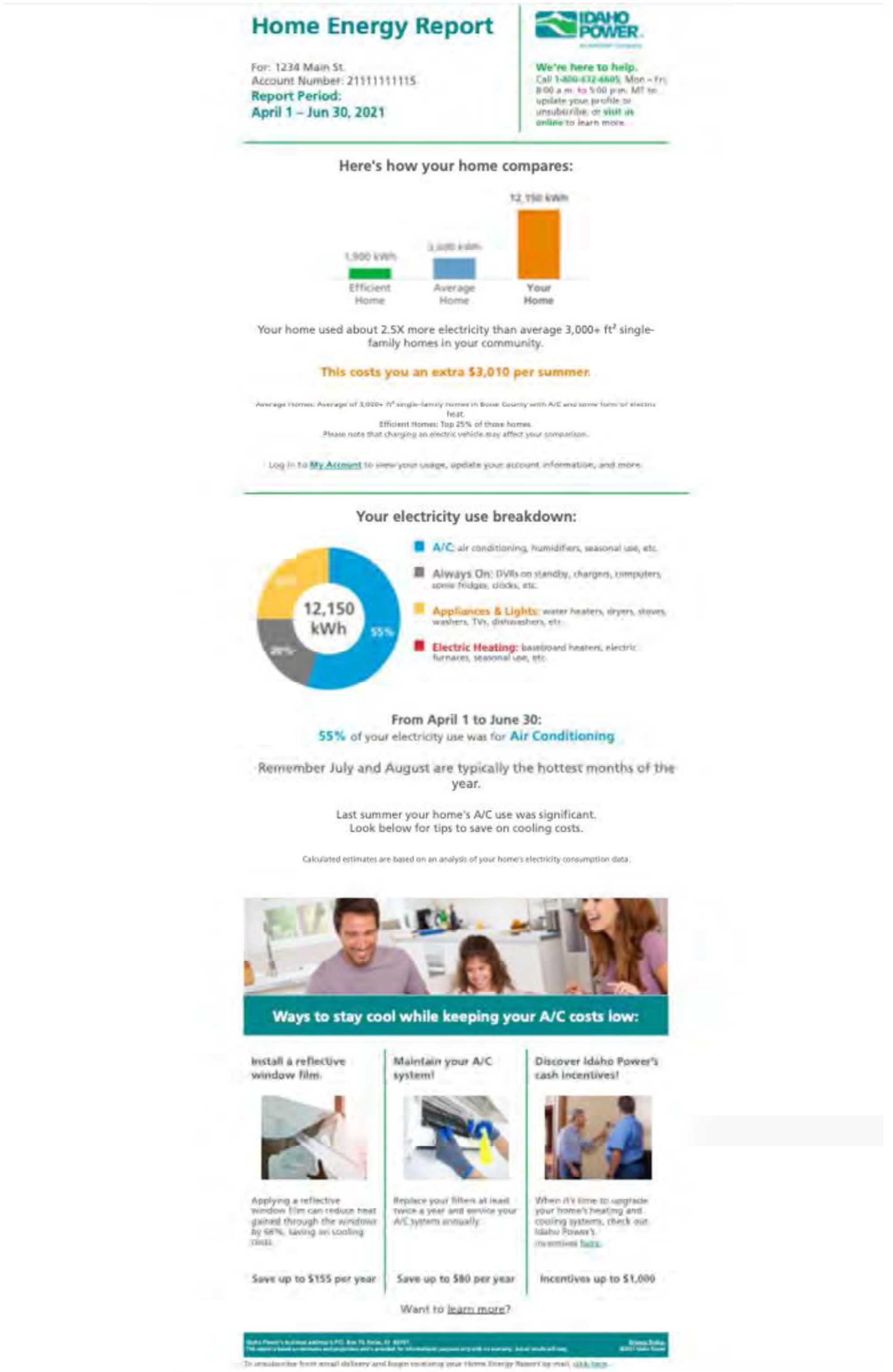
A-2. Sample Print HER — A/C Tips



A-3. Sample Email Report — Always-On Tips

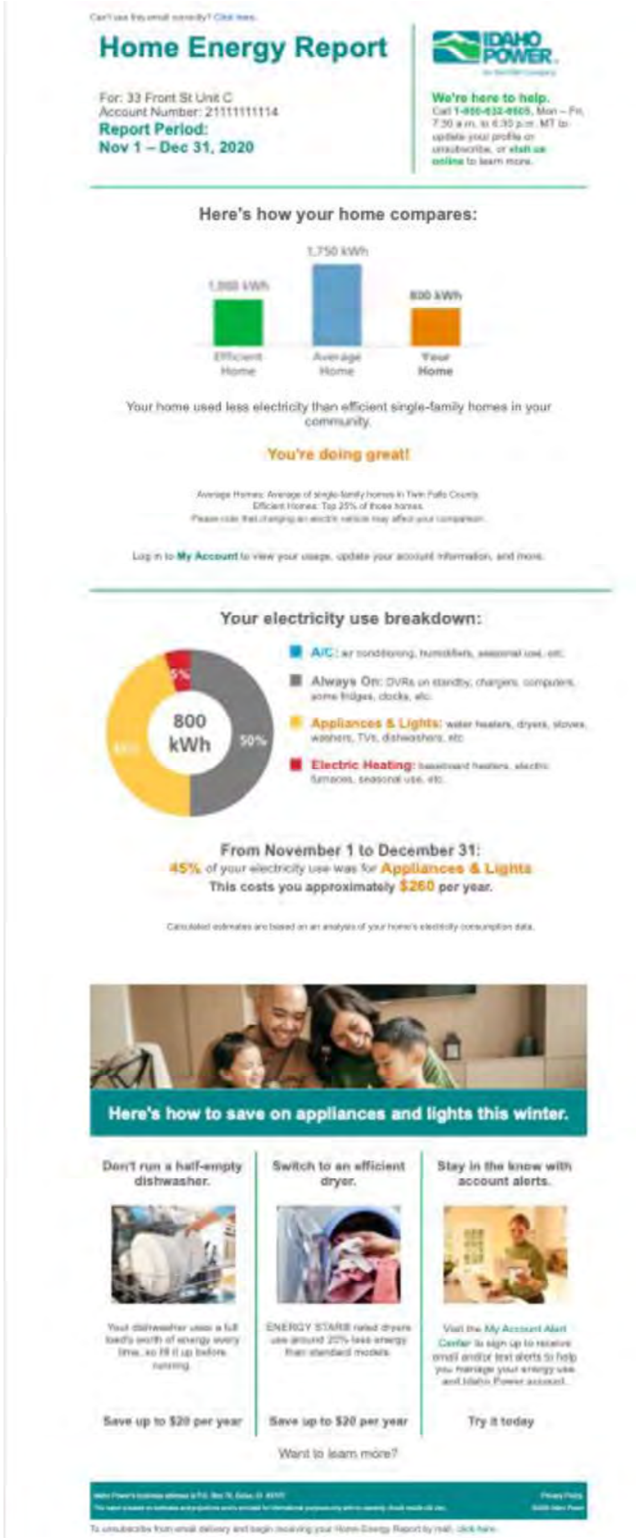


A-4. Sample Email Report — A/C Tips



A-5. Sample Print Report — Appliances & Lights Tips

A-6. Sample Email Report — Appliances & Lights Tips



Home Energy Report

For: 33 Front St Unit C
Account Number: 21111111114
Report Period:
Nov 1 – Dec 31, 2020

IDAHO POWER

We're here to help.

Here's how your home compares:

Efficient Home	Average Home	Your Home
	1,750 kWh	800 kWh

Your home used less electricity than efficient single-family homes in your community.

You're doing great!

Your electricity use breakdown:

800 kWh

A/C: air conditioning, humidifiers, seasonal use, etc.

Always On: DVRs on standby, chargers, computers, some fridges, clocks, etc.

Appliances & Lights: water heaters, dryers, stoves, washers, TVs, dishwashers, etc.

Electric Heating: baseboard heaters, electric furnaces, seasonal use, etc.

From November 1 to December 31:
45% of your electricity use was for Appliances & Lights
This costs you approximately $260 per year.

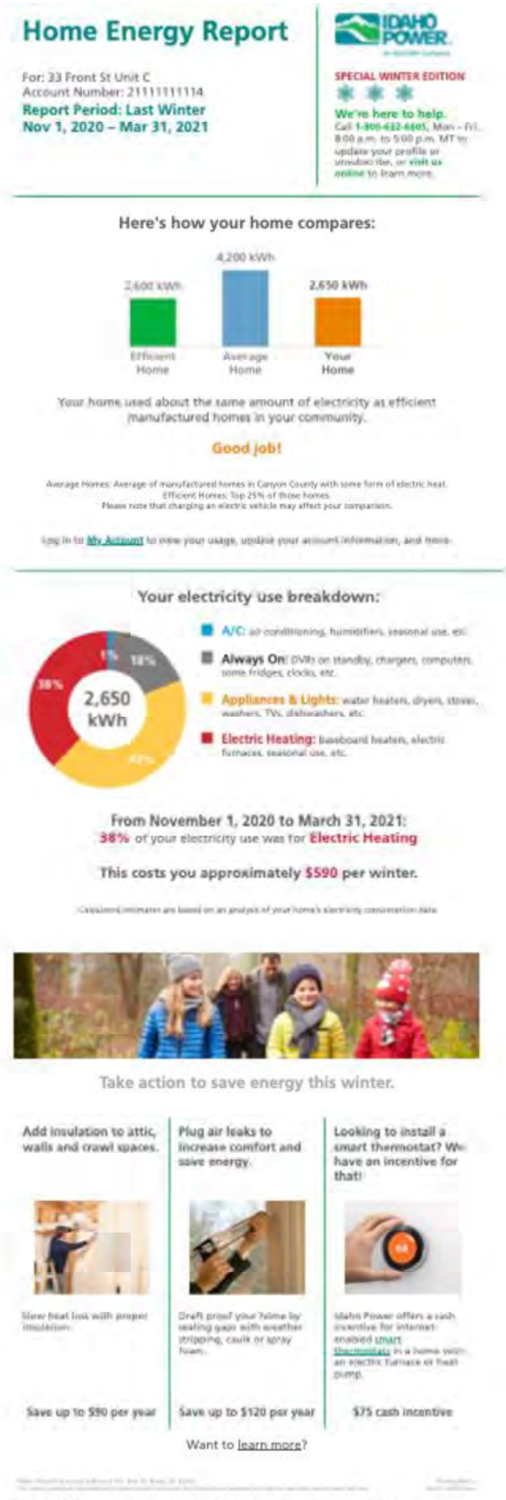
Here's how to save on appliances and lights this winter.

Don't run a half-empty dishwasher.	Switch to an efficient dryer.	Stay in the know with account alerts.
Save up to $20 per year	Save up to $20 per year	Try it today

Want to learn more?

A-7. SAMPLE PRINT REPORT — HEATING TIPS

A-8. Sample Email Report — Heating Tips



Home Energy Report

IDAHO POWER

For: 33 Front St Unit C
Account Number: 21111111114
Report Period: Last Winter
Nov 1, 2020 – Mar 31, 2021

SPECIAL WINTER EDITION

We're here to help.
Call 1-800-432-4405, Mon – Fri, 8:00 a.m. to 5:00 p.m. MT to update your profile or unsubscribe, or visit us online to learn more.

Here's how your home compares:

Your home used about the same amount of electricity as efficient manufactured homes in your community.

Good job!

Average Homes: Average of manufactured homes in Canyon County with some form of electric heat.
Efficient Homes: Top 25% of those homes.
Please note that charging an electric vehicle may affect your comparison.

Log in to My Account to view your usage, update your account information, and more.

Your electricity use breakdown:

- **A/C:** air conditioning, humidifiers, seasonal use, etc.
- **Always On:** DVRs on standby, chargers, computers, some fridges, clocks, etc.
- **Appliances & Lights:** water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
- **Electric Heating:** baseboard heaters, electric furnaces, seasonal use, etc.

From November 1, 2020 to March 31, 2021:
38% of your electricity use was for **Electric Heating**

This costs you approximately $590 per winter.

Take action to save energy this winter.

Add insulation to attic, walls and crawl spaces.	Plug air leaks to increase comfort and save energy.	Looking to install a smart thermostat? We have an incentive for that!
Slow heat loss with proper insulation.	Draft proof your home by sealing gaps with weather stripping, caulk or spray foam.	Idaho Power offers a cash incentive for internet-enabled smart thermostats in a home with an electric furnace or heat pump.
Save up to $90 per year	Save up to $120 per year	$75 cash incentive

Want to learn more?

To unsubscribe from email delivery and begin receiving your Home Energy Report by mail, click here.

www.adaptiveconsumerengagement.com

3.2 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	May 10, 2021	January 1, 2021 – March 31, 2021
Q2	July 30, 2021	April 1, 2021 - June 30, 2021
Q3	November 4, 2021	July 1, 2021 - September 30, 2021
Q4	February 5, 2022	October 1, 2021 - December 31, 2021

Idaho Power Company Home Energy Report Program Y4

Quarterly Monitoring Report (January 1, 2021 – March 31, 2021)

Presented on May 10, 2021

Aclara™

Agenda

Program Overview

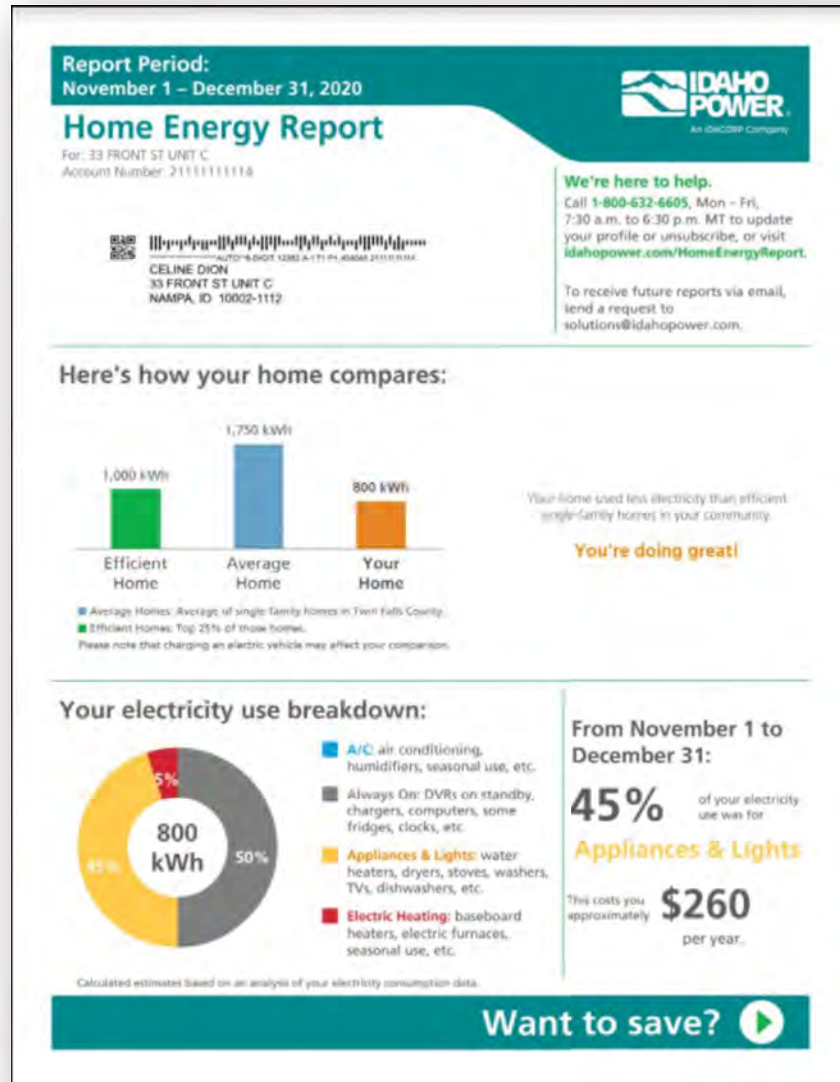
Savings Estimates

Program Results

Microsite and CSA Results

Attrition and Opt-outs

Questions



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Home Energy Report Program Overview

YR4 Program Design

Total # of Treated Customers 115,252

Group	Size
T1 (electric heating)	5,009
T2 (electric heating)	4202
T3	5,264
T4	2,452
T6	98,325

Pilot Customers Treated: **16,927**

Total Customers Treated: **115,252**

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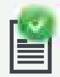
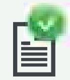
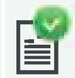
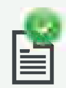
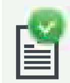
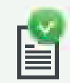
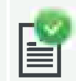
Report Schedule

	2020											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4												
T5*												
T6												

	2021											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6												

*T5 customers were removed from treatment in May 2020

Program Savings Summary

Quarterly Savings Summary

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	January 1, 2021 – March 31, 2021	80.88	1,456,547	1.67
T6	January 1, 2021 – March 31, 2021	30.06	2,955,215	0.80
T12346	January 1, 2021 – March 31, 2021	37.93	4,411,762	0.93

	T1	T2	T3	T4	T6
Treatment	5,324	4,665	5,468	2,551	98,320
Control	1,329	746	3,248	2,385	13,398

Quarterly Aggregate Energy Savings

Cohort	Average Energy Savings in kWh per Customer in the Treatment Period	Cumulative Savings (all months, all households, kWh)	Treatment Period
T1234	80.88	1,456,547	January 1, 2021 – March 31, 2021
T6	30.06	2,955,215	January 1, 2021 – March 31, 2021
T12346	37.93	4,411,762	January 1, 2021 – March 31, 2021

	T1	T2	T3	T4	T6
Treatment	5,324	4,665	5,468	2,551	98,320
Control	1,329	746	3,248	2,385	13,398

Statistical Significance of Savings Calculated

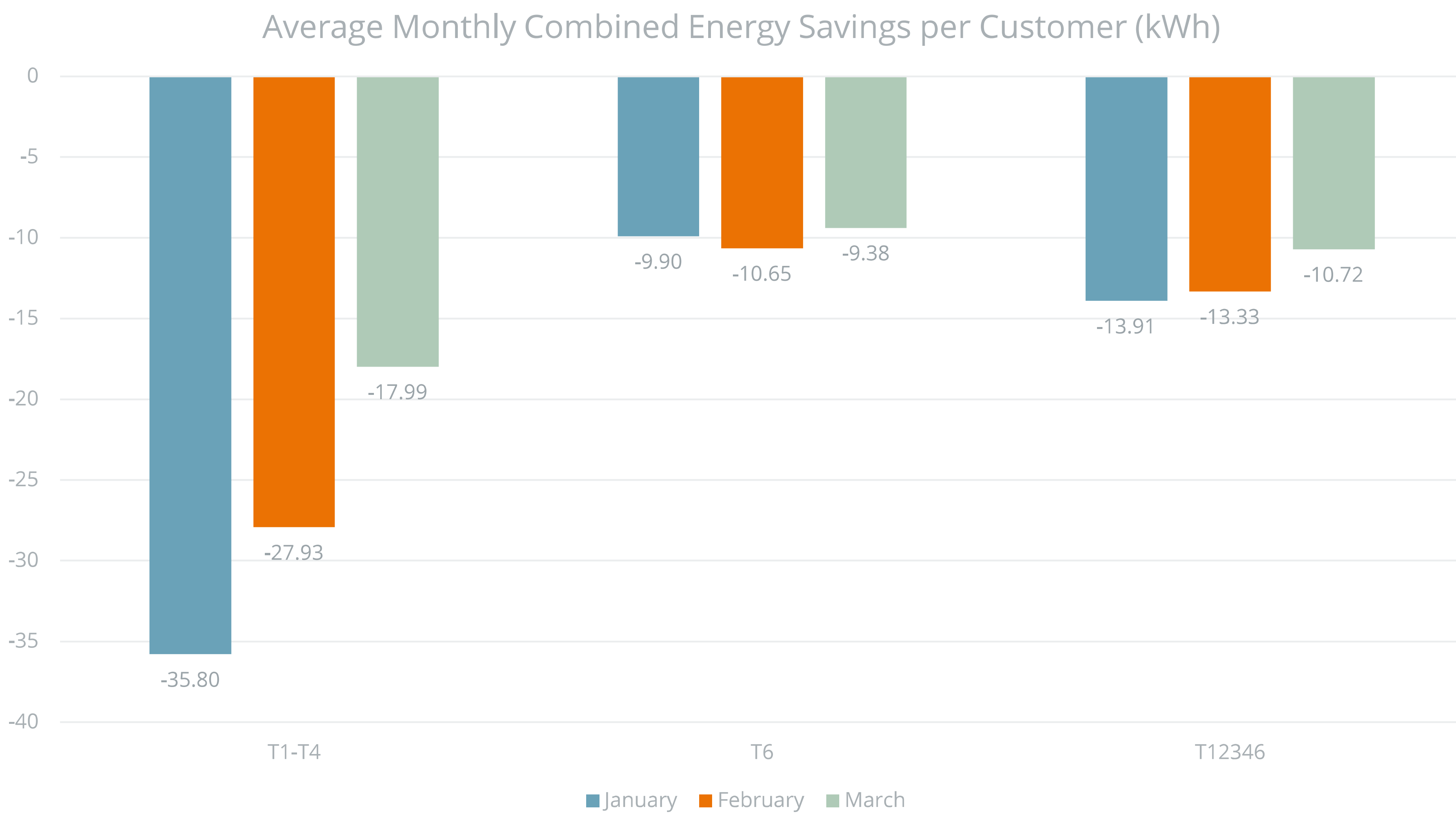
Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	80.88	19.39	1.45669E-16	TRUE	January 1, 2021 – March 31, 2021
T6	30.06	18.055	0.000551	TRUE	January 1, 2021 – March 31, 2021
T12346 Combined	37.93	6.91	2.91433E-27	TRUE	January 1, 2021 – March 31, 2021

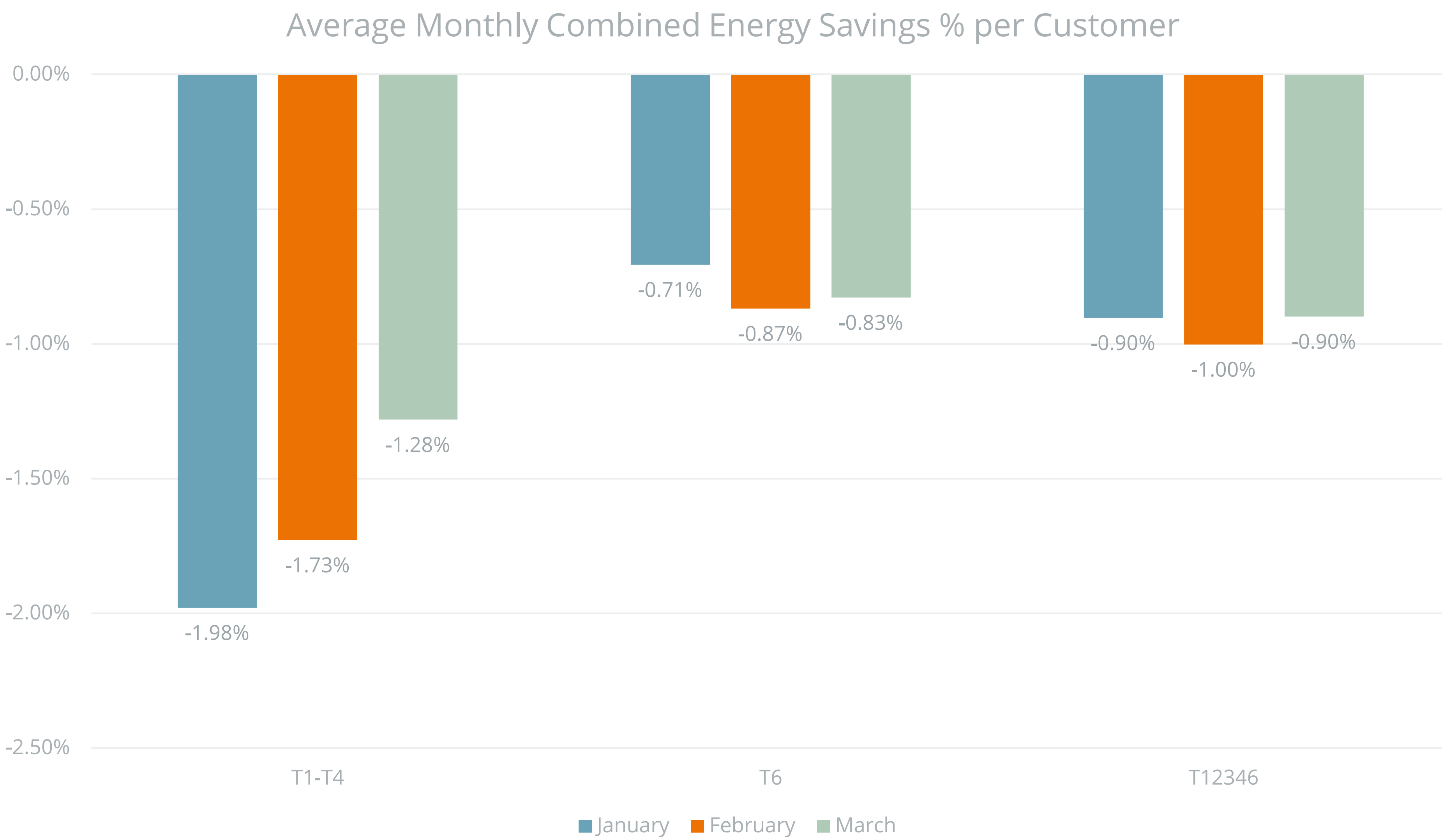
	T1	T2	T3	T4	T6
Treatment	5,324	4,665	5,468	2,551	98,320
Control	1,329	746	3,248	2,385	13,398

HER Program Results

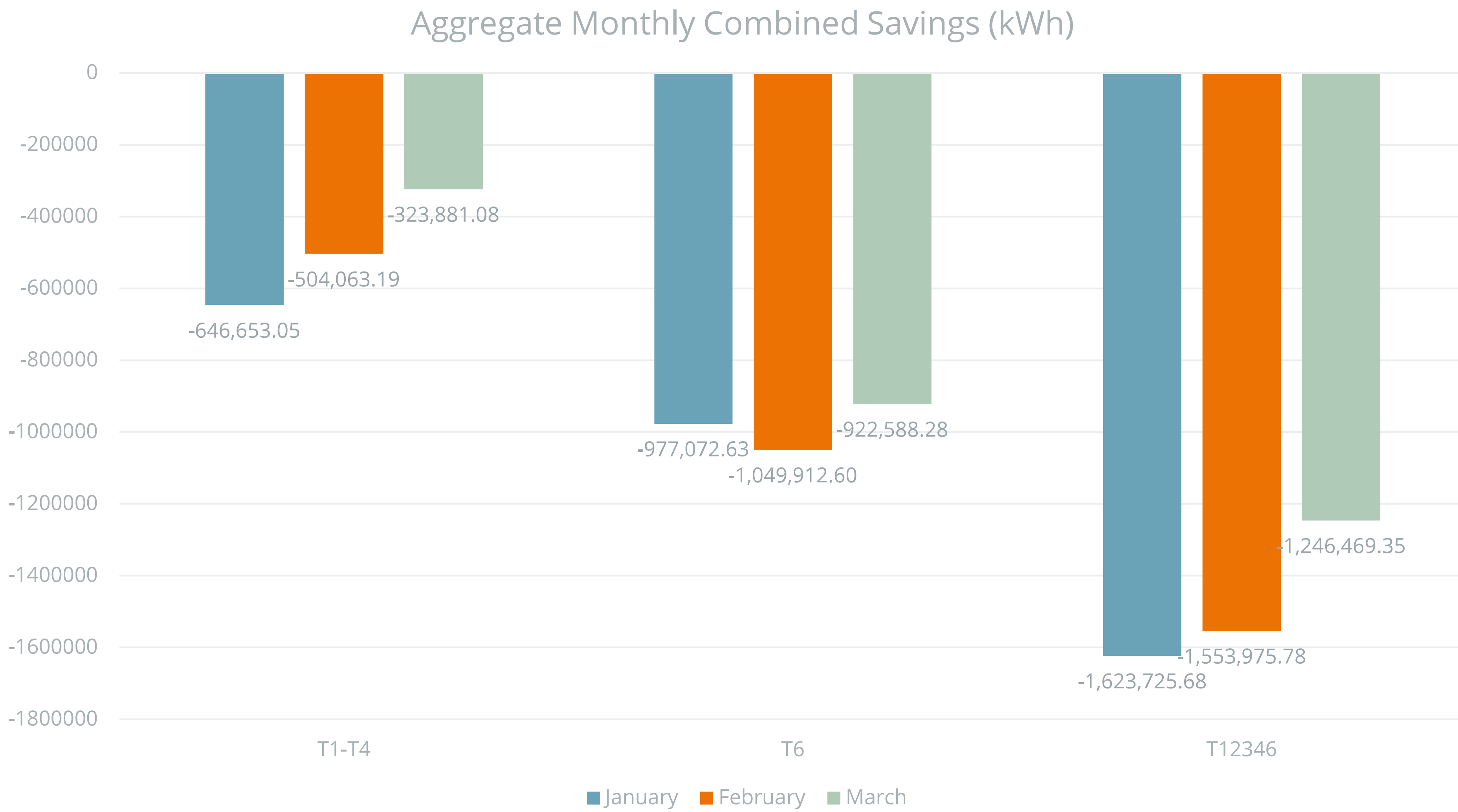
Average Energy Savings in kWh per Customer



Average Monthly Energy Savings in %



Aggregate Monthly Savings



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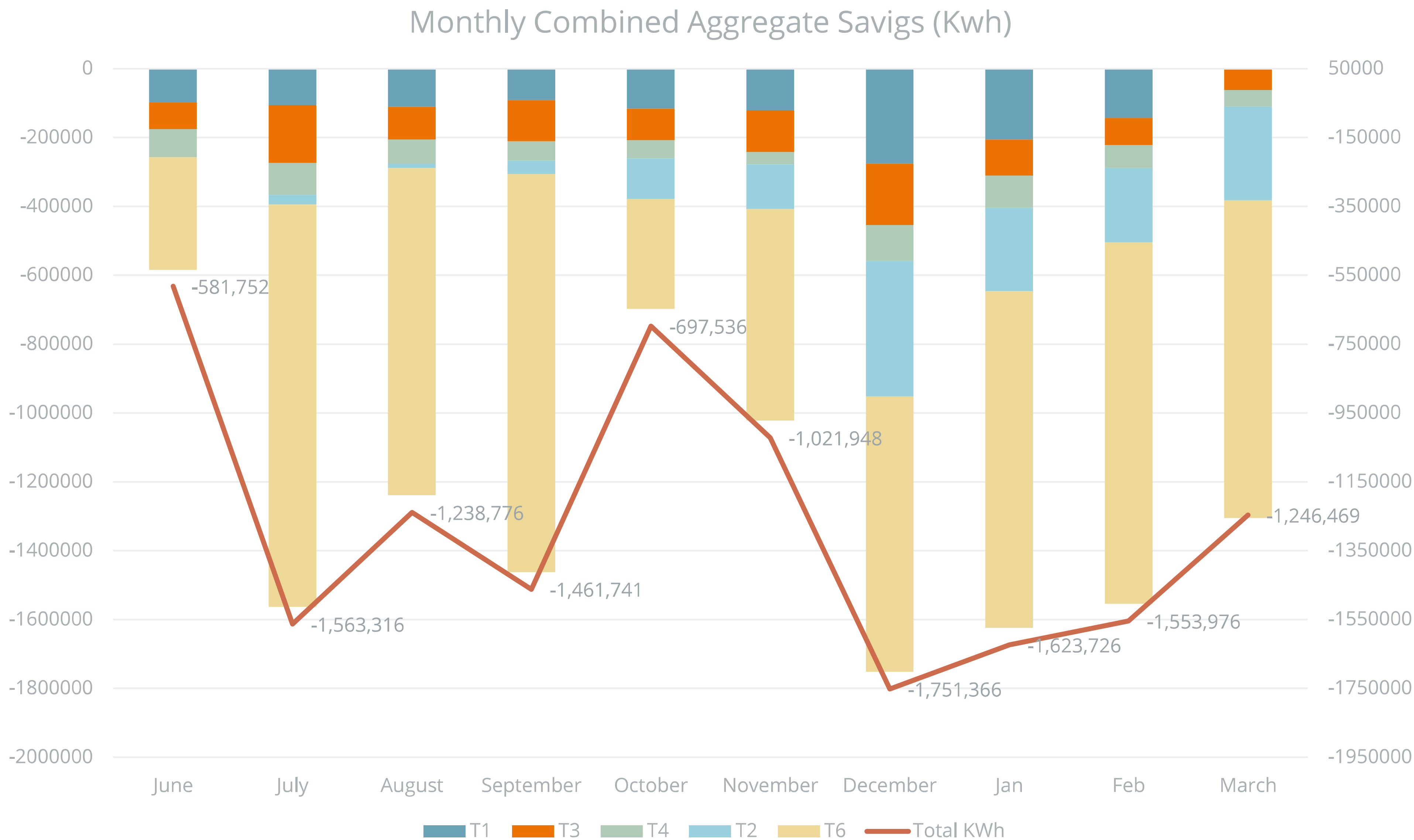
Combined Aggregate Savings by Month (kWh)



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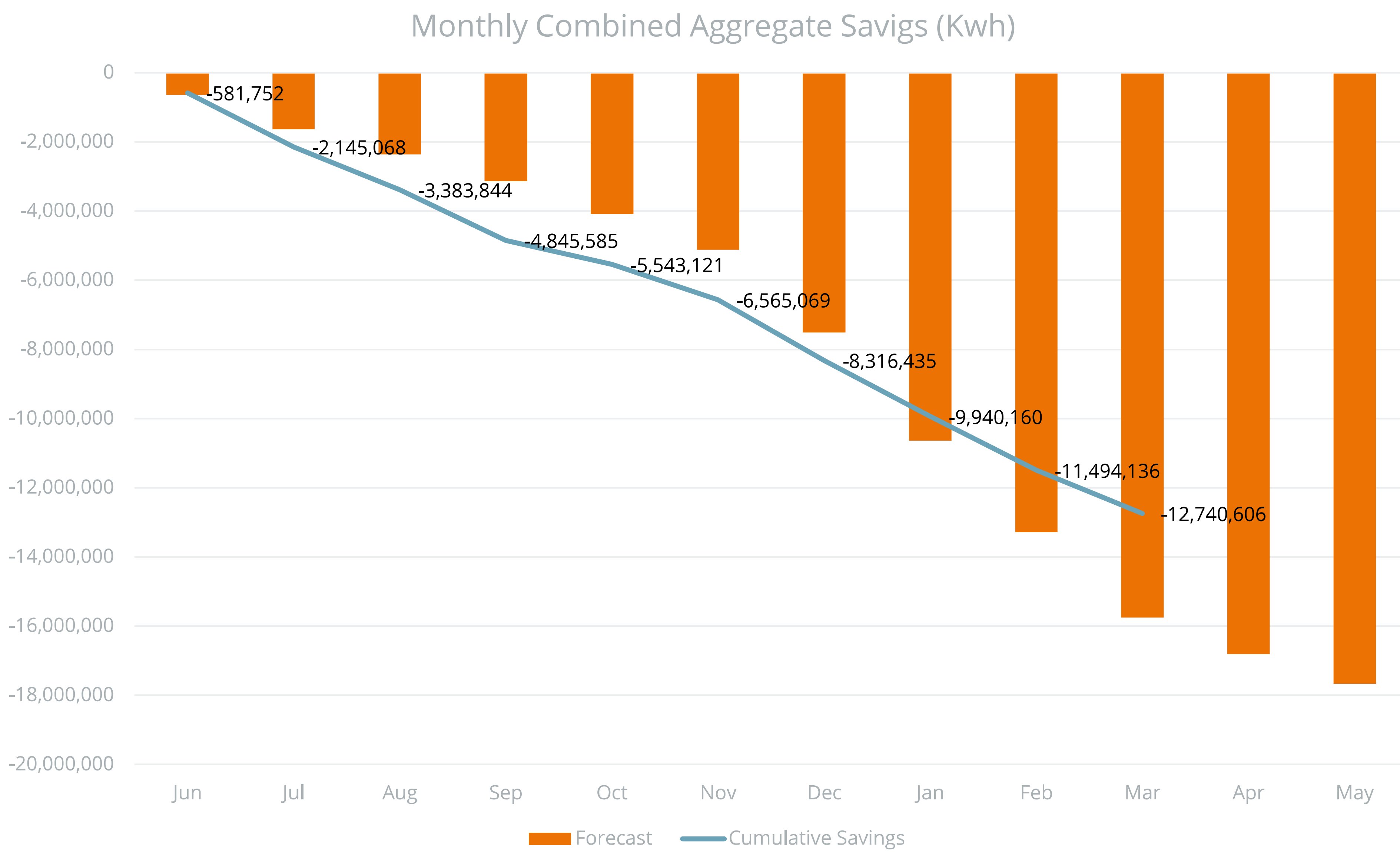
Cumulative Combined Savings by Month (kWh)



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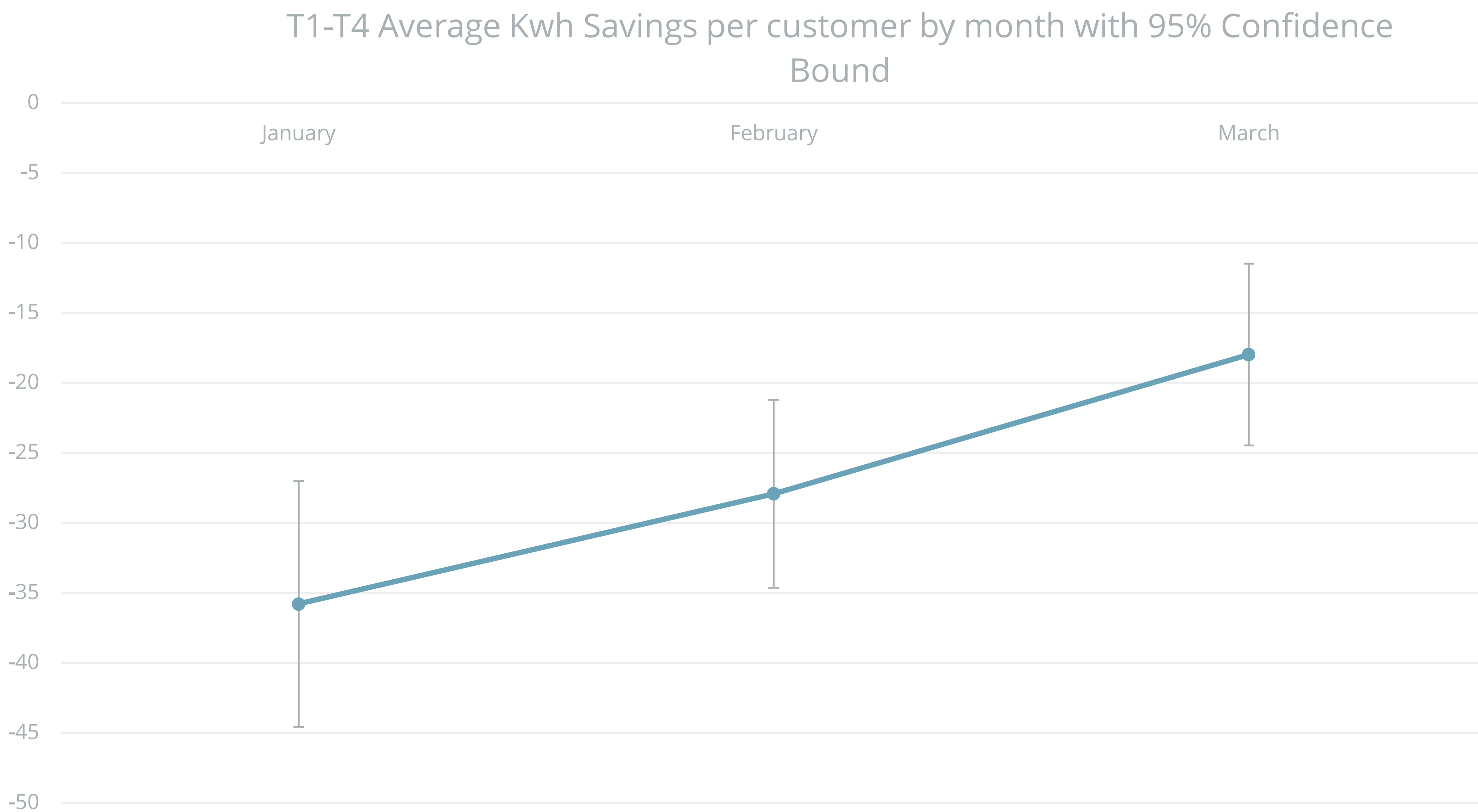
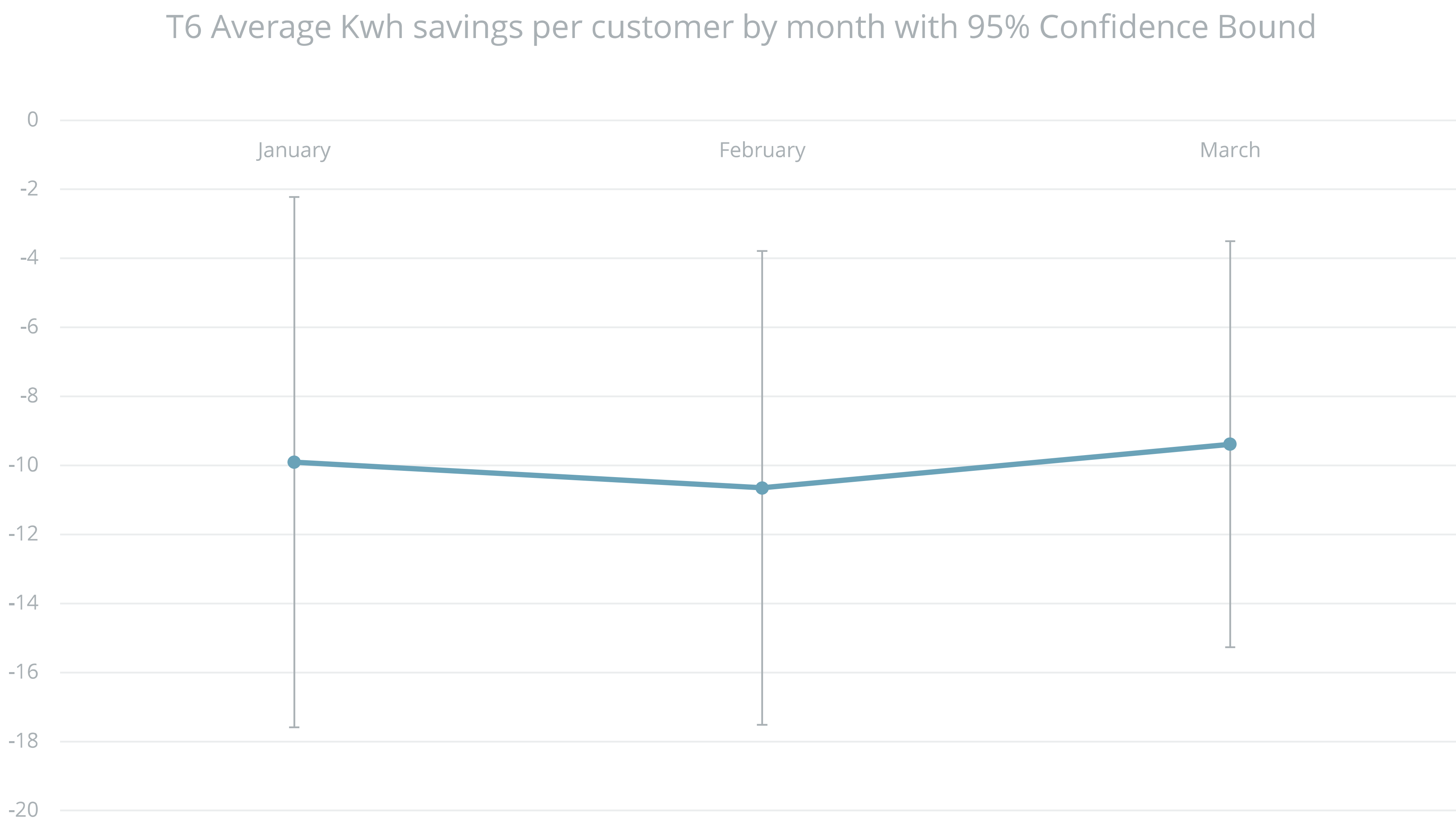
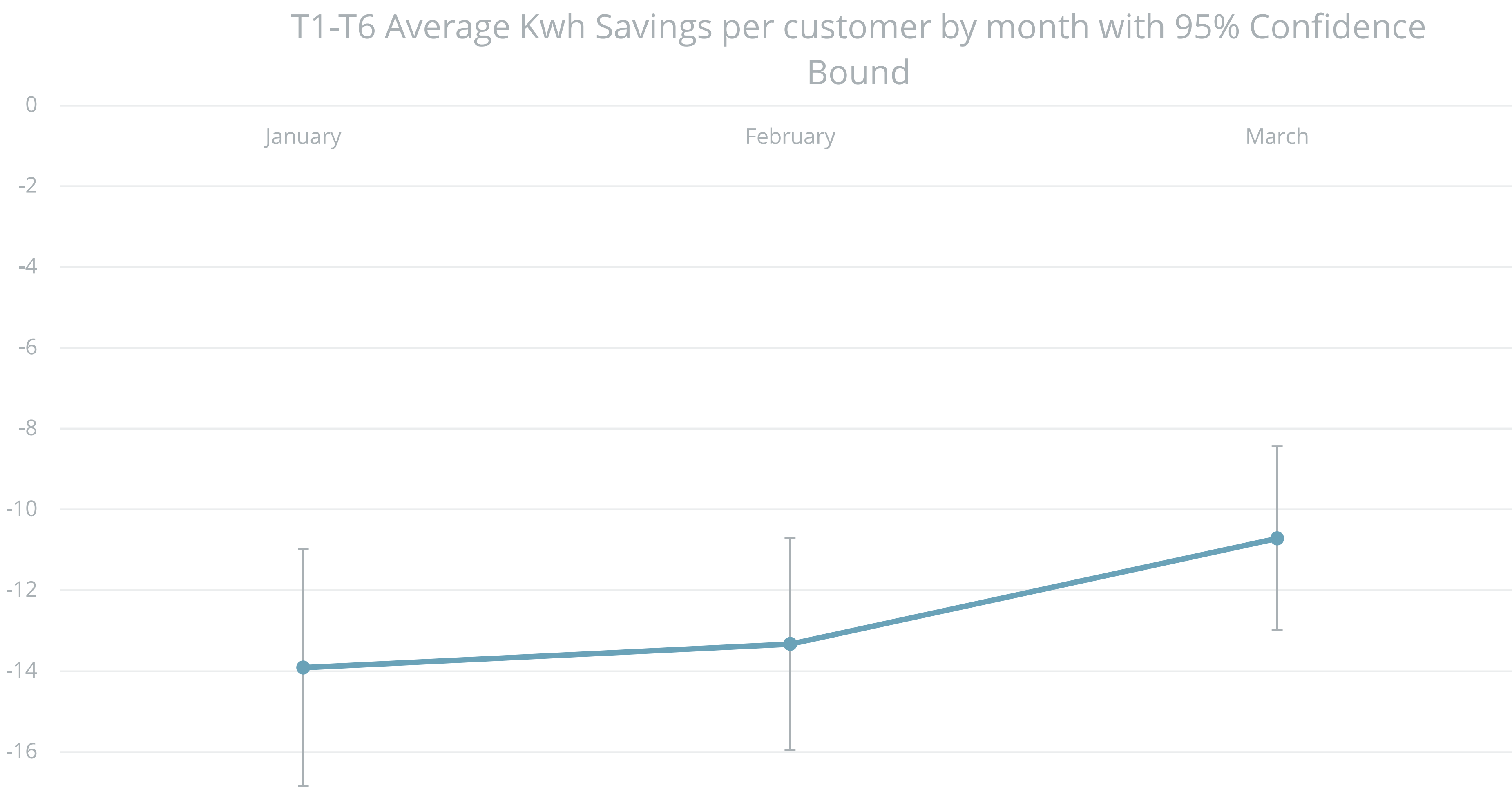
T1234 Energy Savings Confidence Intervals



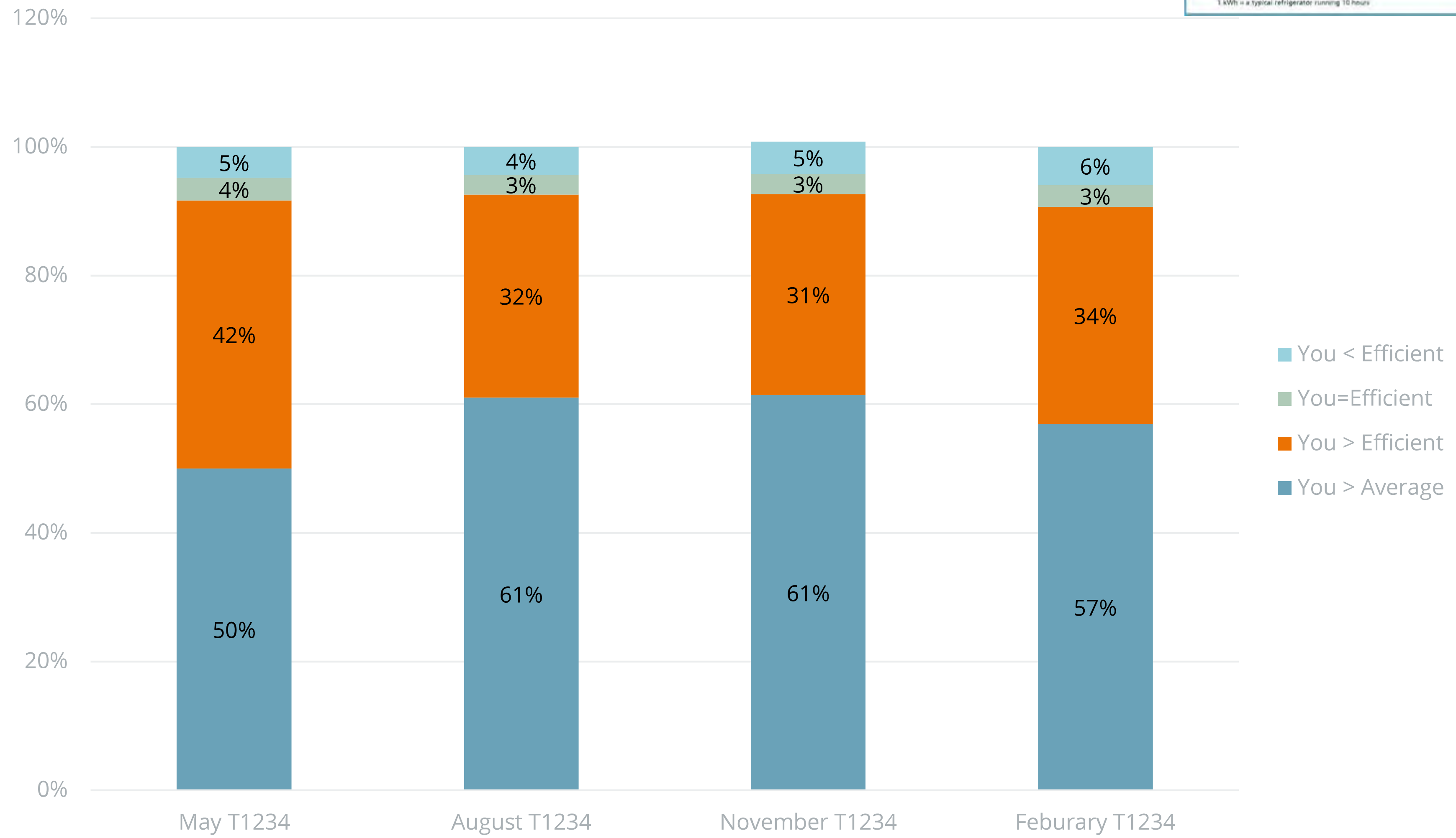
T6 Energy Savings Confidence Intervals



T12346 Energy Savings Confidence Intervals



T1234 Peer Comparison Distribution



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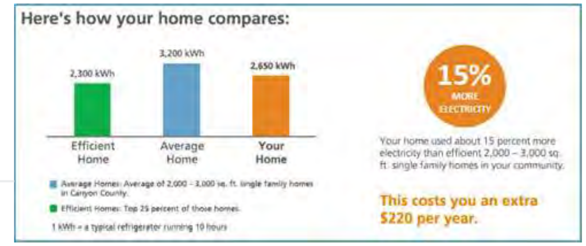
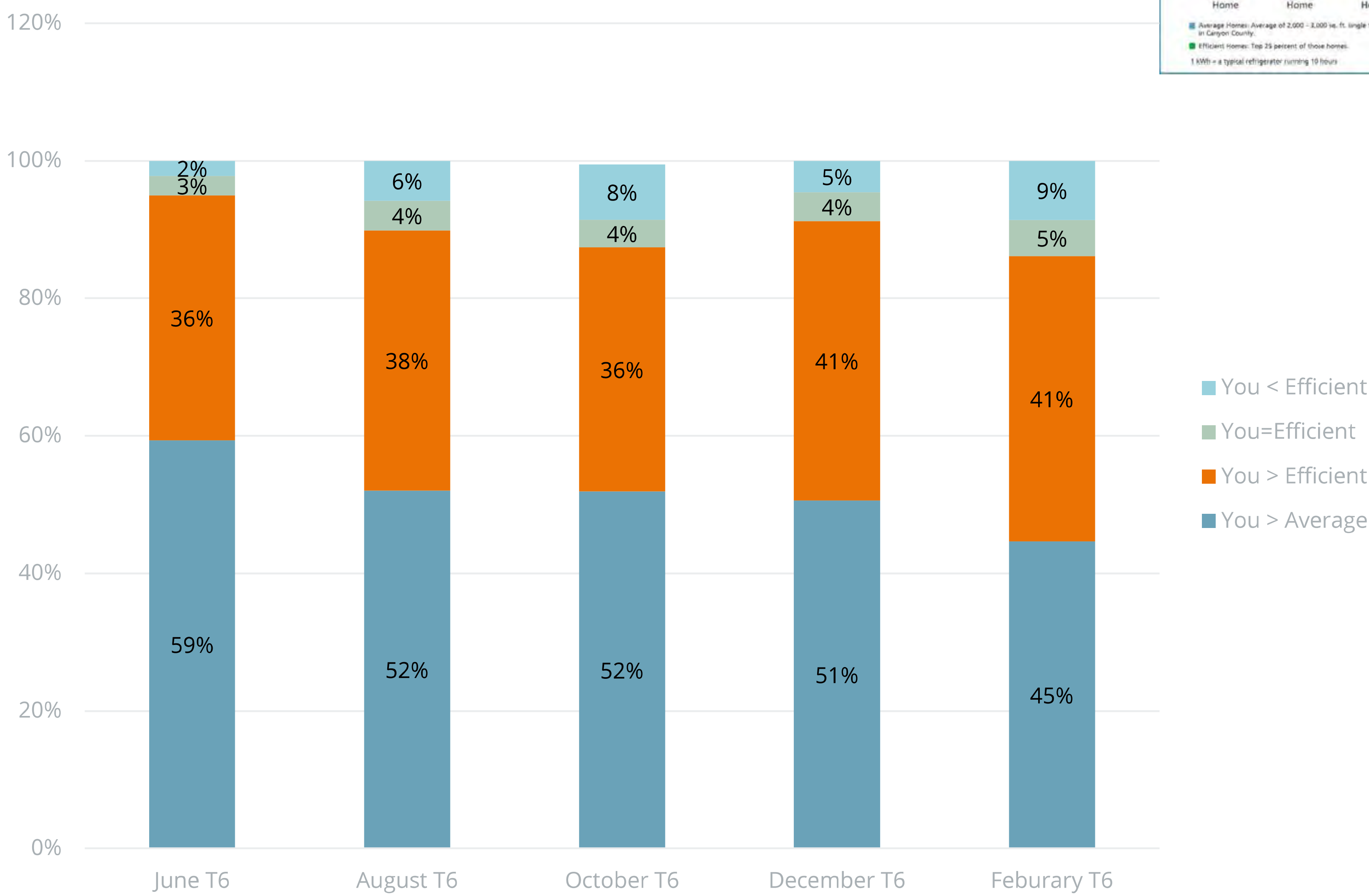
T6 Peer Comparison Distribution





Attrition Overview – All Groups

T12345	Feb	May	Aug	Nov	Feb	Total
Permanent Removals						
Move Outs	263	238	90	470	269	1330
AMI Insufficient/Negative Usage	119	0	0	0	0	119
Location	0	0	0	0	0	0
Property	2	2	0	1	0	5
Opt Outs	7	5	2	3	4	21
USPS - Non Deliverables	44	15	26	19	47	151*
Temporary Removals						
AMI Insufficient/Negative Usage	0	67	81	33	65	246
Total Removals	435	327	199	526	485	1972
Insufficient Benchmarking	0	0	12	0	100	112
Reports Delivered	**20,197**	**18,126**	**17,773**	**17,346**	**16,915**	**90,357**

T6	Jun	Aug	Sep	Dec	Feb	Total
Permanent Removals						
Move Outs	517	689	3155	1874	1501	7736
Location	28	33	207	0	377	612
Property	3	11	15	13	5	47
Opt Outs	0	63	48	26	38	175
USPS - Non Deliverables	1009	1053	964	988	314	4328*
Temporary Removals						
AMI Insufficient/Negative Usage	5	358	413	422	513	1711
Total Removals	1562	2207	4802	3323	2748	14,642
Insufficient Benchmarking	28	34	207	0	377	612
Reports Delivered	**106,941**	**105,267**	**102,314**	**100,560**	**98,238**	**513,320**

*there are ongoing discussions regarding how we can reduce the number of non deliverables.

Attrition and Opt Out Rates

All Treatment Customers (January 2021 – March 2021)		
Permanent Removals	2,655	2.24%
Opt Outs	42	0.035%

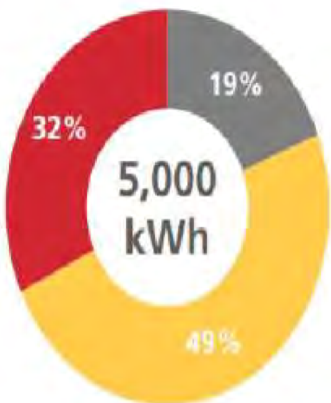
T1234 Customers (January 2021 – March 2021)		
Permanent Removals	420	2.41%
Opt Outs	4	0.02%

T6 Customers (January 2021 – March 2021)		
Permanent Removals	2,235	2.21%
Opt Outs	38	0.038%

Average Electricity Use Breakdown

T1234 Customers
Oct – Dec 2020

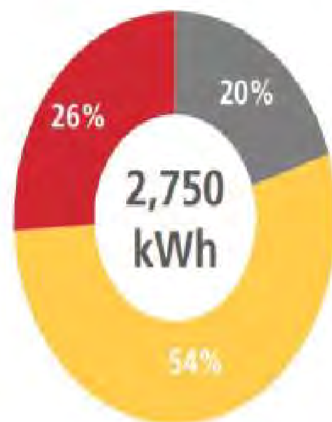
Your electricity use breakdown:



- **A/C:** air conditioning, humidifiers, seasonal use, etc.
- **Always On:** DVRs on standby, chargers, computers, some fridges, clocks, etc.
- **Appliances & Lights:** water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
- **Electric Heating:** baseboard heaters, electric furnaces, seasonal use, etc.

T6 Customers
Nov – Dec 2020

Your electricity use breakdown:

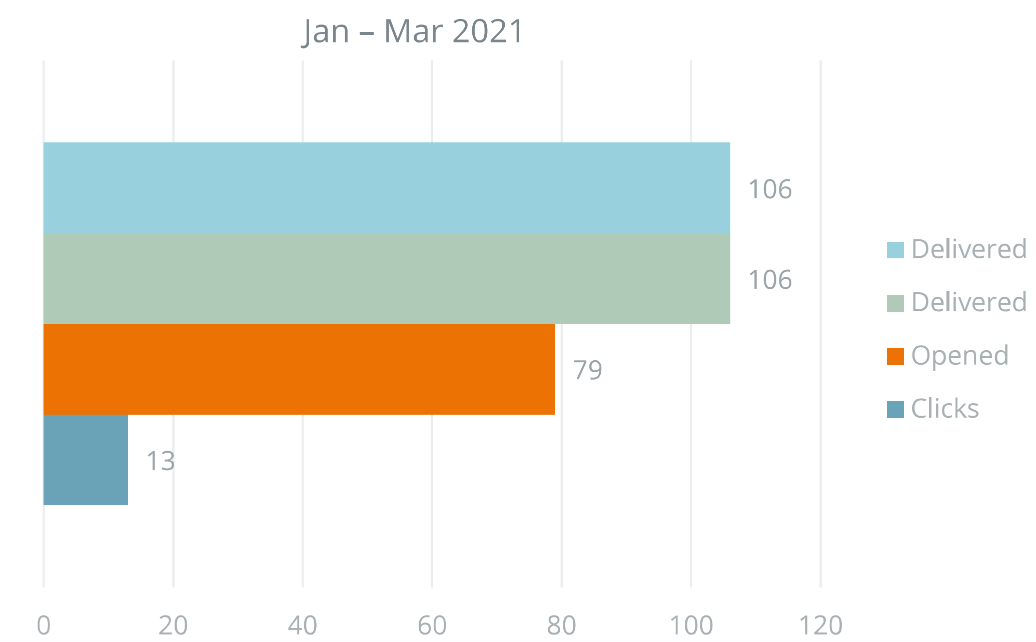


- **A/C:** air conditioning, humidifiers, seasonal use, etc.
- **Always On:** DVRs on standby, chargers, computers, some fridges, clocks, etc.
- **Appliances & Lights:** water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
- **Electric Heating:** baseboard heaters, electric furnaces, seasonal use, etc.

Email Open Rates Remain High

	May	Aug	Oct	Nov	Dec	Feb
Total # of emails	12	55	75	16	89	106
Click-through Rate	25%	7.5%	7.7%	8.3%	22.6%	16.5%
Open Rate	73%	73%	69%	75%	70%	75%
Unsubscribe clicks	0	0	0	0	0	0
Unsubscribe rate	0%	0%	0%	0%	0%	0%
Click rate on rebate link	0%	0%	0%	0%	0%	4%

- 15 total old customers switched to email (0.1%)
- 110 total new customers switched to email (0.08%)
- 106 total emails were delivered in 2021



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Email Click-Throughs

	Feb	May	Aug	Oct	Nov	Dec	Feb
View HTML	0	1	0	1	0	6	0

	Feb	May	Aug	Oct	Nov	Dec	Feb
Rebates	0	0	0	0	0	5	3

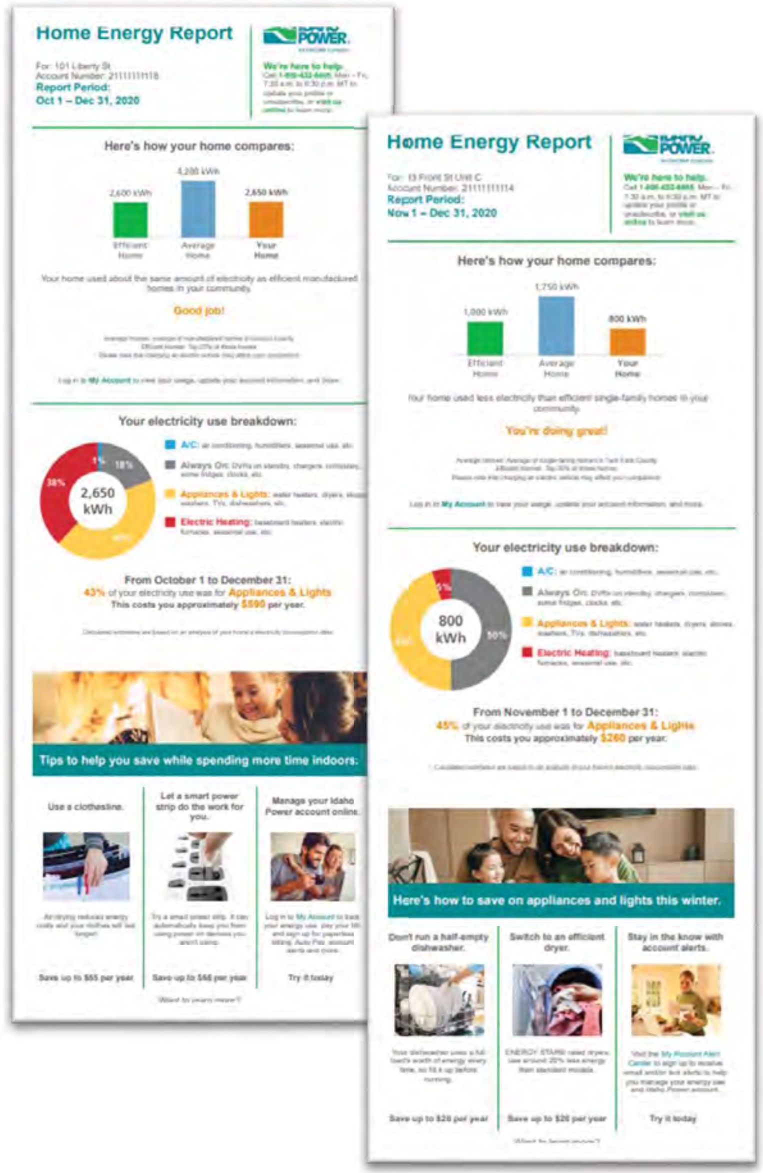
	Feb	May	Aug	Oct	Nov	Dec	Feb
MyAccount	0	1	1	2	1	2	6

	Feb	May	Aug	Oct	Nov	Dec	Feb
FAQ	0	0	0	0	0	0	0

	Feb	May	Aug	Oct	Nov	Dec	Feb
Privacy	0	0	0	0	0	0	0

	Feb	May	Aug	Oct	Nov	Dec	Feb
Learn More	0	0	0	1	0	1	0

	Feb	May	Aug	Oct	Nov	Dec	Feb
Unsubscribe	0	0	0	0	0	0	0



CSA & Microsite Analysis

Microsite Activity

Microsite Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Unique Clicks	4	22	32										**58**
Total Clicks	4	27	32										**63**
Unique Page Views	10	65	5										**80**
Total Views	10	72	5										**87**

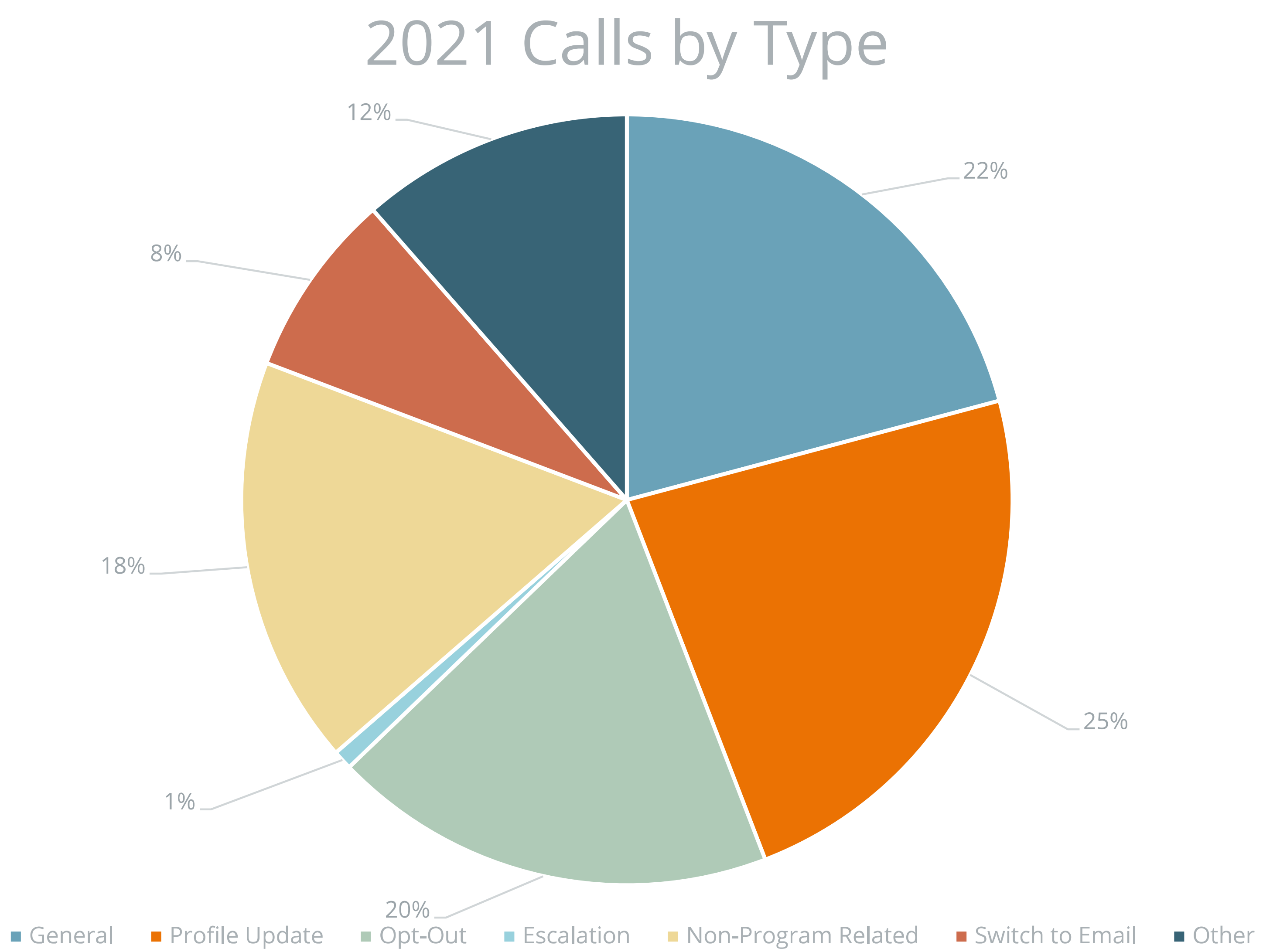
Call Center Volume Continues at YR3 Rate

Call Reason	2021												Total
	Jan	Feb 🗎	Mar	Apr	May 🗎	Jun	Jul	Aug 🗎	Sep	Oct	Nov 🗎	Dec	
General	2	45	4										51
Profile Update	3	46	8										57
Opt-Out	3	43	1										47
Escalation	0	2	0										2
Non-Program Related	13	22	7										42
Switch to Email	4	15	0										19
Other	1	23	4										28
Total	25	183	20										228

🗎 Treatment Month

	2018	2019	2020	2021
Total Calls	411	246	1087	228
Opt-Out Calls	0.64%	0.05%	0.124%	0.04%

Distribution of Calls by Type



CSA Reports Providing Great Insight

General Questions

- Multiple customers called to request an energy audit or to discuss their usage.
- One customer called in to express appreciation of the report and calling his attention to heating use.

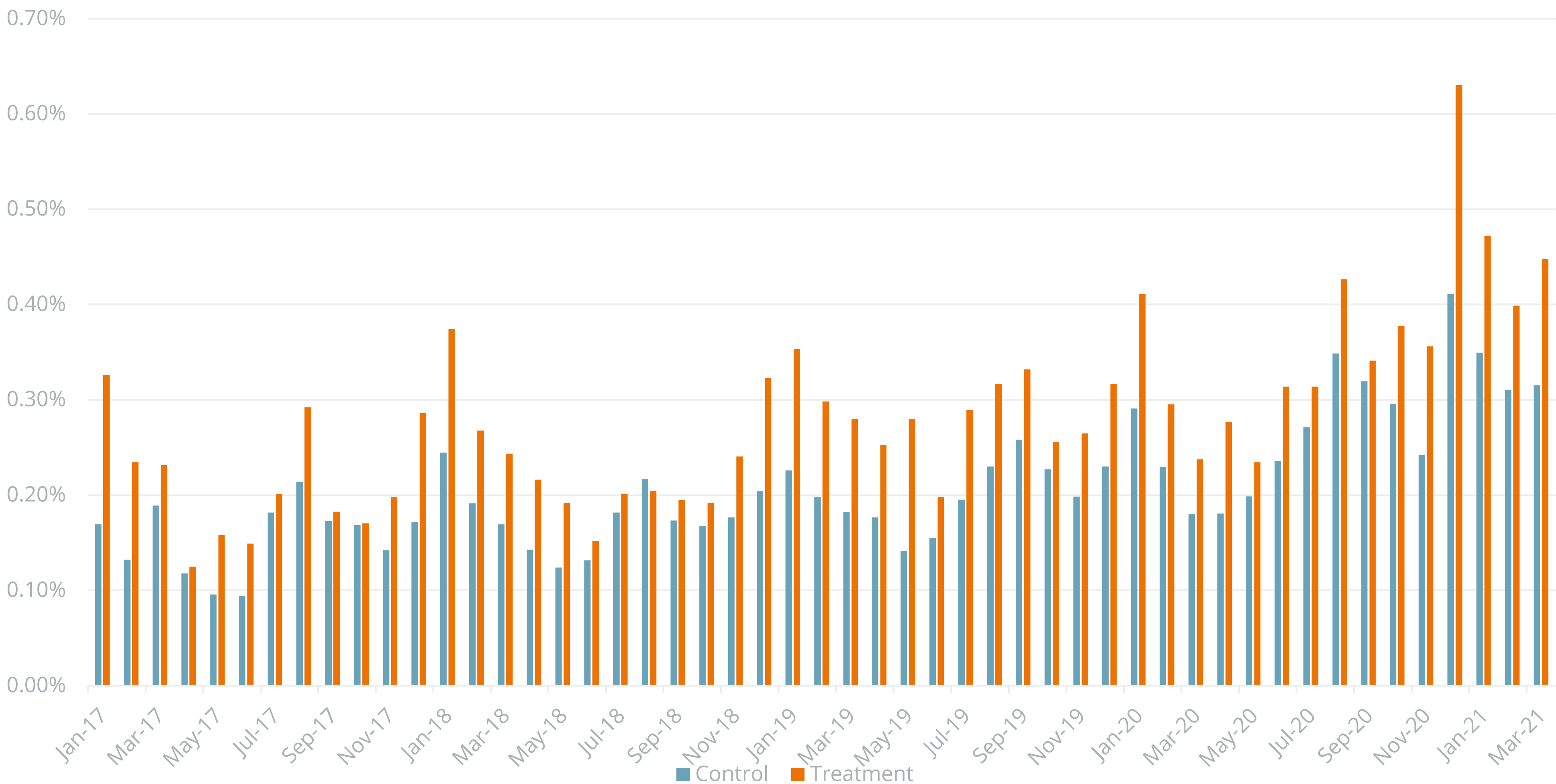
Home Profile Updates:

- A customer updated profile to note electric heat and electric water heater.
- Another customer updated his home's square footage.

Opt-outs

- One customer doesn't' feel like he needs another piece of mail
- Another customer said she would use as much power as she wanted
- Multiple customers informed a rep of a medical condition that requires increased energy usage.

IPC My Account Activity – Treatment HH Continue to Show Higher Engagement



Since the beginning of the program, the treatment has been consistently more active than the control group

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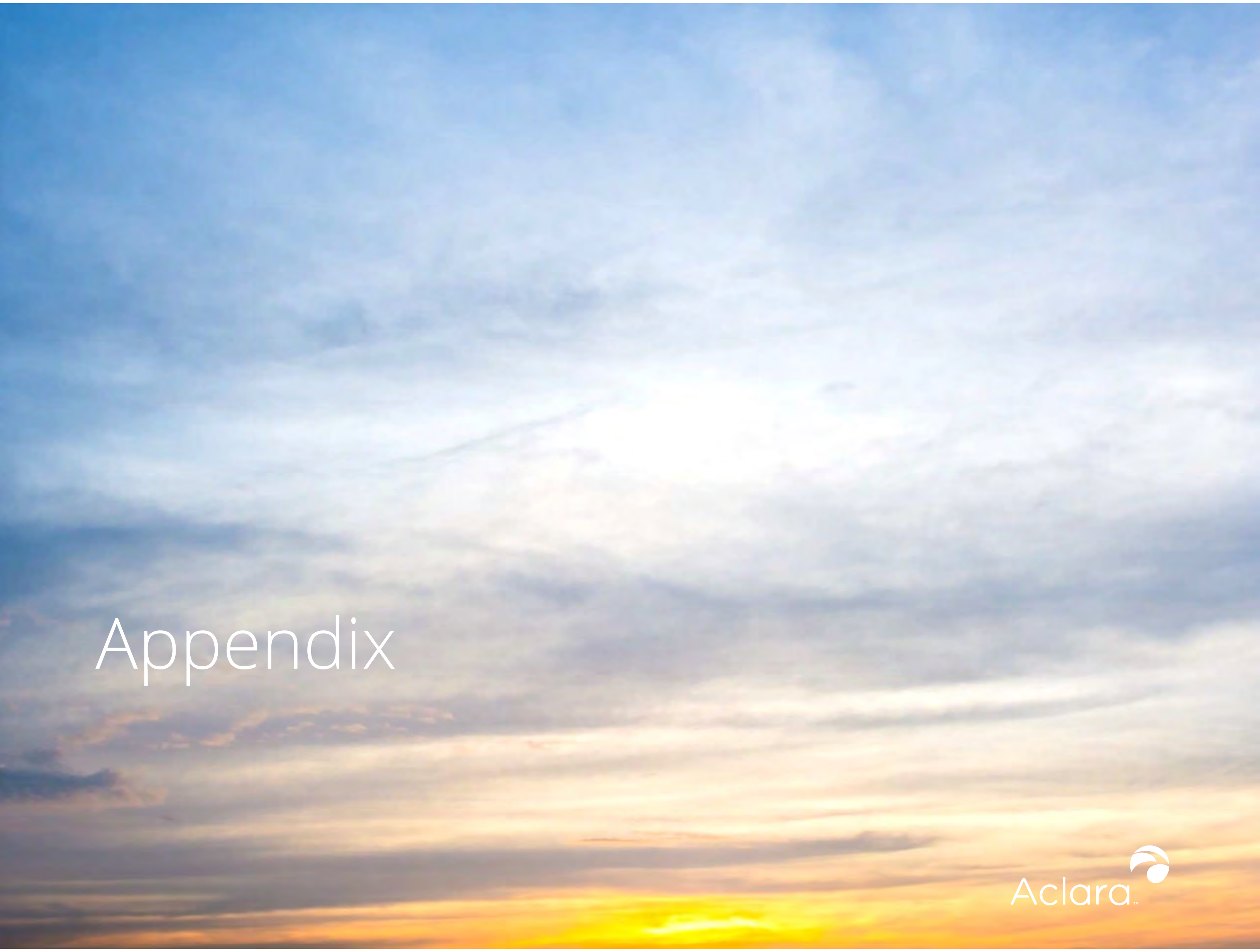
Appendix



Year to Date Aggregate Energy Savings

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1	January 1, 2020 – December 31, 2020	267.72	1,445,666	1.25%
T2	January 1, 2020 – December 31, 2020	363.31	1,734,800	1.76%
T3	January 1, 2020 – December 31, 2020	223.38	1,237,313	1.48%

* T6 savings results are based on treatment period, which began in June 2020.
** T5 customers received final treatment in February 2020

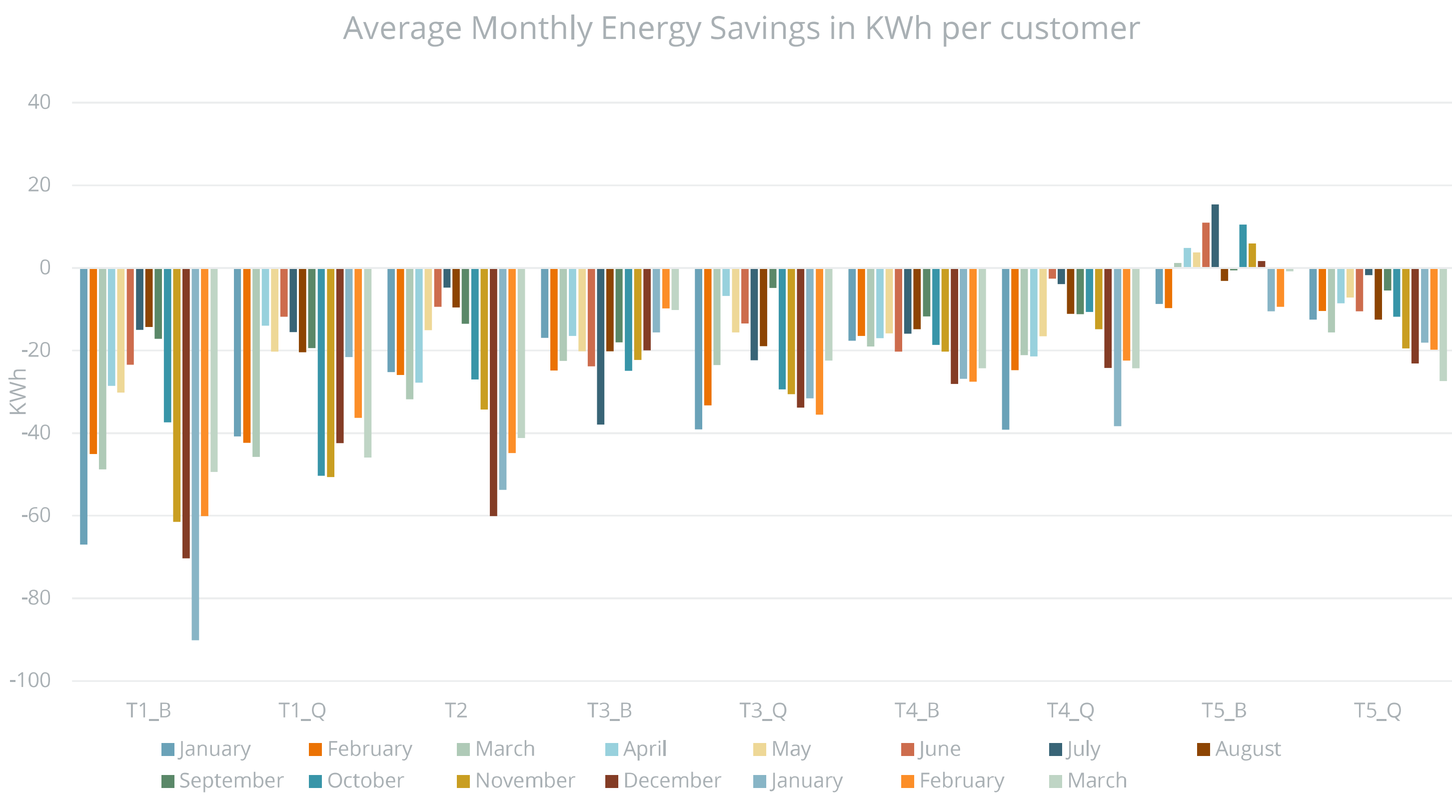
Year to Date Aggregate Energy Savings

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings	Statistically Significant
T1234 Combined	January 1, 2020 – December 31, 2020	289.43	5,298,860	1.74%	YES
T12346 Combined	January 1, 2020 – December 31, 2020	87.03	10,316,562	0.74%	YES
T123456 Combined	January 1, 2020 – December 31, 2020	86.72	10,427,940	0.74%	YES

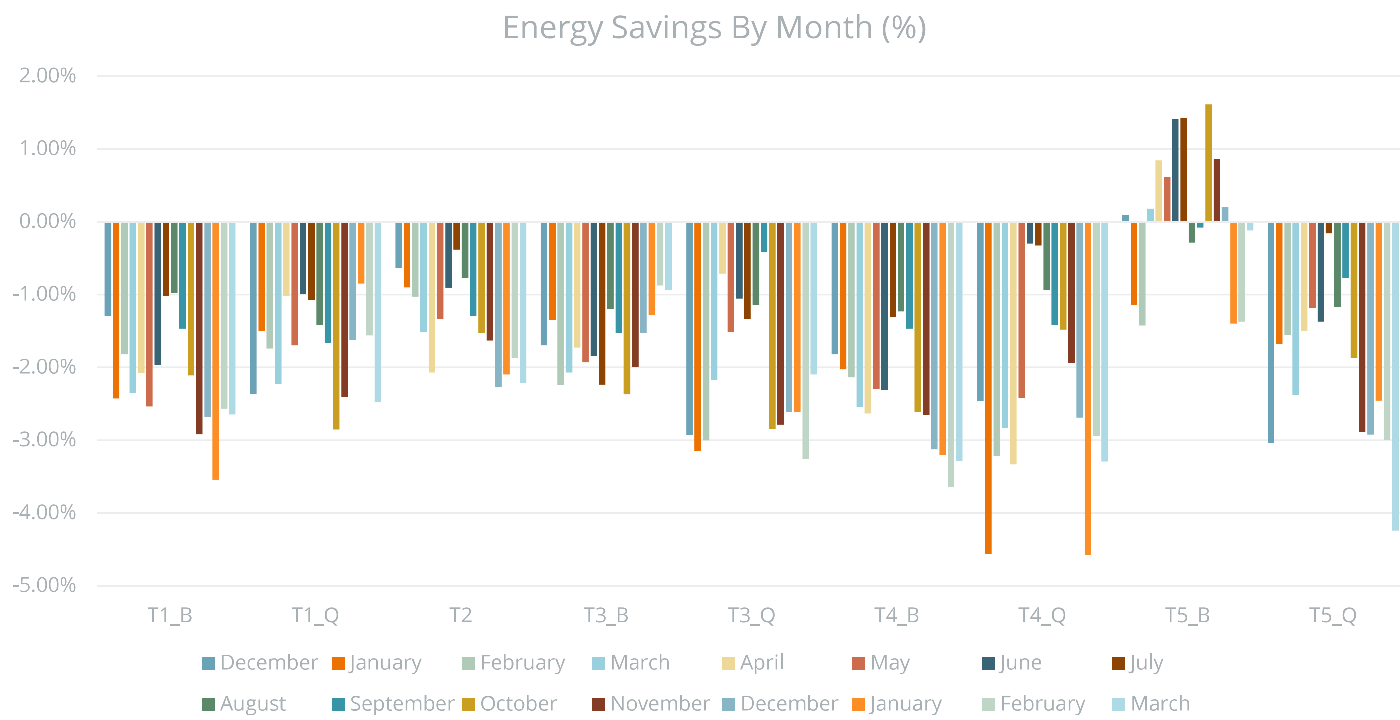
Year to Date Statistical Significance

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1	267.72	298.91	0.039593	YES	January 1, 2020 – December 31, 2020
T2	363.31	302.86	0.009356	YES	January 1, 2020 – December 31, 2020
T3	223.38	154.82	0.002342	YES	January 1, 2020 – December 31, 2020
T4	339.66	138.84	8.14E-07	YES	January 1, 2020 – December 31, 2020
T1234 Combined	**289.43**	**43.57**	**4.77687E-39**	**YES**	**January 1, 2020 – December 31, 2020**
T6	50.06	29.33	0.000412	YES	June 1, 2020 – December 31, 2020
T12346 Combined	**87.03**	**11.39**	**4.79818E-51**	**YES**	**January 1, 2020 – December 31, 2020**
T123456 Combined	**86.72**	**11.15**	**8.47251E-53**	**YES**	**January 1, 2020 – December 31, 2020**

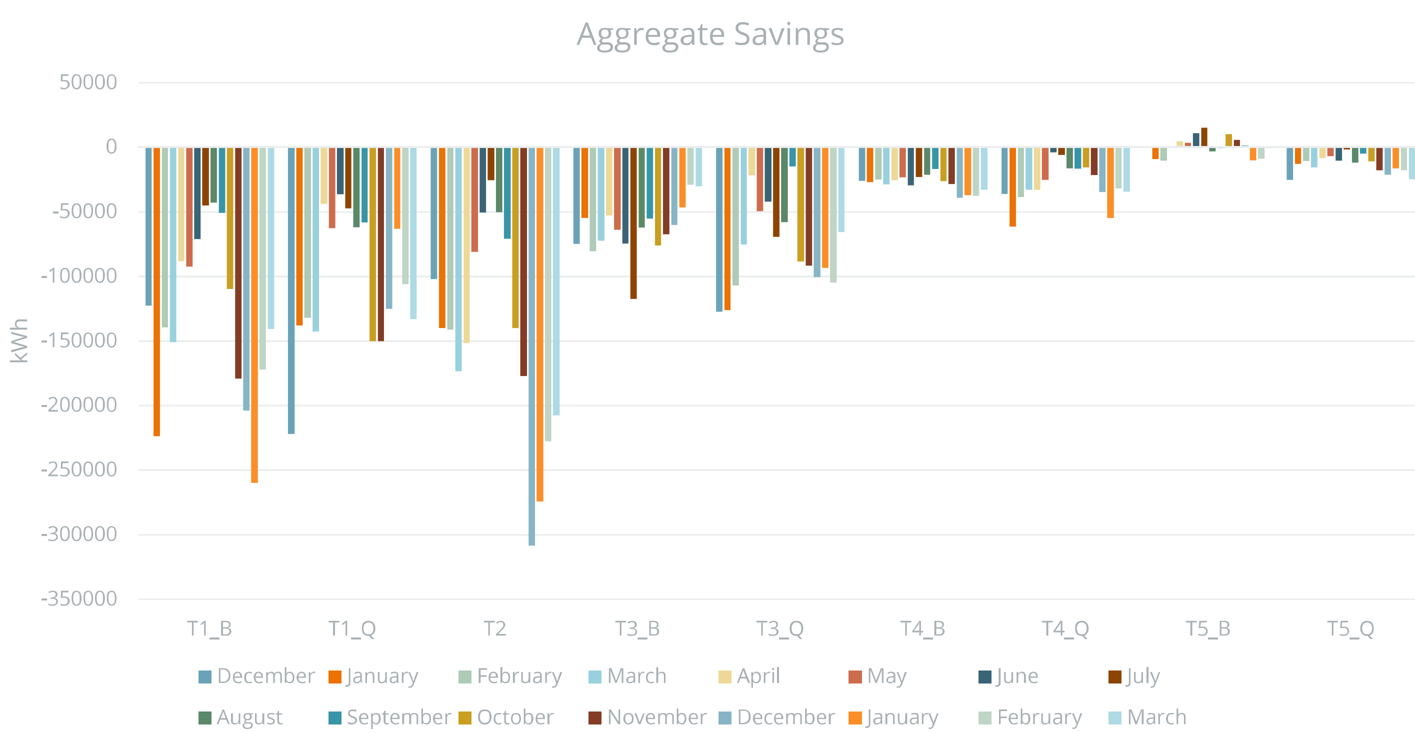
Average Energy Savings in kWh per Customer



YRMonthly Energy Savings in %

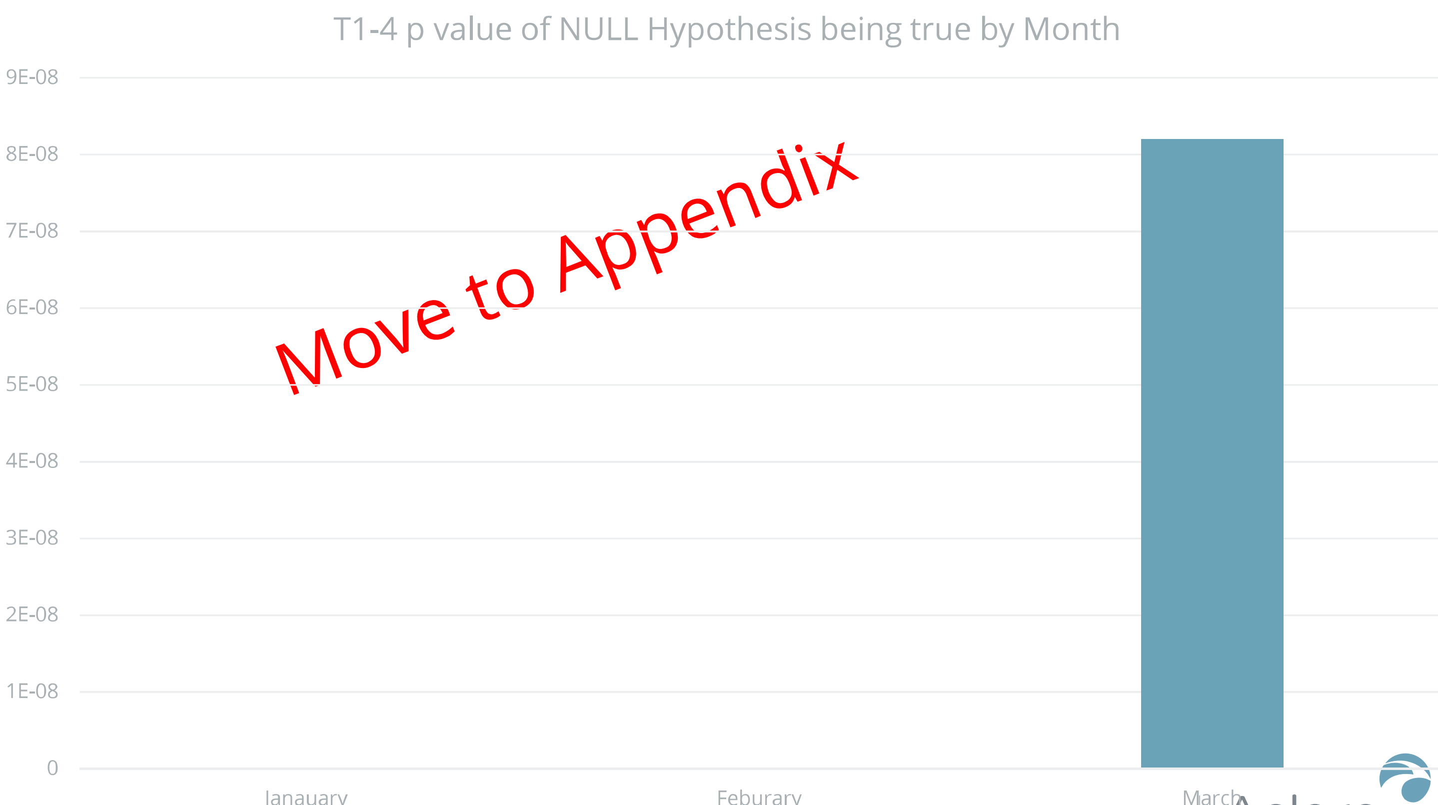


YR 2 Aggregate Savings



T1234 Statistically Significant Savings

Null hypothesis = no energy savings
Alternative hypothesis = Treatment is using less energy than Control
Corresponds to a one-tailed test



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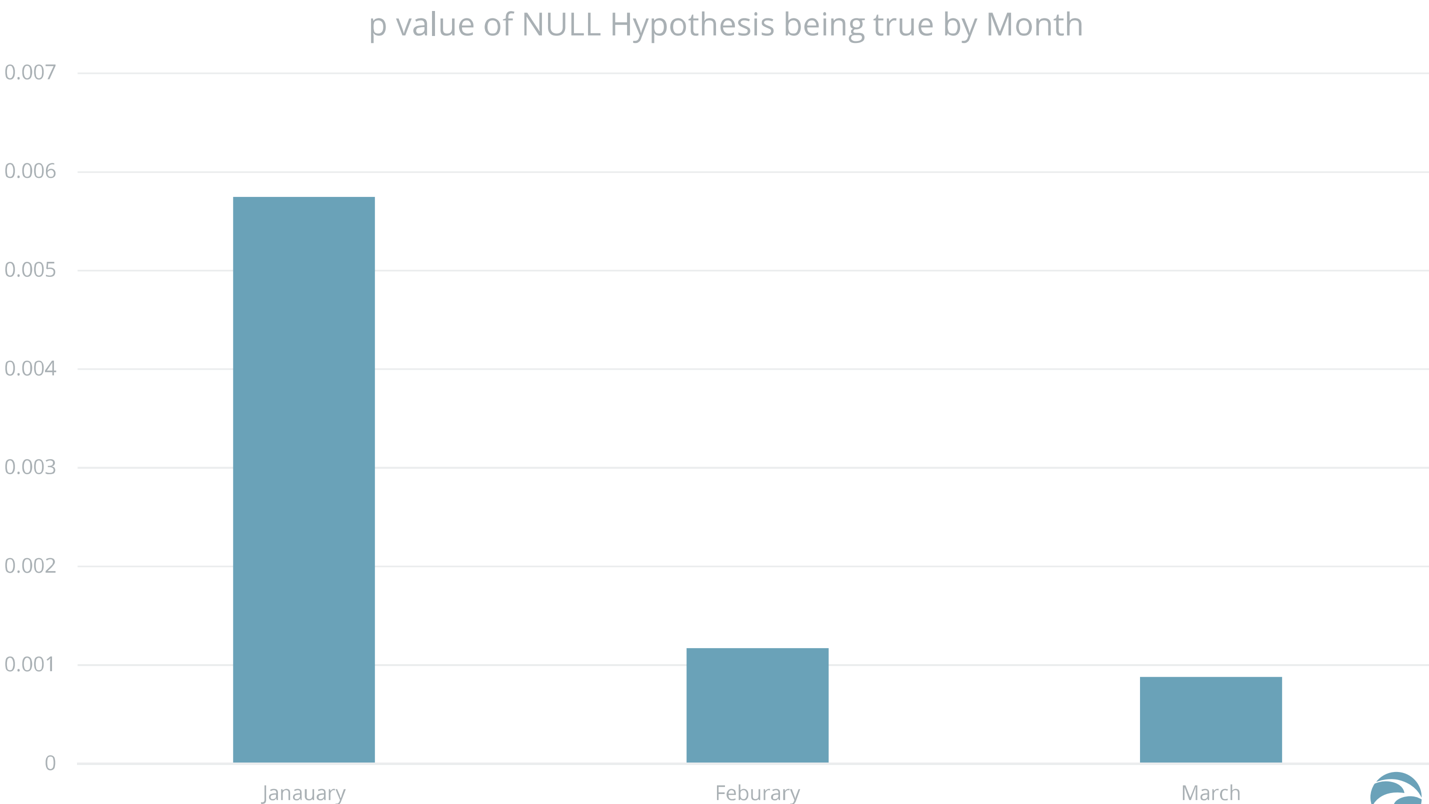
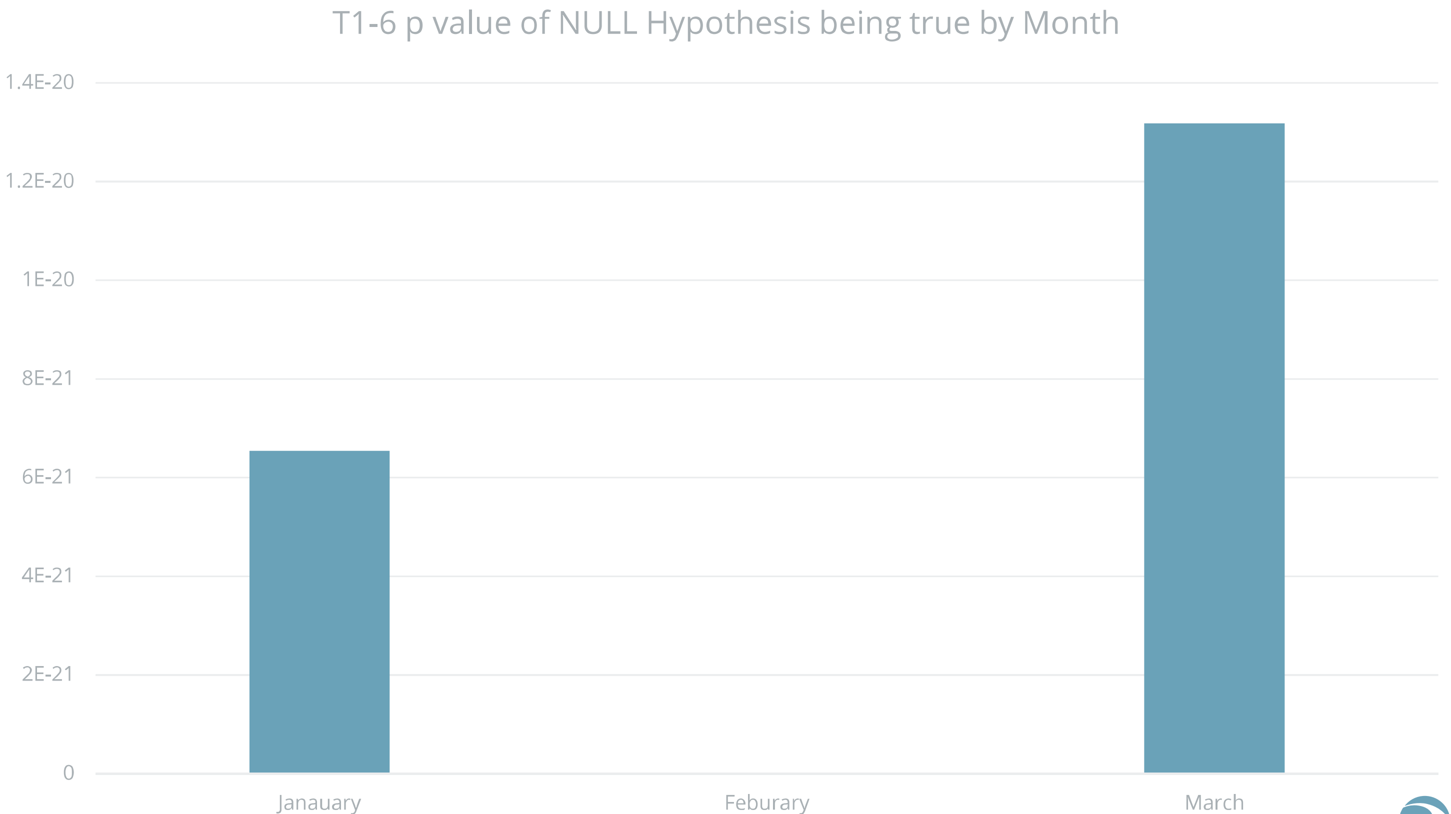
T6 Statistically Significant Savings

Null hypothesis = no energy savings
Alternative hypothesis = Treatment is using less energy than Control
Corresponds to a one-tailed test



T12346 Statistically Significant Savings

Null hypothesis = no energy savings
Alternative hypothesis = Treatment is using less energy than Control
Corresponds to a one-tailed test



Call Center Volume Peaked with Expansion

Call Reason	2020												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	18	3	6	106
Total	16	6	2	1	16	252	250	174	46	159	35	130	1,087

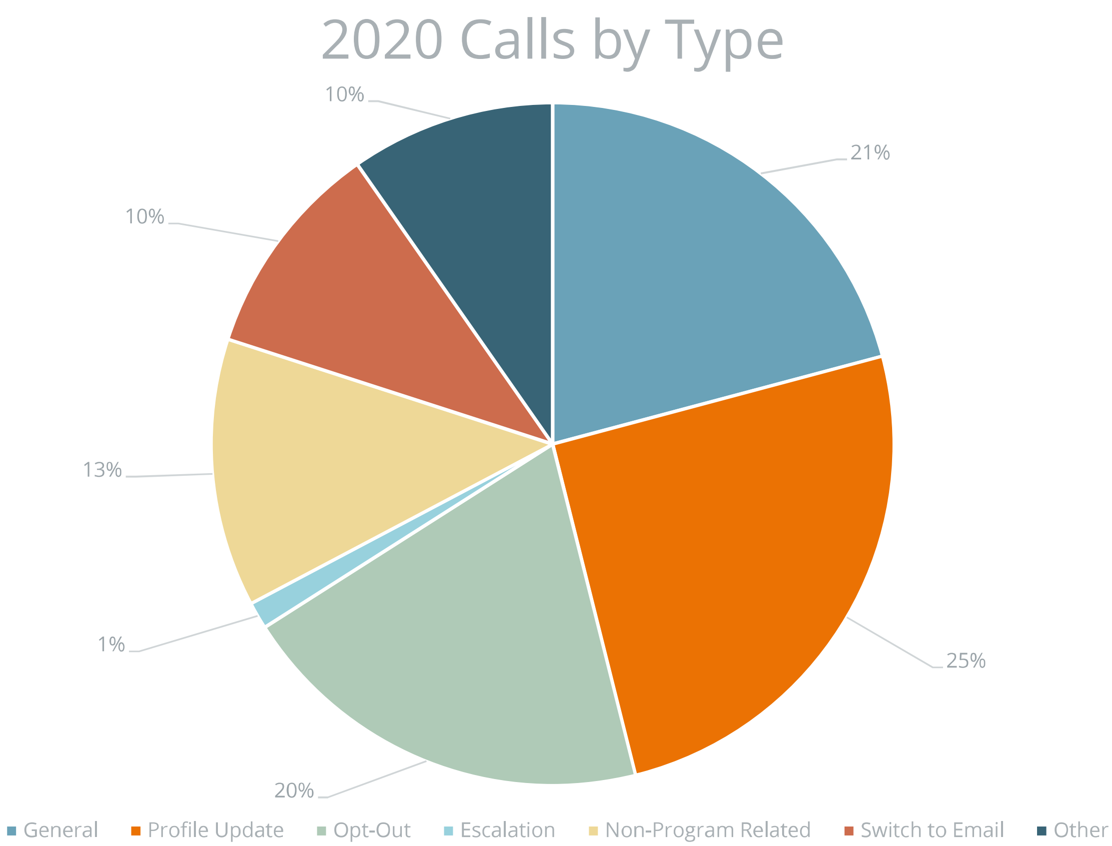
T1234

T6

	2018	2019	2020
Total Calls	411	246	1087
Opt-Out Calls	0.64%	0.05%	0.124%

Note – New customer reports with welcome letters dropped in mid-June.

Distribution of Calls by Type



Idaho Power Company
Home Energy Report Program Y4

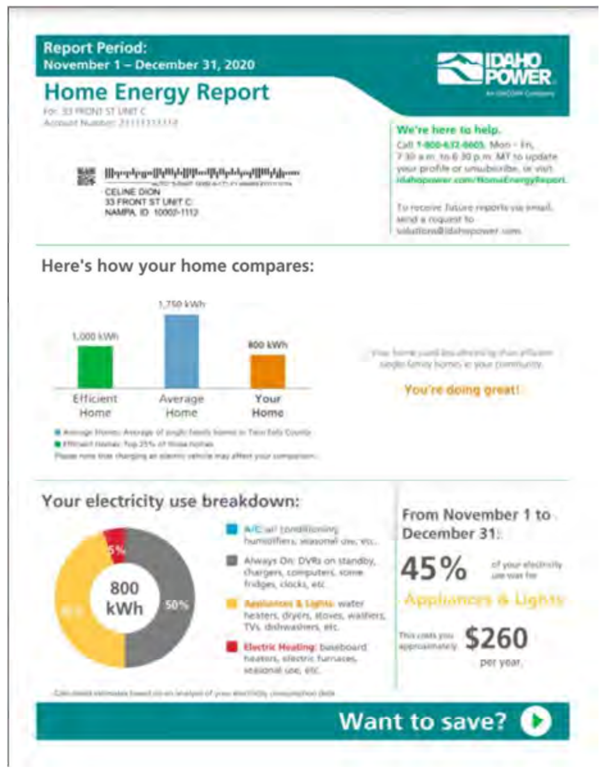
Quarterly Monitoring Report (April 1, 2021 – June 30, 2021)

Presented on August 4, 2021

HARRIS UTILITIES

Agenda

- Program Overview
- Savings Estimates
- Program Results
- Microsite and CSA Results
- Attrition and Opt-outs
- Questions



HARRIS UTILITIES

Home Energy Report Program Overview

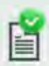
YR4 Program Design

Total # of Treated Customers 110,629

Group	Size
T1 (electric heating)	4,582
T2 (electric heating)	3,971
T3	4,960
T4	2,291
T6	94,825

Pilot Customers Treated: **15,804**

Report Schedule

	2020											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4												
T5*												
T6												

	2021											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6												

*T5 customers were removed from treatment in May 2020

Program Savings Summary

Quarterly Savings Summary

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	April 1, 2021 – June 30, 2021	34.54	609,833	1.05
T6	April 1, 2021 – June 30, 2021	31.94	3,062,473	0.94
T12346	April 1, 2021 – June 30, 2021	32.34	3,672,307	0.96

	T1	T2	T3	T4	T6
Treatment	5,217	4,573	5,359	2,505	95,886
Control	1,305	731	3,181	2,336	13,029

Statistical Significance of Savings Calculated

Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	34.54	12.62	4.06206E-08	TRUE	April 1, 2021 – June 30, 2021
T6	31.94	18.46	0.0003474	TRUE	April 1, 2021 – June 30, 2021
T12346 Combined	32.34	7.0316	9.79529E-20	TRUE	April 1, 2021 – June 30, 2021

	T1	T2	T3	T4	T6
Treatment	5,217	4,573	5,359	2,505	95,886
Control	1,305	731	3,181	2,336	13,029

HARRIS UTILITIES

Year to Date Savings Summary

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	January 1, 2021 – June 30, 2021	116.11	2,049,774	1.45%
T6	January 1, 2021 – June 30, 2021	67.96	6,516,061	0.95%
T12346	January 1, 2021 – June 30, 2021	75.44	8,565,835	1.03%

	T1	T2	T3	T4	T6
Treatment	5,217	4,573	5,359	2,505	95,886
Control	1,305	731	3,181	2,336	13,029

HARRIS UTILITIES

Statistical Significance of Savings Calculated

Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

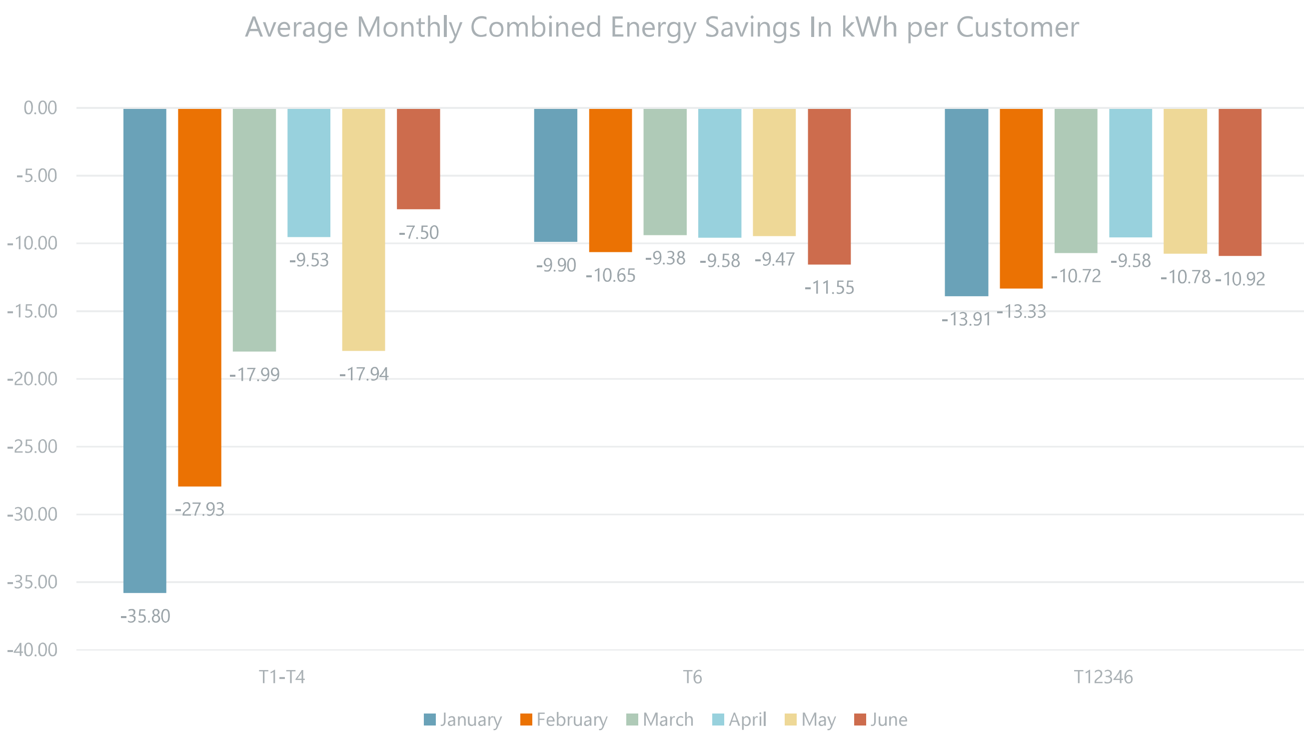
Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	116.11	28.21	3.63599E-16	TRUE	January 1, 2021 – June 30, 2021
T6	67.96	27.35	5.562E-07	TRUE	January 1, 2021 – June 30, 2021
T12346 Combined	75.44	10.48	1.60782E-45	TRUE	January 1, 2021 – June 30, 2021

	T1	T2	T3	T4	T6
Treatment	5,217	4,573	5,359	2,505	95,886
Control	1,305	731	3,181	2,336	13,029

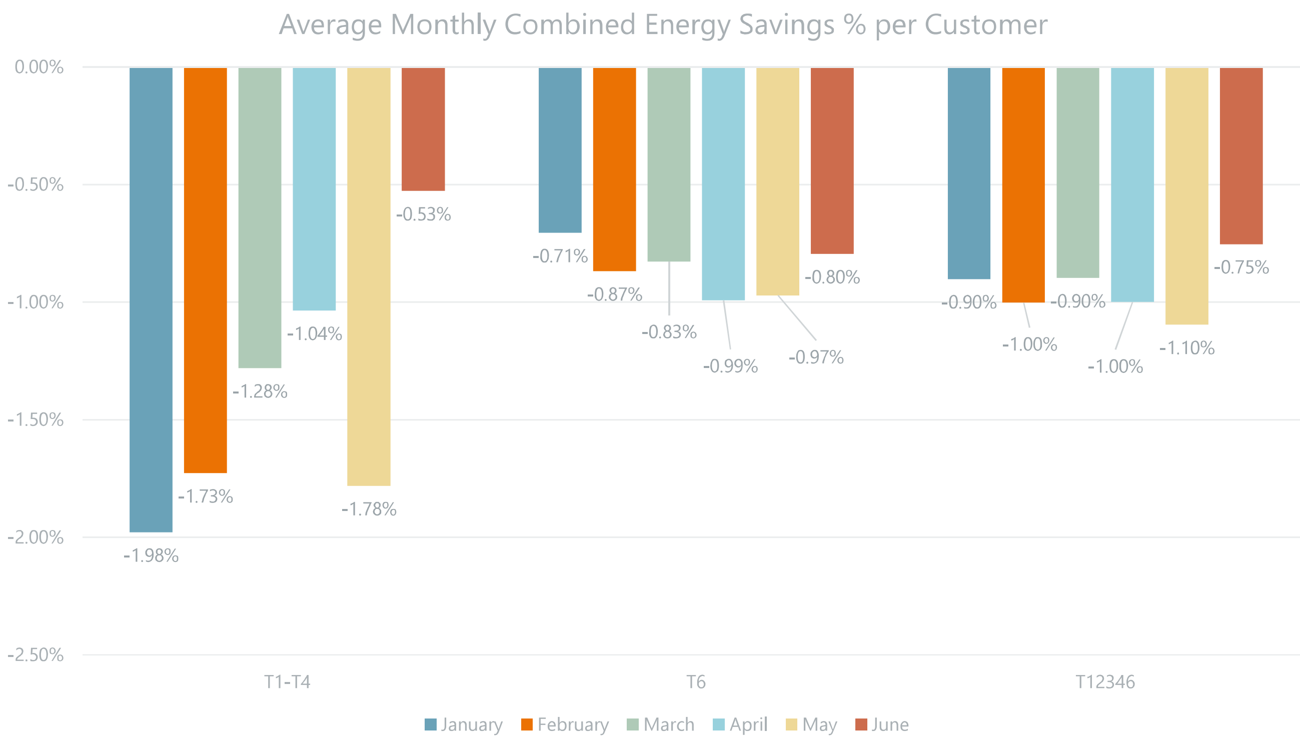
HER Program Results

HARRIS UTILITIES

Average Energy Savings in kWh per Customer

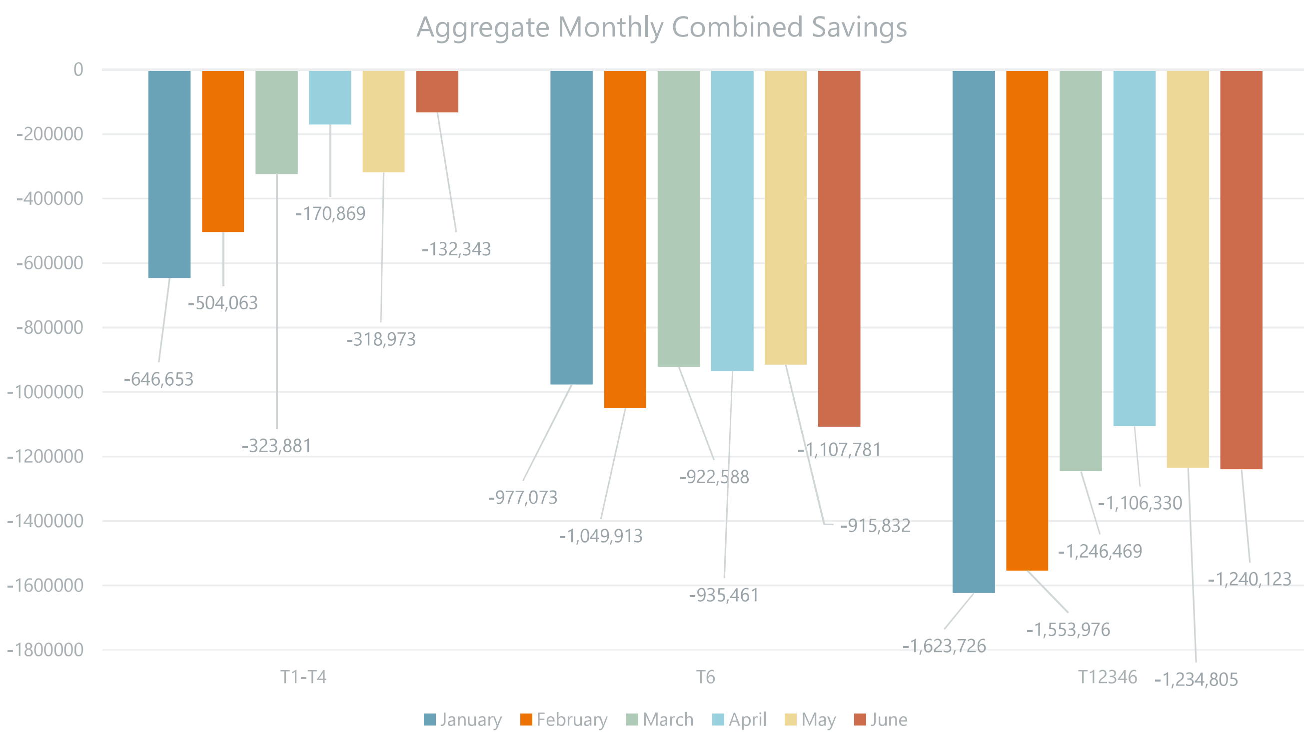


Average Monthly Energy Savings in %



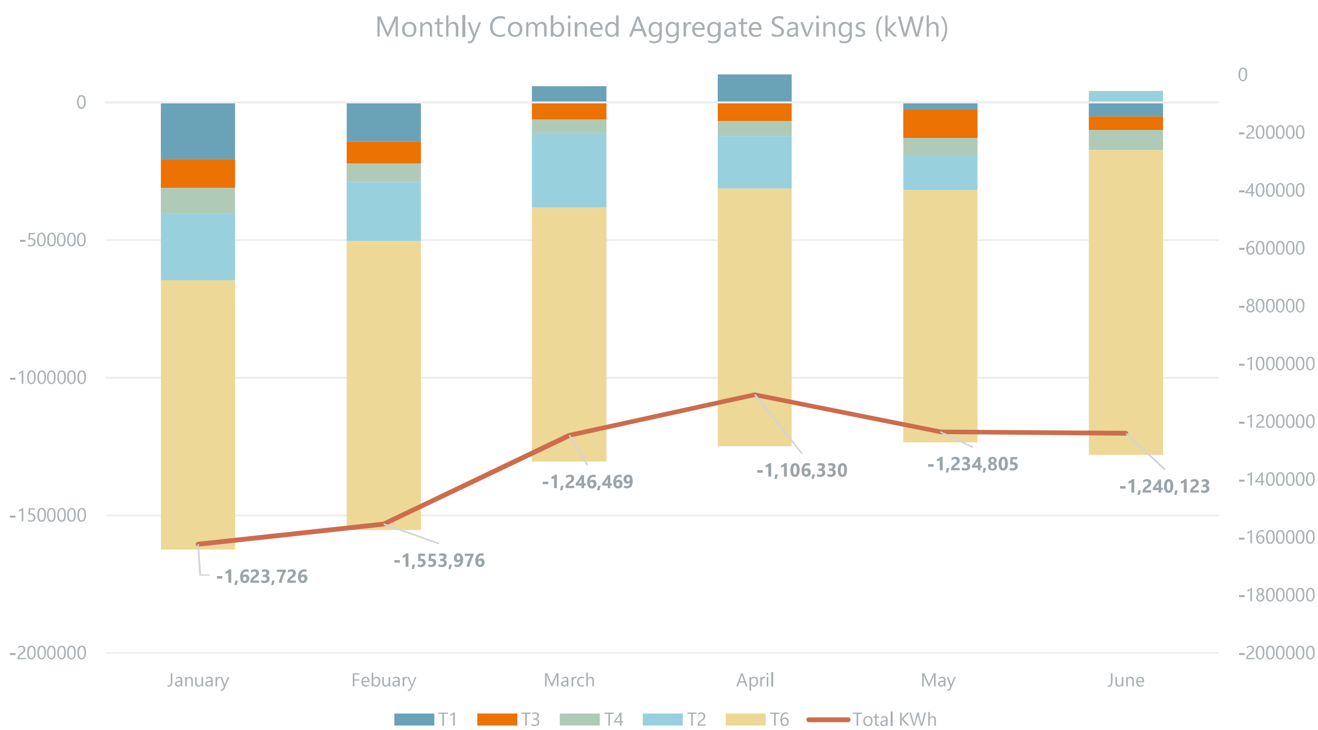
HARRIS UTILITIES

Aggregate Monthly Savings



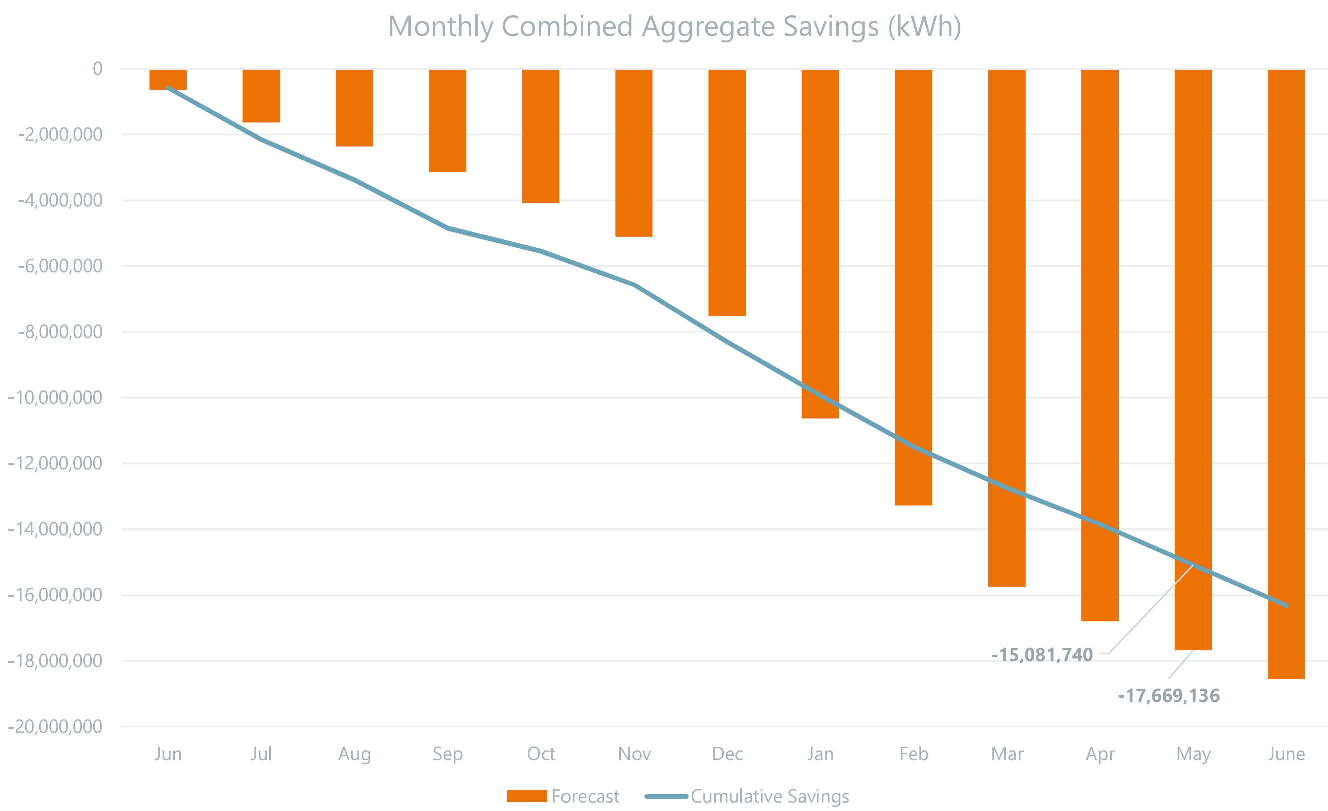
HARRIS UTILITIES

Combined Aggregate Savings by Month (kWh)



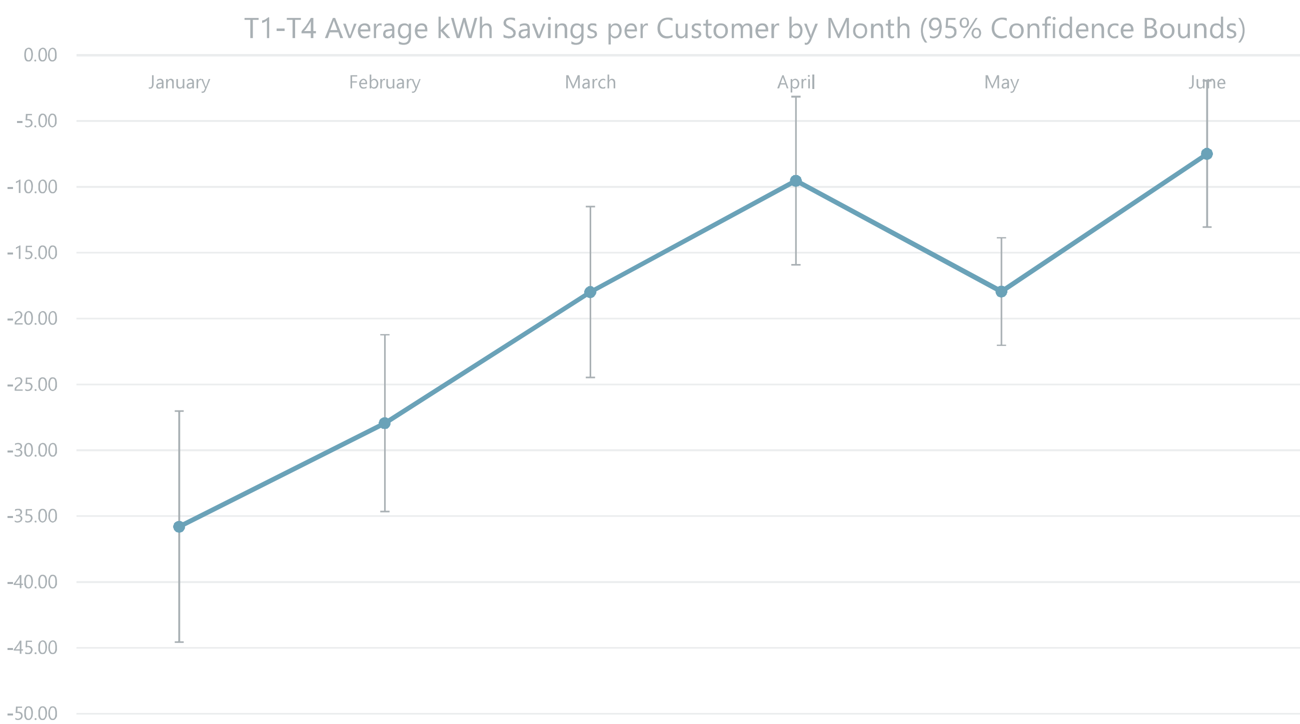
HARRIS UTILITIES

Cumulative Combined Savings by Month (kWh)

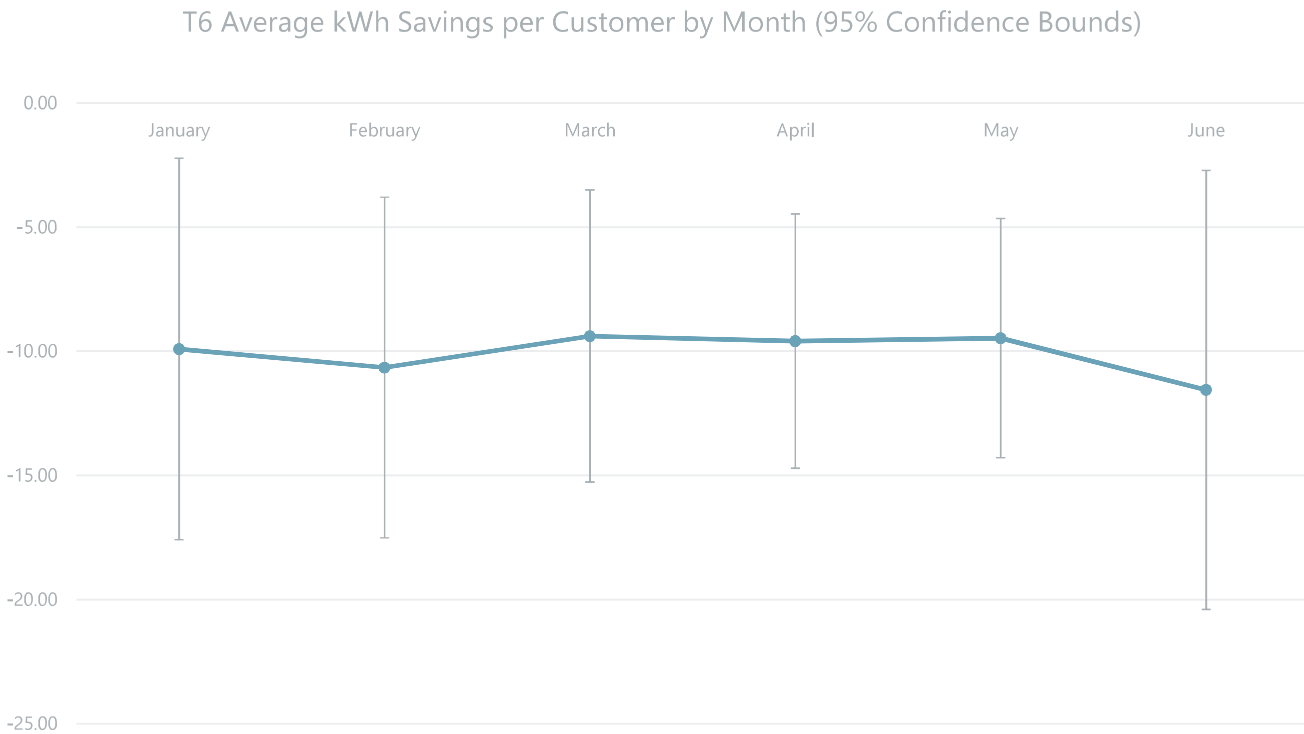


HARRIS UTILITIES

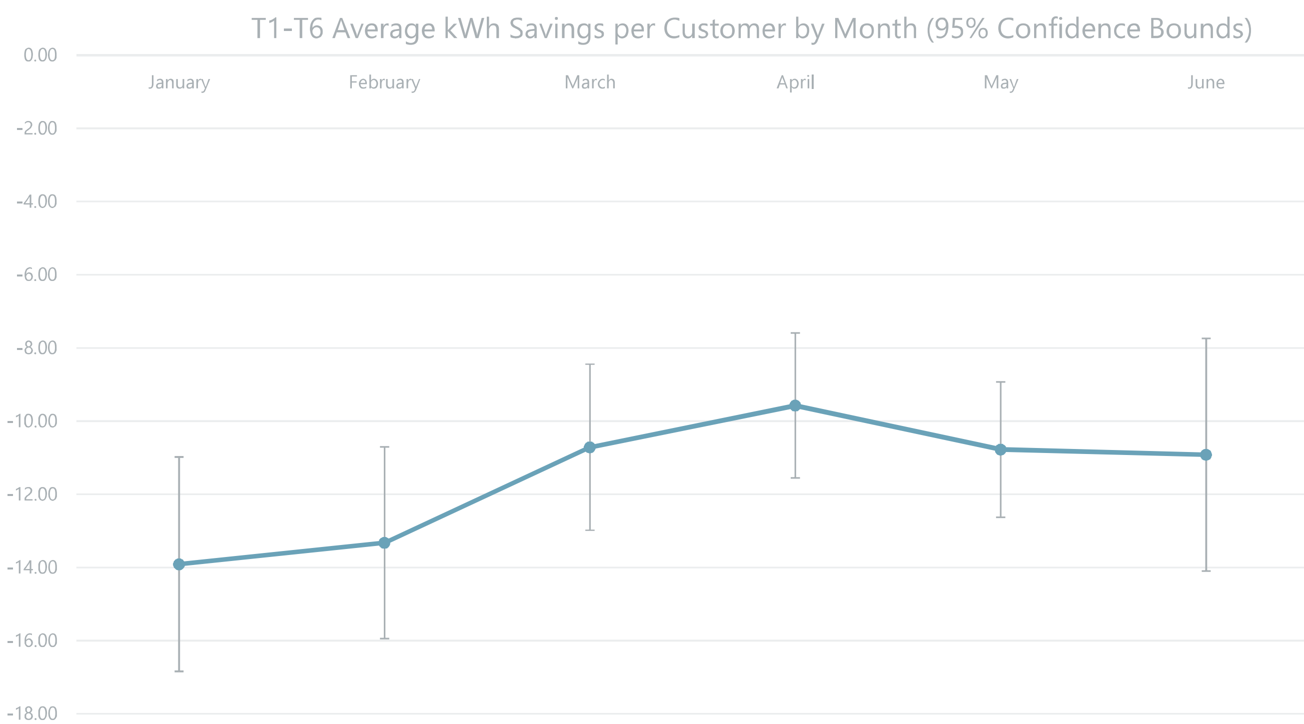
T1234 Savings Confidence Intervals



T6 Savings Confidence Intervals

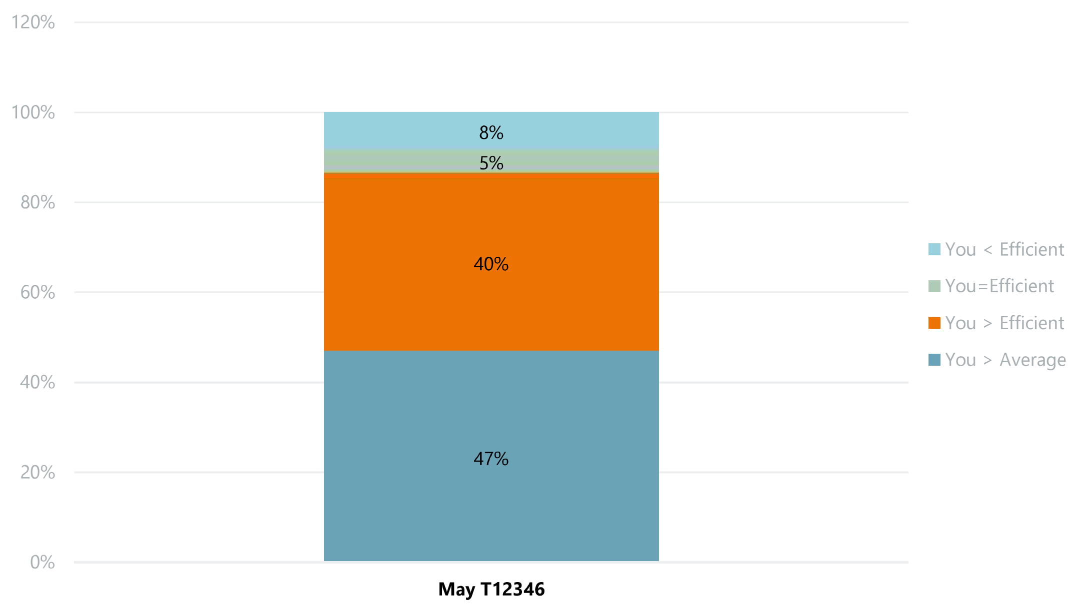


T12346 Savings Confidence Intervals



HARRIS UTILITIES

T12346 Peer Comparison Distribution



Attrition Overview – All Groups

T12345	Feb	May	Aug	Nov	Feb	May	August	Total
Permanent Removals								
Move Outs	263	238	90	470	269	214	298	1,842
AMI Insufficient/Negative Usage	119	0	0	0	0	0	0	119
Location	0	0	0	0	0	0	0	0
Property	2	2	0	1	0	0	57	62
Opt Outs	7	5	2	3	4	7	1	29
USPS - Non Deliverables	44	15	26	19	47	0	0	151*
Temporary Removals								
AMI Insufficient/Negative Usage	0	67	81	33	65	48	132	426
Total Removals	435	327	199	526	485	225	356	2,553
Insufficient Benchmarking	0	0	12	0	100	4	2	118
Reports Delivered	**20,197**	**18,126**	**17,773**	**17,346**	**16,915**	**16,652**	**16,263**	**123,272**

T6	Jun	Aug	Sep	Dec	Feb	May	August	Total
Permanent Removals								
Move Outs	517	689	3,155	1,874	1,501	1,702	2,199	11,637
Location	28	33	207	0	377	0	0	645
Property	3	11	15	13	5	14	24	85
Opt Outs	0	63	48	26	38	38	21	234
USPS - Non Deliverables	1,009	1,053	964	988	314	0	0	4,328*
Temporary Removals								
AMI Insufficient/Negative Usage	5	358	413	422	513	374	901	2,986
Total Removals	1,562	2,207	4,802	3,323	2,748	2,146	3,150	19,938
Insufficient Benchmarking	28	34	207	0	377	18	5	669
Reports Delivered	**106,941**	**105,267**	**102,314**	**100,560**	**98,238**	**96,277**	**93,791**	**703,388**

*there are ongoing discussions regarding how we can reduce the number of non deliverables.

HARRIS UTILITIES

Attrition and Opt Out Rates

All Treatment Customers (January 2021 – June 2021)		
Permanent Removals	7,252	5.09%
Opt Outs	109	0.076%

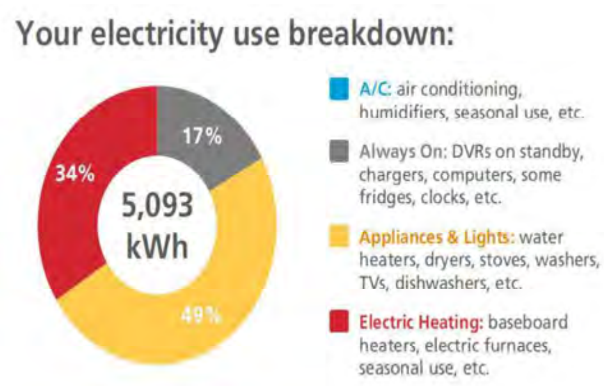
T1234 Customers (January 2021 – June 2021)		
Permanent Removals	1,001	2.94%
Opt Outs	12	0.035%

T6 Customers (January 2021 – June 2021)		
Permanent Removals	6,251	5.76%
Opt Outs	97	0.09%

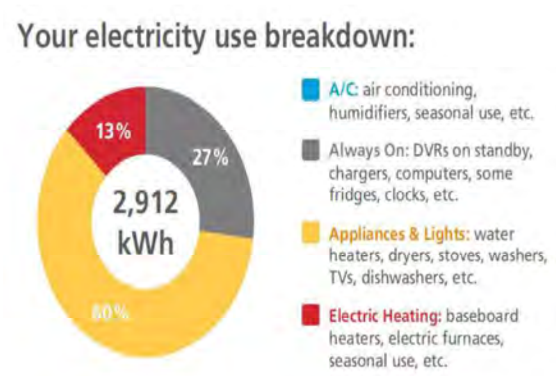
HARRIS UTILITIES

Average Electricity Use Breakdown

T12346 Customers
Jan - Mar AL



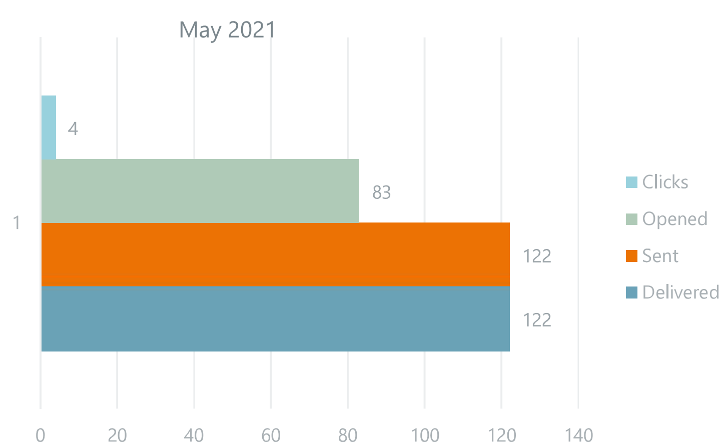
T12346 Customers
Jan - Mar AC



Email Open Rates Remain High

	May	Aug	Oct	Nov	Dec	Feb	May
Total # of emails	12	55	75	16	89	106	122
Click-through Rate	25%	7.5%	7.7%	8.3%	22.6%	16.5%	4.8%
Open Rate	73%	73%	69%	75%	70%	75%	68%
Unsubscribe clicks	0	0	0	0	0	0	3
Unsubscribe rate	0%	0%	0%	0%	0%	0%	0.8%
Click rate on rebate link	0%	0%	0%	0%	0%	4%	0

- 15 total old customers switched to email (0.1%)
- 114 total new customers switched to email (0.11%)
- 122 total emails were delivered in May 2021



2021 Email Click-Throughs

	Feb	May
View HTML	0	0
Rebates	0	0
MyAccount	0	1
FAQ	0	0
Privacy	0	0
Learn More	0	0
Unsubscribe	0	3

CSA & Microsite Analysis

Microsite Activity

Microsite Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Unique Clicks	4	22	32	22	42	14							**136**
Total Clicks	4	27	32	22	45	14							**144**
Unique Page Views	10	65	5	10	40	10							**140**
Total Views	10	72	5	14	42	18							**161**

Call Center Volume Reflects Quarterly Schedule

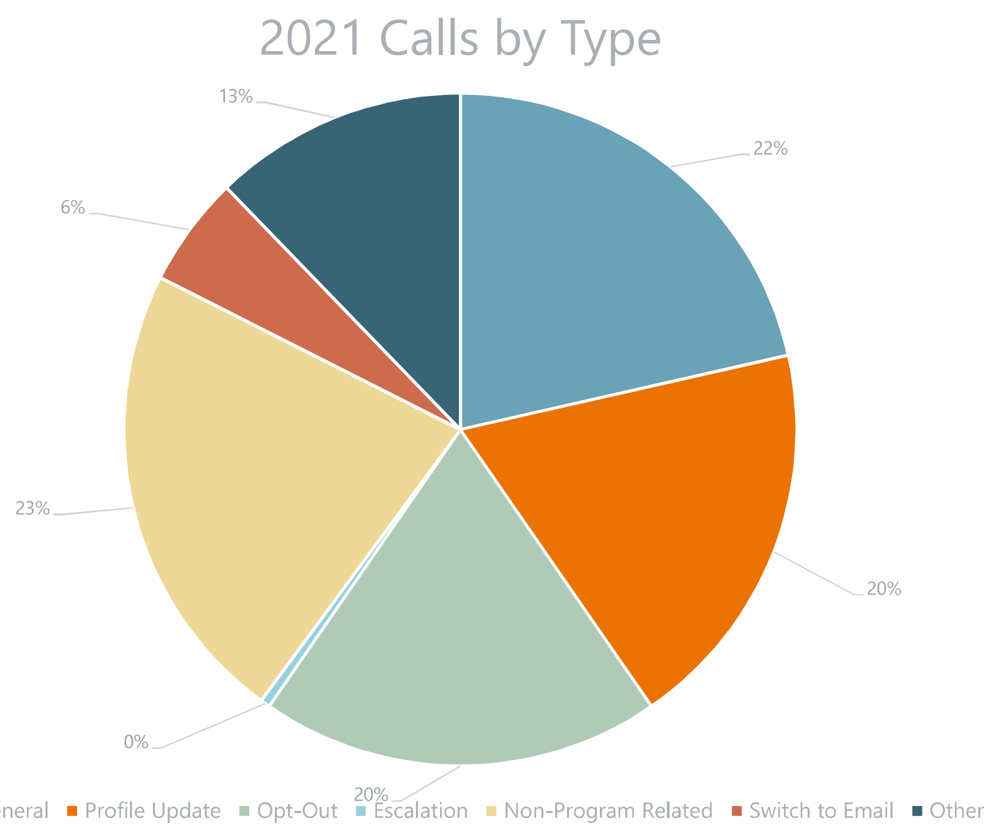
Call Reason	2021												Total
	Jan	Feb 🗎	Mar	Apr	May 🗎	Jun	Jul	Aug 🗎	Sep	Oct	Nov 🗎	Dec	
General	2	45	4	2	34	6							93
Profile Update	3	46	8	2	19	4							82
Opt-Out	3	43	1	0	20	0							67
Escalation	0	2	0	0	0	0							2
Non-Program Related	13	22	7	5	37	13							97
Switch to Email	4	15	0	0	3	1							23
Other	1	23	4	0	21	4							53
Total	26	196	24	9	134	28							417

🗎 Treatment Month

	2018	2019	2020	2021
Total Calls	411	246	1087	417
Opt-Out Calls	0.64%	0.05%	0.124%	16.1%

HARRIS UTILITIES

Distribution of Calls by Type



CSA Reports Providing Great Insight

General Questions

- (Customer) called surprised he uses above average.. found he is on high end of comparison size and has 3 freezers and 2 fridges. Advised refrigeration is where his extra power is being used.
- (Customer) called asking if she should unplug electronics when not in use.

Home Profile Updates:

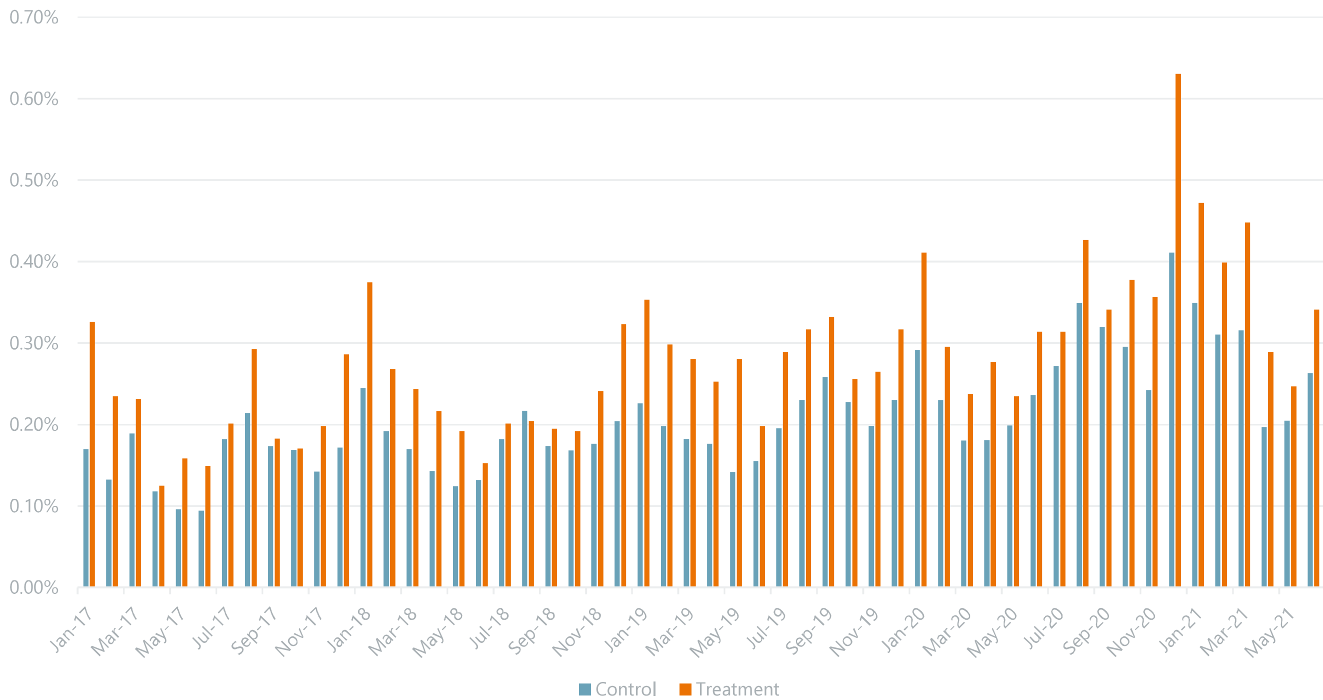
- (Customer)'s home was being compared to 1,000 sq ft instead 1,900 sq ft as they have a full livable basement. Updated the basic profile
- (Customer) doesn't like getting the HER as it makes her feel bad about her energy usage. Was considering opting out; convinced her to update home profile and see if results improve

Opt-outs

- (Customer) has a well and an irrigation pump used it irrigate the pasture. Believes information is inaccurate.
- (Customer) sent a letter indicating they are in their 80's and fully aware of their electric use. They pay their bills and do not find value in continuing the reports.
- (Customer) knows how to conserve energy. Doesn't need this info.

HARRIS UTILITIES

IPC My Account Activity – HER Recipients Continue to Use My Account More Frequently



Since the beginning of the program, the treatment has been consistently more active than the control group

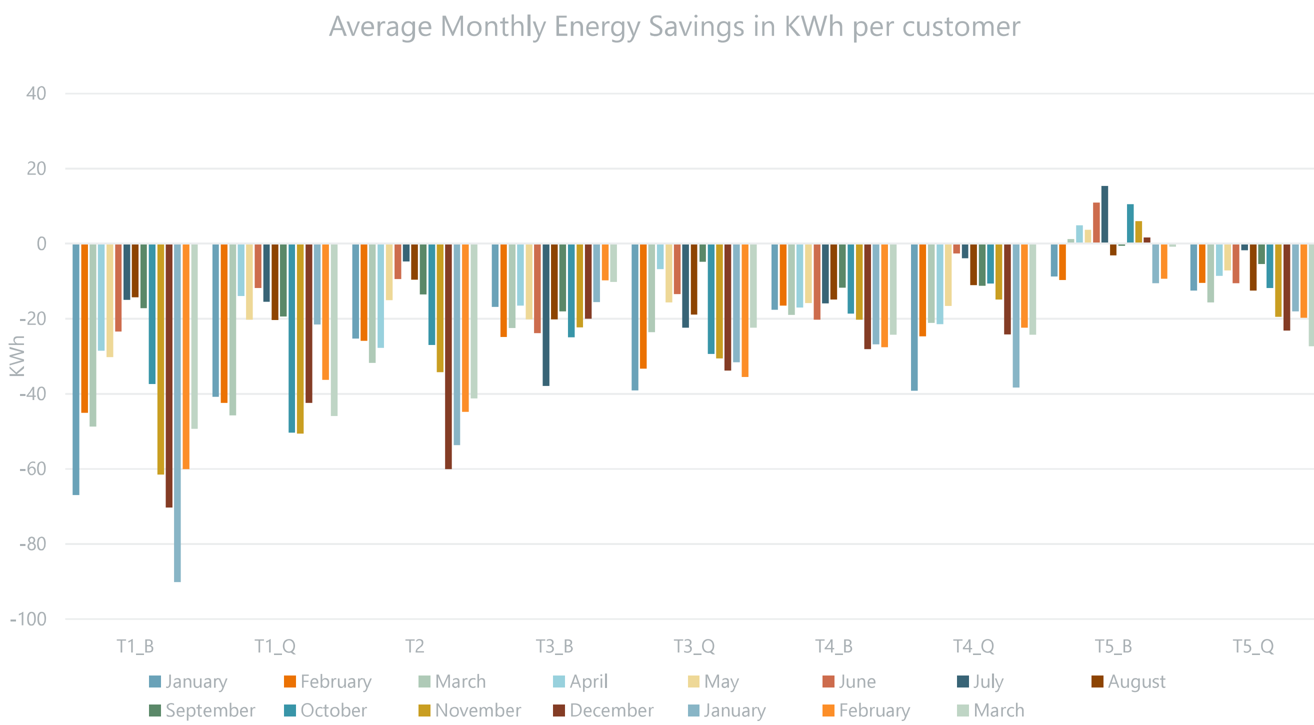

Program Improvements
HARRIS
UTILITIES

Program Improvements

Recommended Improvements	Description	Status
Evaluate Messaging to Ensure Appropriate Tips for each Season	As reports drop throughout the calendar year, it is important to pay attention to the relevancy of each message to the season.	Complete
Consider Another CSAT Survey	The last survey was conducted during the pilot in 2019.	In Progress
Review Benchmarking Insufficiencies	Customers ultimately lost due to benchmarking insufficiencies (i.e. county, floorsize) should be removed during eligibility (including top-up phases).	In Progress
Incorporate Self-Service Opt-in to Email Function	Customers must call in to opt into email, which could be solved by a digital self-serve solution.	Not Started
Identify Way to Detect EV Ownership	A growing number of customers have electric vehicles, which likely impacts their ability to reduce energy use.	Not Started
Review Net Metering Later in the Eligibility Process	A growing number of customers are switching to net metering as they adopt solar energy. Removing them from HER eligibility later in the review process should be more accurate.	Not Started

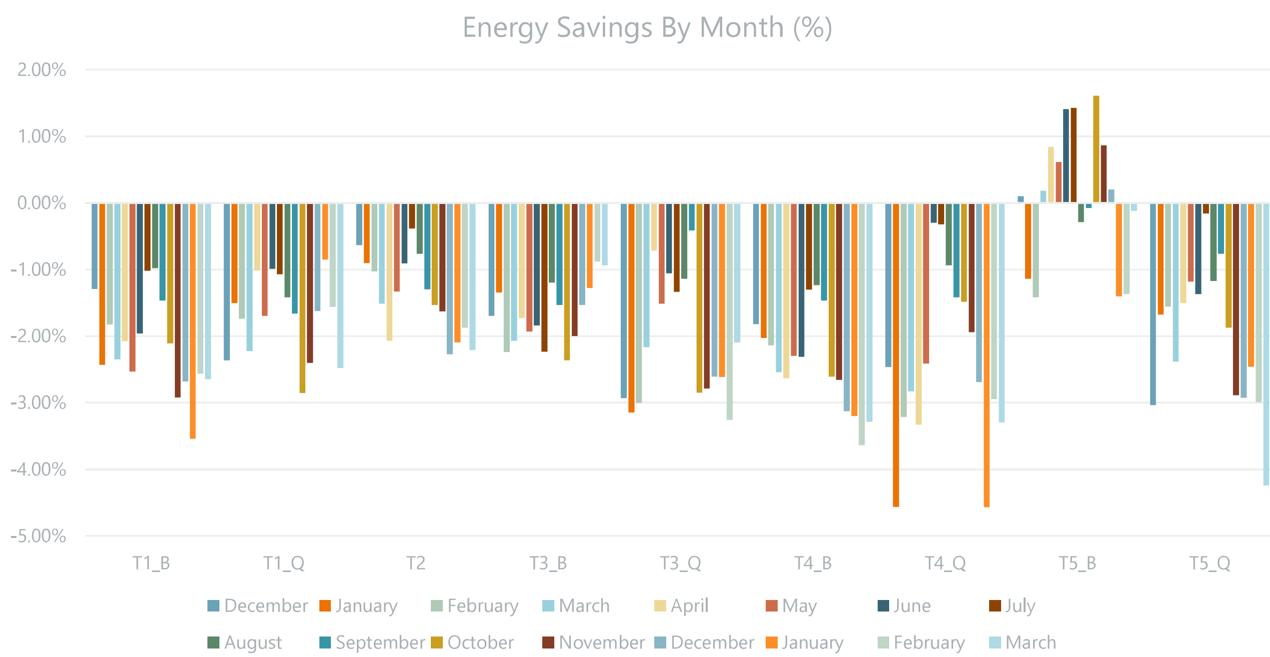

Appendix
HARRIS
UTILITIES

Average Energy Savings in kWh per Customer



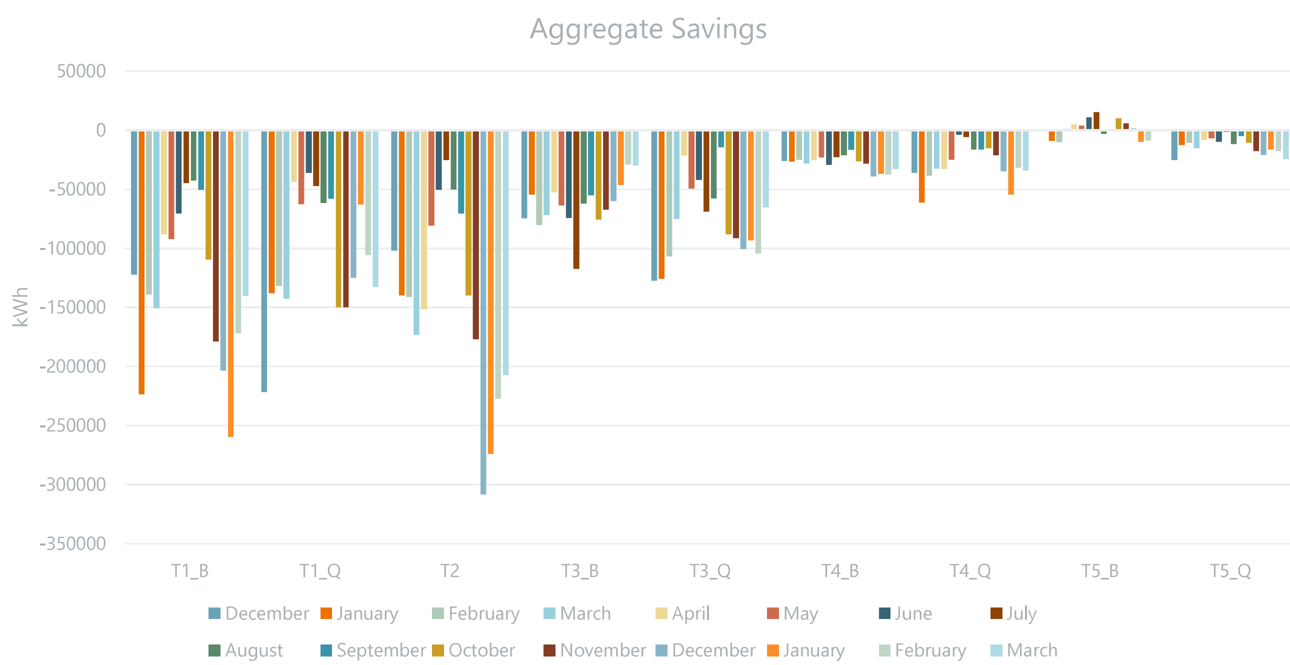
HARRIS UTILITIES

YRMonthly Energy Savings in %



HARRIS UTILITIES

YR 2 Aggregate Savings



Call Center Volume Peaked with Expansion

Call Reason	2020												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	18	3	6	106
Total	16	6	2	1	16	252	250	174	46	159	35	130	1,087

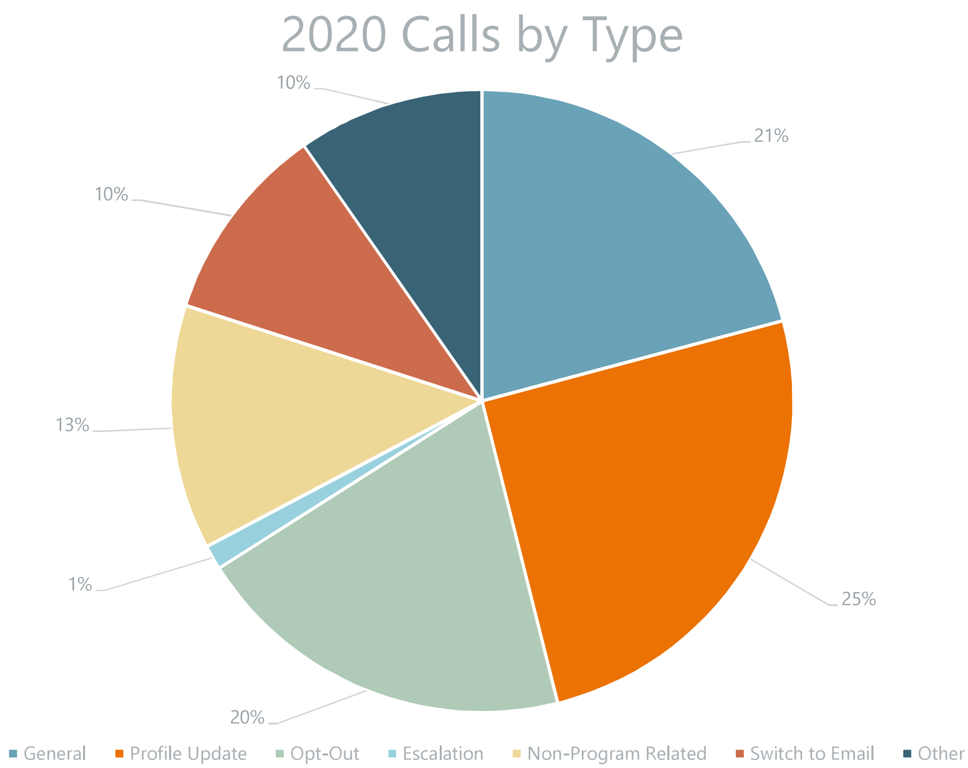
T1234

T6

	2018	2019	2020
Total Calls	411	246	1087
Opt-Out Calls	0.64%	0.05%	0.124%

Note – New customer reports with welcome letters dropped in mid-June.

Distribution of Calls by Type



Idaho Power Company Home Energy Report Program Year 2021

Quarterly Monitoring Report (July 1, 2021 – September 30, 2021)

Presented on November 4, 2021

Agenda

Program Overview

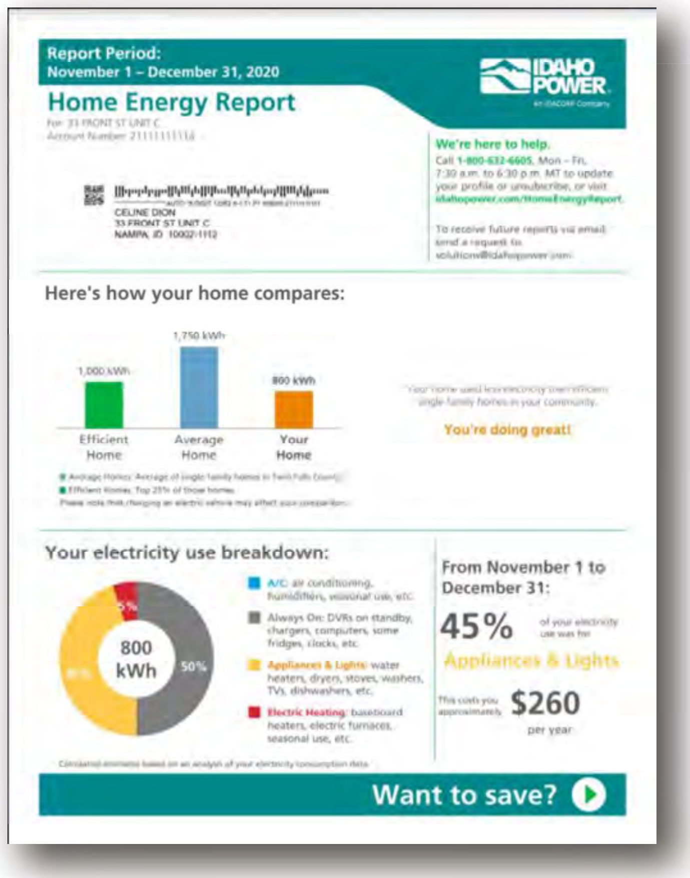
Savings Estimates

Program Results

Microsite and CSA Results

Attrition and Opt-outs

Questions



HARRIS UTILITIES

Home Energy Report Program Overview

YR4 Program Design

Total # of Treated Customers 110,472

Group	Size
T1 (electric heating)	4,535
T2 (electric heating)	3,931
T3	4,922
T4	2,275
T6	94,809

Pilot Customers Treated: **15,663**

HARRIS UTILITIES

Report Schedule

	2021											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6												

	2022											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6												

*T5 customers were removed from treatment in May 2020

Program Savings Summary

Savings Method Change

Old Method

Prior to Q3 2021, only included the group of customers still active in the group as of the end of the period in our analysis were included. This means that if a customer moved out in the third month of the quarter, they're savings for the first two months of the quarter were not measured.

New Method

Per Craig's suggestion, starting in Q3 2021, data for customers who moved out during the analysis period are included *up until the date they moved out*. This is done consistently for both treatment and control groups.

Impact

Customers with less than three months will have lower consumption. This (appropriately) leads to slightly lower the average per customer impact, but it increases the total savings, since we are multiplying that average by the total count of customers who were active for any part of the quarter.

HARRIS UTILITIES

Quarterly Savings Summary

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	July 1, 2021 – September 30, 2021	47.13	835,487	1.16
T6	July 1, 2021 – September 30, 2021	42.81	4,104,480	1.05
T12346	July 1, 2021 – September 30, 2021	43.49	4,939,967	1.07

	T1	T2	T3	T4	T6
Treatment	5,256	4,598	5,363	2,511	95,873
Control	1,306	731	3,180	2,337	13,028

HARRIS UTILITIES

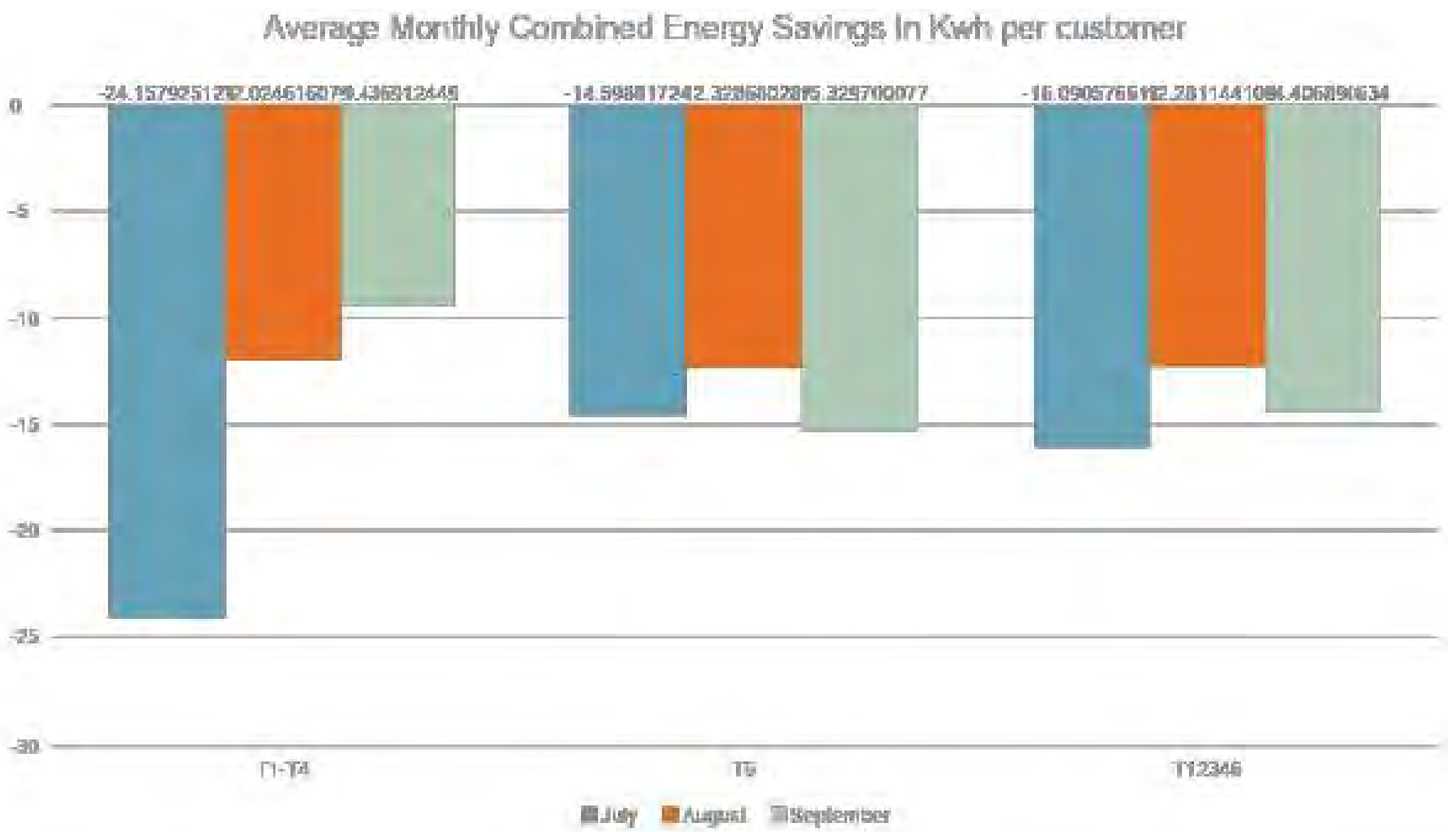
Year to Date Savings Summary

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	January 1, 2021 – Sept 30, 2021	167.04	3,065,262	1.42%
T6	January 1, 2021 – Sept 30, 2021	75.76	7,588,993	0.69%
T12346	January 1, 2021 – Sept 30, 2021	89.89	10,654,255	0.81%

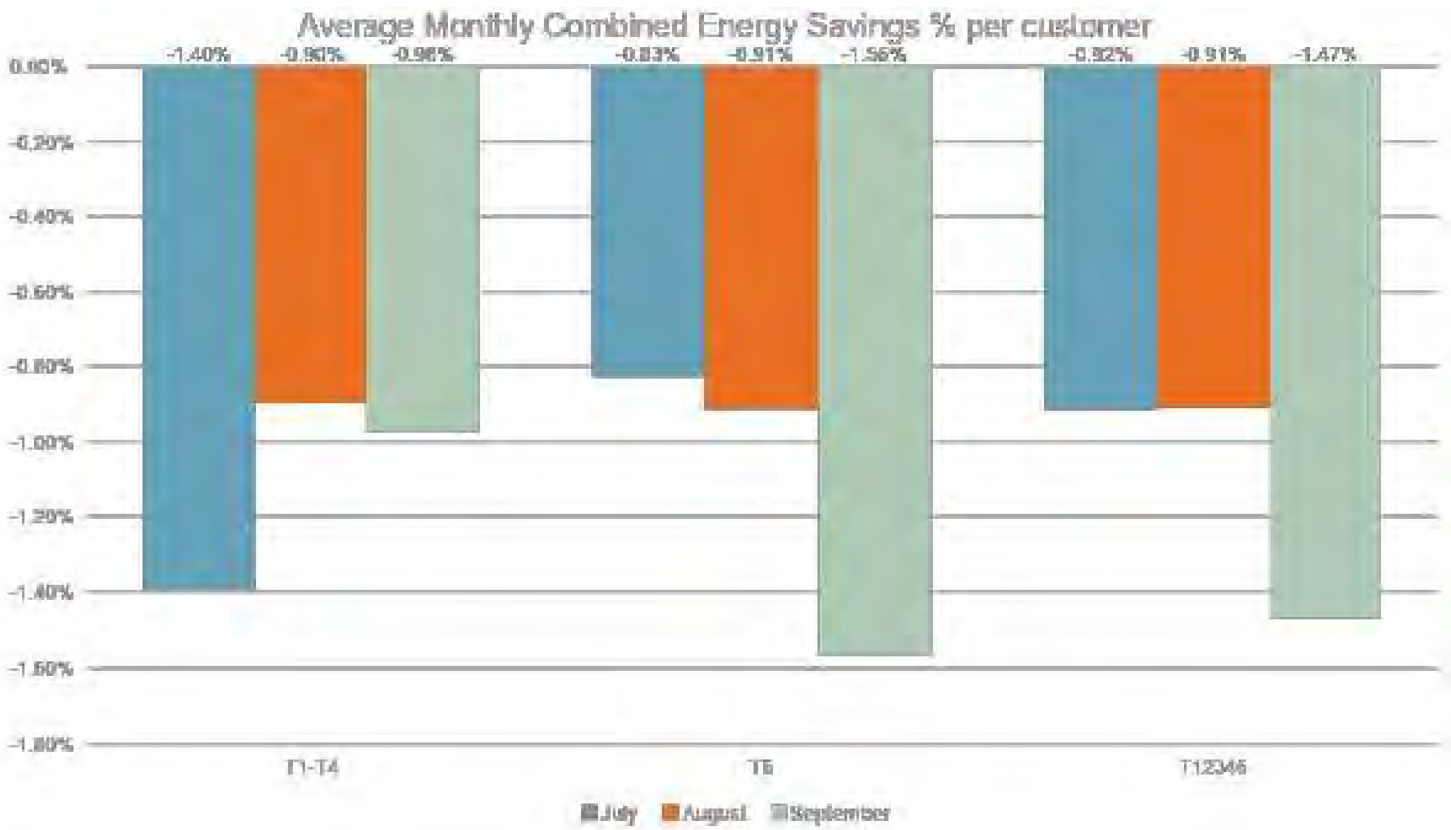
	T1	T2	T3	T4	T6
Treatment	5,439	4,775	5,539	2,597	100,171
Control	1,357	756	3,299	2,417	13,663

HER Program Results

Average Energy Savings in kWh per Customer



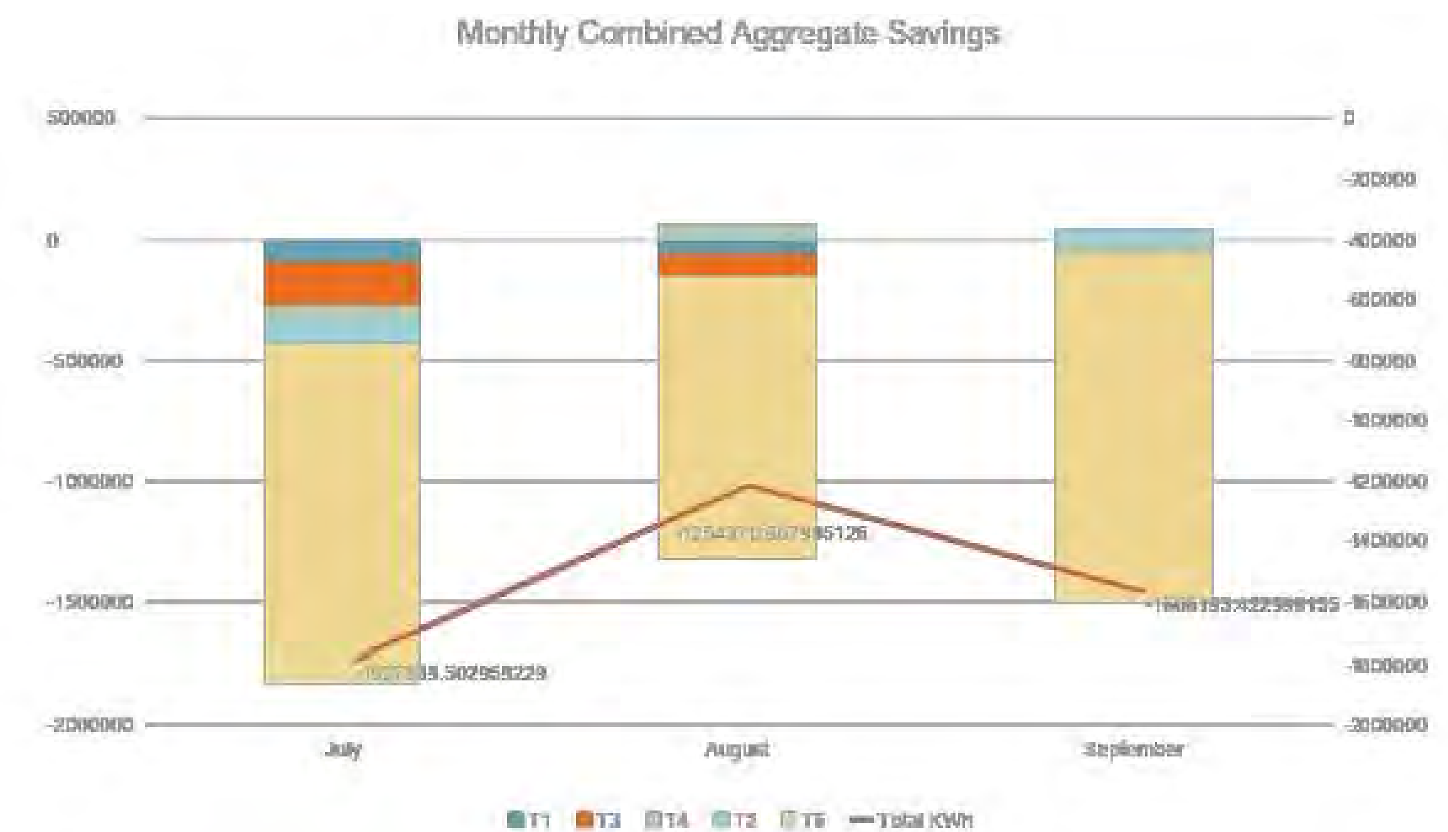
Average Monthly Energy Savings in %



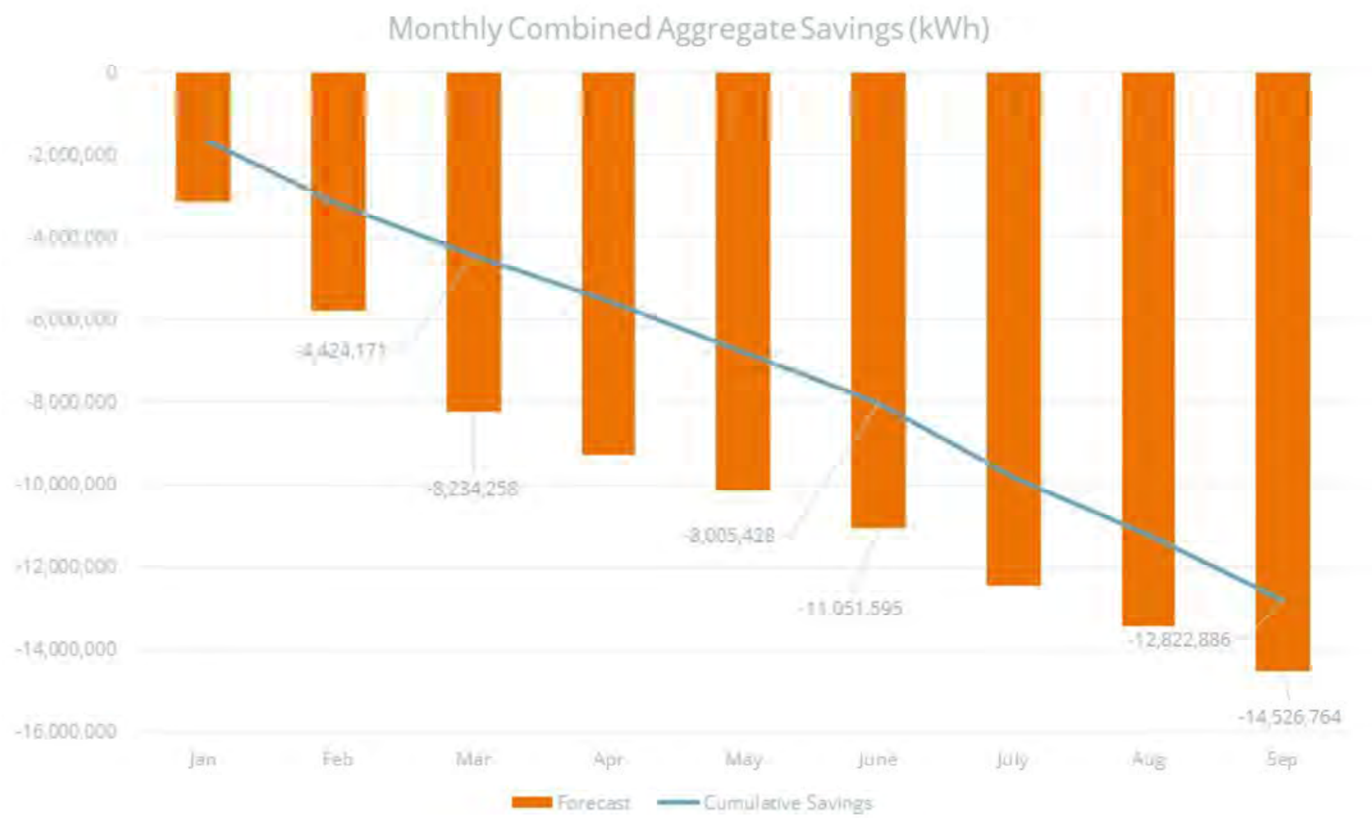
HARRIS UTILITIES

Aggregate Monthly Savings

Combined Aggregate Savings by Month (kWh)

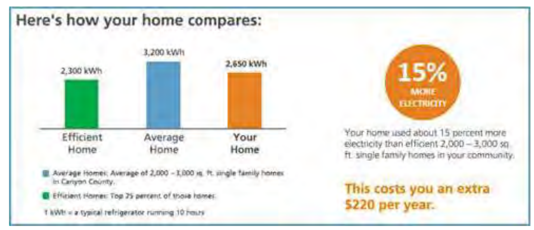


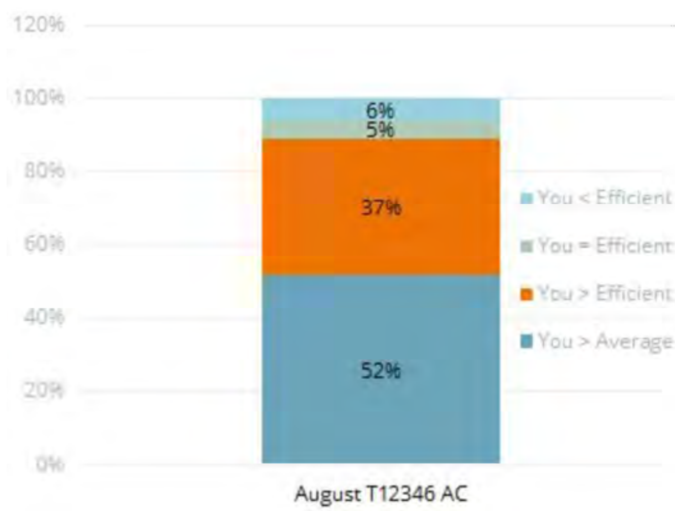
Cumulative Combined Savings by Month (kWh)



HARRIS UTILITIES

T12346 Peer Comparison Distribution





HARRIS UTILITIES

Attrition Overview – All Groups

T12345	Feb	May	Aug	Nov	Feb	May	August	Total
Permanent Removals								
Move Outs	263	238	90	470	269	214	298	1,842
AMI Insufficient/Negative Usage	119	0	0	0	0	0	0	119
Location	0	0	0	0	0	0	0	0
Property	2	2	0	1	0	0	57	62
Opt Outs	7	5	2	3	4	7	1	29
USPS - Non Deliverables	44	15	26	19	47	0	0	151
Temporary Removals								
AMI Insufficient/Negative Usage	0	67	81	33	65	48	132	426
Total Removals	435	327	199	526	485	225	356	2,553
Insufficient Benchmarking	0	0	12	0	100	4	2	118
Reports Delivered	**20,197**	**18,126**	**17,773**	**17,346**	**16,915**	**16,652**	**16,263**	**123,272**

T6	Jun	Aug	Sep	Dec	Feb	May	August	Total
Permanent Removals								
Move Outs	517	689	3,155	1,874	1,501	1,702	2,199	11,637
Location	28	33	207	0	377	0	0	645
Property	3	11	15	13	5	14	24	85
Opt Outs	0	63	48	26	38	38	21	234
USPS - Non Deliverables	1,009	1,053	964	988	314	0	0	4,328
Temporary Removals								
AMI Insufficient/Negative Usage	5	358	413	422	513	374	901	2,986
Total Removals	1,562	2,207	4,802	3,323	2,748	2,146	3,150	19,938
Insufficient Benchmarking	28	34	207	0	377	18	5	669
Reports Delivered	**106,941**	**105,267**	**102,314**	**100,560**	**98,238**	**96,277**	**93,791**	**703,388**

HARRIS UTILITIES

Attrition and Opt Out Rates

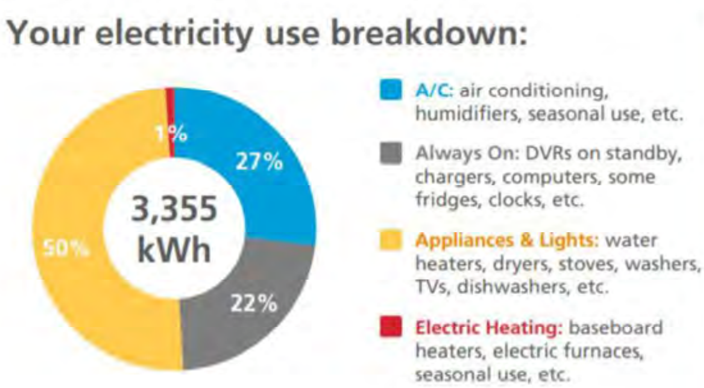
All Treatment Customers (January 2021 – September 2021)		
Permanent Removals	7,269	5.10%
Opt Outs	126	0.088%

T1234 Customers (January 2021 – September 2021)		
Permanent Removals	1,002	2.95%
Opt Outs	13	0.038%

T6 Customers (January 2021 – September 2021)		
Permanent Removals	6,267	5.78%
Opt Outs	113	0.10%

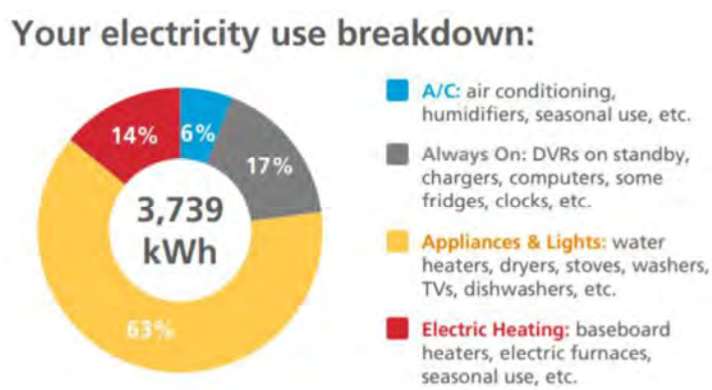
Average Electricity Use Breakdown

T12346 Customers
April - June AC



T12346 Customers

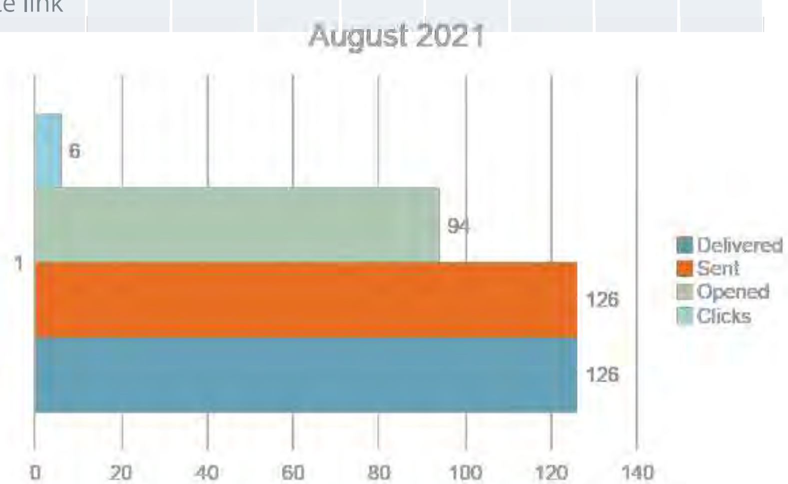
April - June AO



HARRIS UTILITIES

Email Open Rates Remain High

	May	Aug	Oct	Nov	Dec	Feb	May	Aug
Total # of emails	12	55	75	16	89	106	122	126
Click-through Rate	25%	7.5%	7.7%	8.3%	22.6%	16.5%	4.8%	6.4%
Open Rate	73%	73%	69%	75%	70%	75%	68%	75%
Unsubscribe clicks	0	0	0	0	0	0	3	0
Unsubscribe rate	0%	0%	0%	0%	0%	0%	0.8%	0%
Click rate on rebate link	0%	0%	0%	0%	0%	4%	0	1.1%



- 15 total old customers switched to email (0.1%)
- 137 total new customers switched to email (0.13%)
- 126 total emails were delivered in August 2021

2021 Email Click-Throughs

	Feb	May	Aug
View HTML	0	0	3

	Feb	May	Aug
Rebates	0	0	1

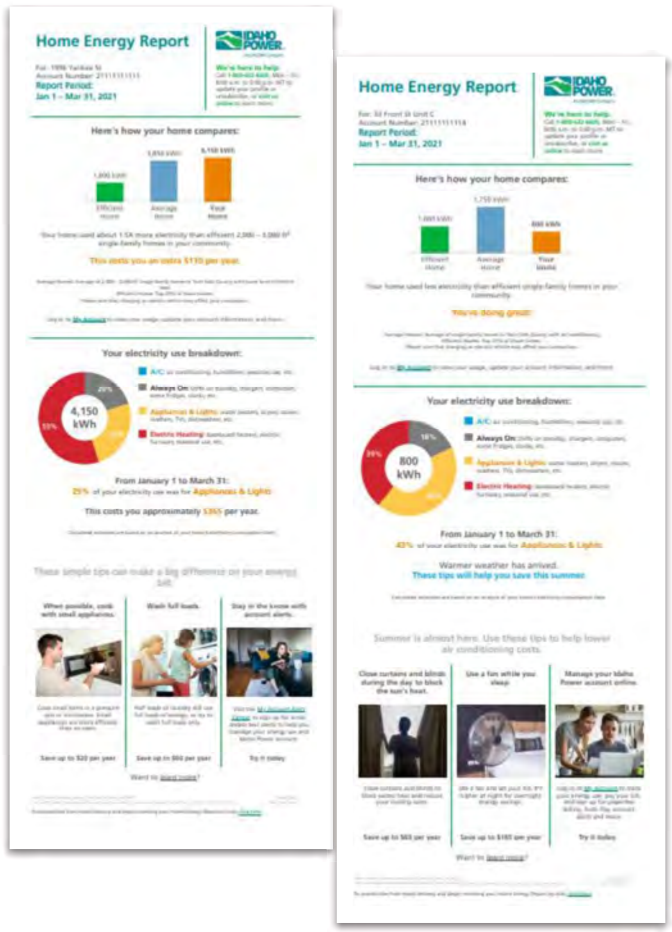
	Feb	May	Aug
MyAccount	0	1	2

	Feb	May	Aug
FAQ	0	0	0

	Feb	May	Aug
Privacy	0	0	0

	Feb	May	Aug
Learn More	0	0	0

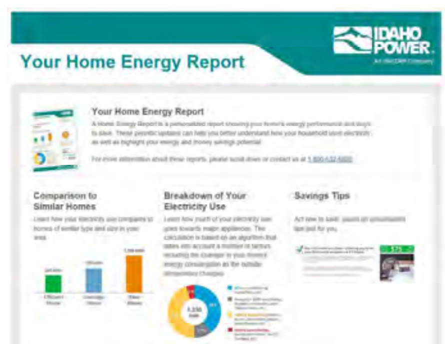
	Feb	May	Aug
Unsubscribe	0	3	0



CSA & Microsite Analysis

Microsite Activity

Microsite Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Unique Clicks	4	22	32	22	42	14	2	10	52				**200**
Total Clicks	4	27	32	22	45	14	2	16	53				**215**
Unique Page Views	10	65	5	10	40	10	2	38	10				**190**
Total Views	10	72	5	14	42	18	2	41	17				**221**



Call Center Volume Reflects Quarterly Schedule

Call Reason	2021												Total
	Jan	Feb 🗎	Mar	Apr	May 🗎	Jun	Jul	Aug 🗎	Sep	Oct	Nov 🗎	Dec	
General	2	45	4	2	34	6	2	16	2				113
Profile Update	3	46	8	2	29	4	1	19	5				117
Opt-Out	3	43	1	0	20	0	0	18	0				85
Escalation	0	2	0	0	0	0	0	0	0				2
Non-Program Related	13	22	7	5	37	13	9	35	11				152
Switch to Email	4	15	0	0	3	1	0	23	9				55
Switch to Paper	0	0	0	0	0	0	0	1	0				1
Other	1	23	4	0	21	4	2	9	1				65
Total Reasons*	26	196	24	9	144	28	14	121	28				590

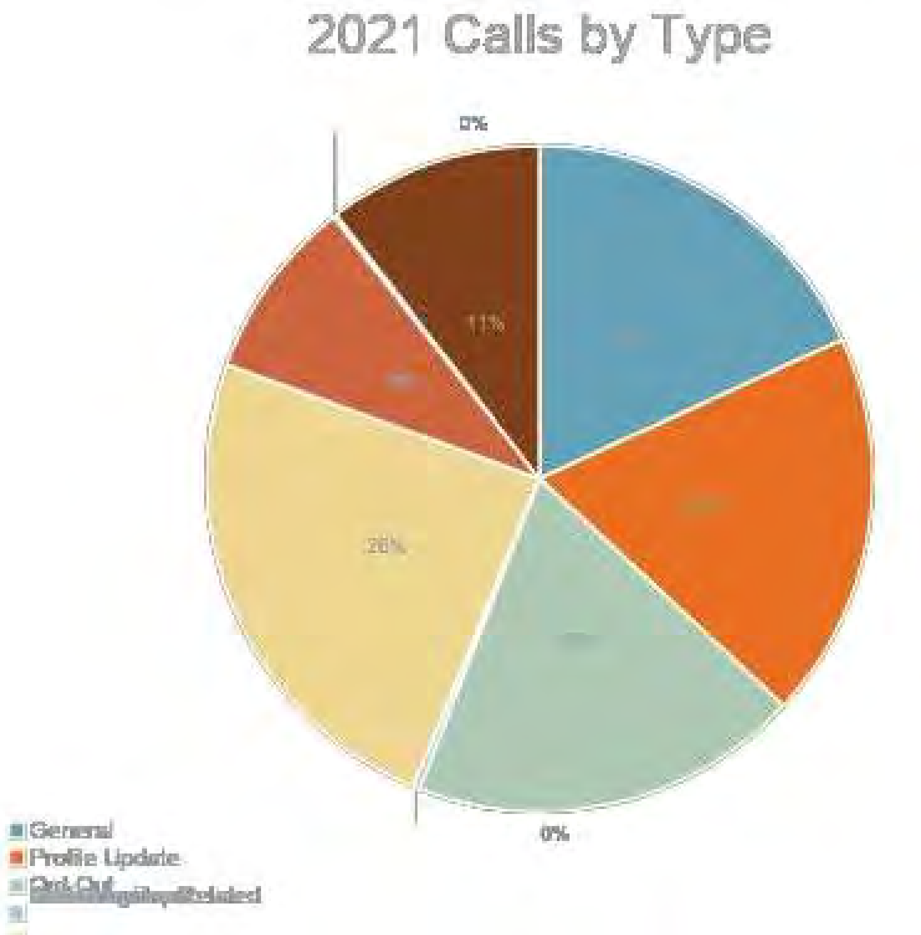
🗎 Treatment Month

	2018	2019	2020	2021
Total Calls*	411	246	1087	535
Opt-Out Calls**	0.64%	0.05%	0.124%	0.178%

* Some customers call in for more than on reason which is why there is a variance in Total Reasons and Total Calls.
**Opt-out rate calculated against total of T1 + optimized T345 + T2 for the year

HARRIS UTILITIES

Distribution of Calls by Type



CSA Reports Providing Great Insight

General Questions

- (Customer) had questions about tree trimming, also gave info about home energy audits and how to sign up
- (Customer) called wondering why they had high usage. Determined due to irrigation system tied to the house meter.

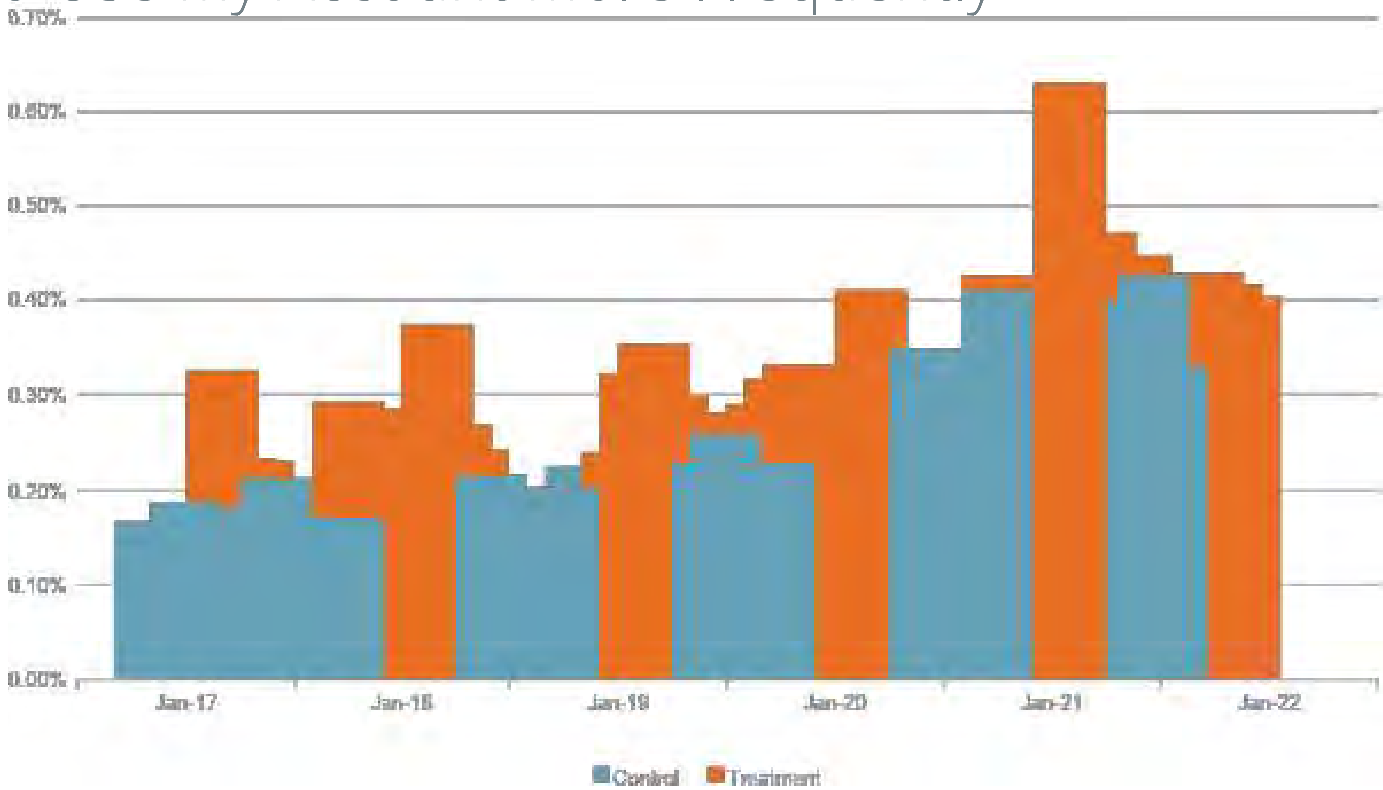
Home Profile Updates:

- (Customer)'s sq ft listed as 968, did addition 15 yrs. ago now 1,400, updated that and rest of home profile for more future report accuracy.
- (Customer) received HER trying to find ways to save energy on appliances. We filled out the home profile. Went over kilowatt meter or how to do a breaker test and monitor AMI data. All electric home also recommended the home energy audit for 99.00 and how to sign up for waiting list.

Opt-outs

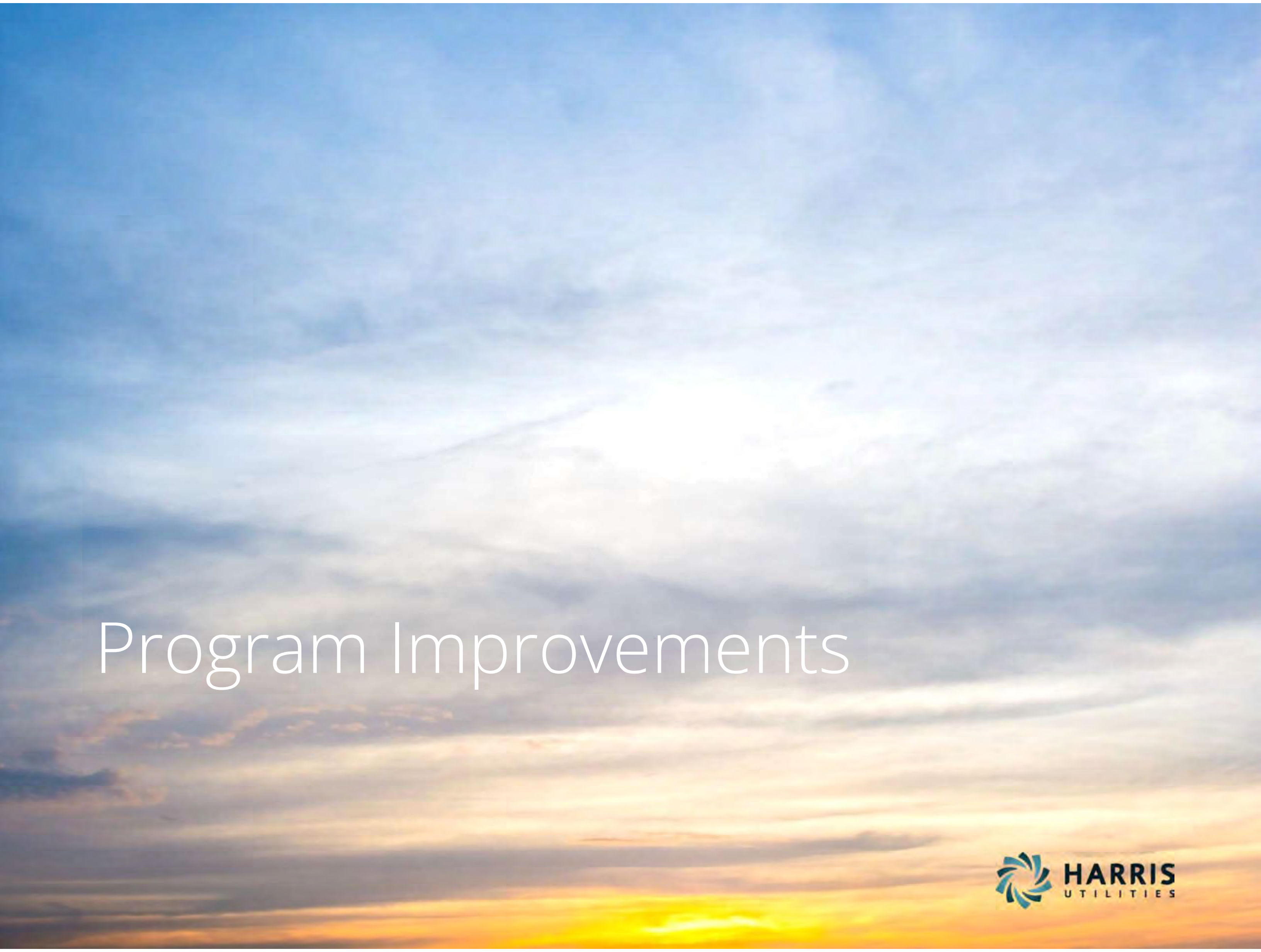
- (Customer) wanted to opt out of report they are both retired, home full time and do energy intensive hobbies, so they save where they can in other ways.
- (Customer) doesn't read the reports. Thinks they're a waste of paper.
- (Customer) is aware of use and doing what they are able to do. Wrote a nice letter requesting to be removed.

IPC My Account Activity – HER Recipients Continue to Use My Account More Frequently



Since the beginning of the program, the treatment has been consistently more active than the control group

HARRIS UTILITIES



Program Improvements

Program Improvements

Recommended Improvements	Description	Status
Implement Another CSAT Survey	The last survey was conducted during the pilot in 2019. Survey closed by IPC on Sept 9th. IPC completing further analysis of results.	Complete
Review Benchmarking Insufficiencies	Customers ultimately lost due to benchmarking insufficiencies (i.e. county, floorsize) should be removed during eligibility (including top-up phases). 14,838 customers had unknown HomeSize (sf). After IPC supplemental data was ingested, the count was brought down to 7,238. Uplight added additional 3rd party data, bringing it down to 5,020. A HER insert included in conjunction with the August reports. IPC also sent out an email campaign in September.	Complete
Incorporate Self-Service Opt-in to Email Function	Customers must call in to opt into email, which could be solved by a digital self-serve solution.	Not Started
Identify Way to Detect EV Ownership	A growing number of customers have electric vehicles, which likely impacts their ability to reduce energy use.	Not Started
Review Net Metering Later in the Eligibility Process	A growing number of customers are switching to net metering as they adopt solar energy. Removing them from HER eligibility later in the review process should be more accurate. Uplight removed 706 IO6 customers in November. We are working this into our process moving forward.	Complete

Appendix

Statistical Significance of Savings Calculated – New Method

Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	47.13	12.85	3.23213E-13	TRUE	July 1, 2021 – September 30, 2021
T6	42.81	18.74	3.771E-06	TRUE	July 1, 2021 – September 30, 2021
T12346 Combined	43.49	7.13	3.20744E-33	TRUE	July 1, 2021 – September 30, 2021

	T1	T2	T3	T4	T6
Treatment	5,256	4,598	5,363	2,511	95,873
Control	1,306	731	3,180	2,337	13,028

HARRIS UTILITIES

Statistical Significance of Savings Calculated – New Method

Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	167.04	39.62	7.11724E-17	TRUE	January 1, 2021 – Sept 30, 2021
T6	75.76	48.63	0.0011311	TRUE	January 1, 2021 – Sept 30, 2021
T12346 Combined	89.89	18,45	6.54204E-22	TRUE	January 1, 2021 – Sept 30, 2021

	T1	T2	T3	T4	T6
Treatment	5,439	4,775	5,539	2,597	100,171
Control	1,357	756	3,299	2,417	13663

HARRIS UTILITIES

Quarterly Savings Summary – Old Method

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	July 1, 2021 – September 30, 2021	47.71	824,596	1.16
T6	July 1, 2021 – September 30, 2021	43.06	4,015,469	1.05
T12346	July 1, 2021 – September 30, 2021	43.79	4,840,064	1.06

	T1	T2	T3	T4	T6
Treatment	5109	4490	5238	2445	93248
Control	1272	718	3114	2302	12694

Statistical Significance of Savings Calculated –Old Method

Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	47.71	12.80	1.38535E-13	TRUE	July 1, 2021 – September 30, 2021
T6	43.06	17.49	6.964E-07	TRUE	July 1, 2021 – September 30, 2021
T12346 Combined	43.79	6.67	3.41939E-38	TRUE	July 1, 2021 – September 30, 2021

	T1	T2	T3	T4	T6
Treatment	5109	4490	5238	2445	93248
Control	1272	718	3114	2302	12694

HARRIS UTILITIES

Year to Date Savings Summary –Old Method

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	January 1, 2021 – Sept 30, 2021	156	2,696,102	1.32
T6	January 1, 2021 – Sept 30, 2021	109.24	10,186,402	0.97
T12346	January 1, 2021 – Sept 30, 2021	116.55	12,882,504	1.02

	T1	T2	T3	T4	T6
Treatment	5109	4490	5239	2445	93248
Control	1272	718	3114	2302	12694

Statistical Significance of Savings Calculated – Old Method

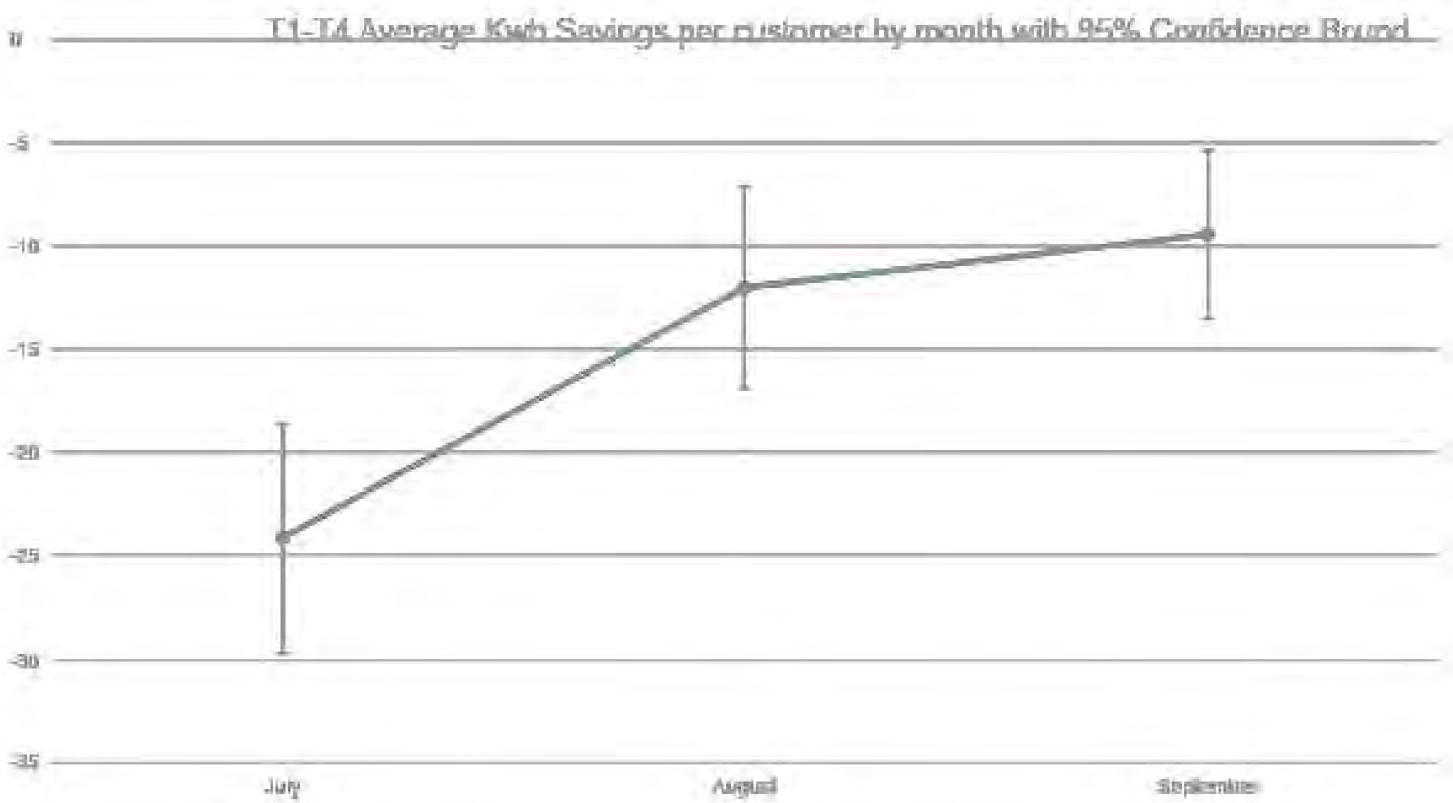
Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	156	12.80	2.258E-126	TRUE	January 1, 2021 – Sept 30, 2021
T6	109.24	38.43	1.268E-08	TRUE	January 1, 2021 – Sept 30, 2021
T12346 Combined	116.55	14.65	4.26488E-55	TRUE	January 1, 2021 – Sept 30, 2021

	T1	T2	T3	T4	T6
Treatment	5109	4490	5239	2445	93248
Control	1272	718	3114	2302	12694

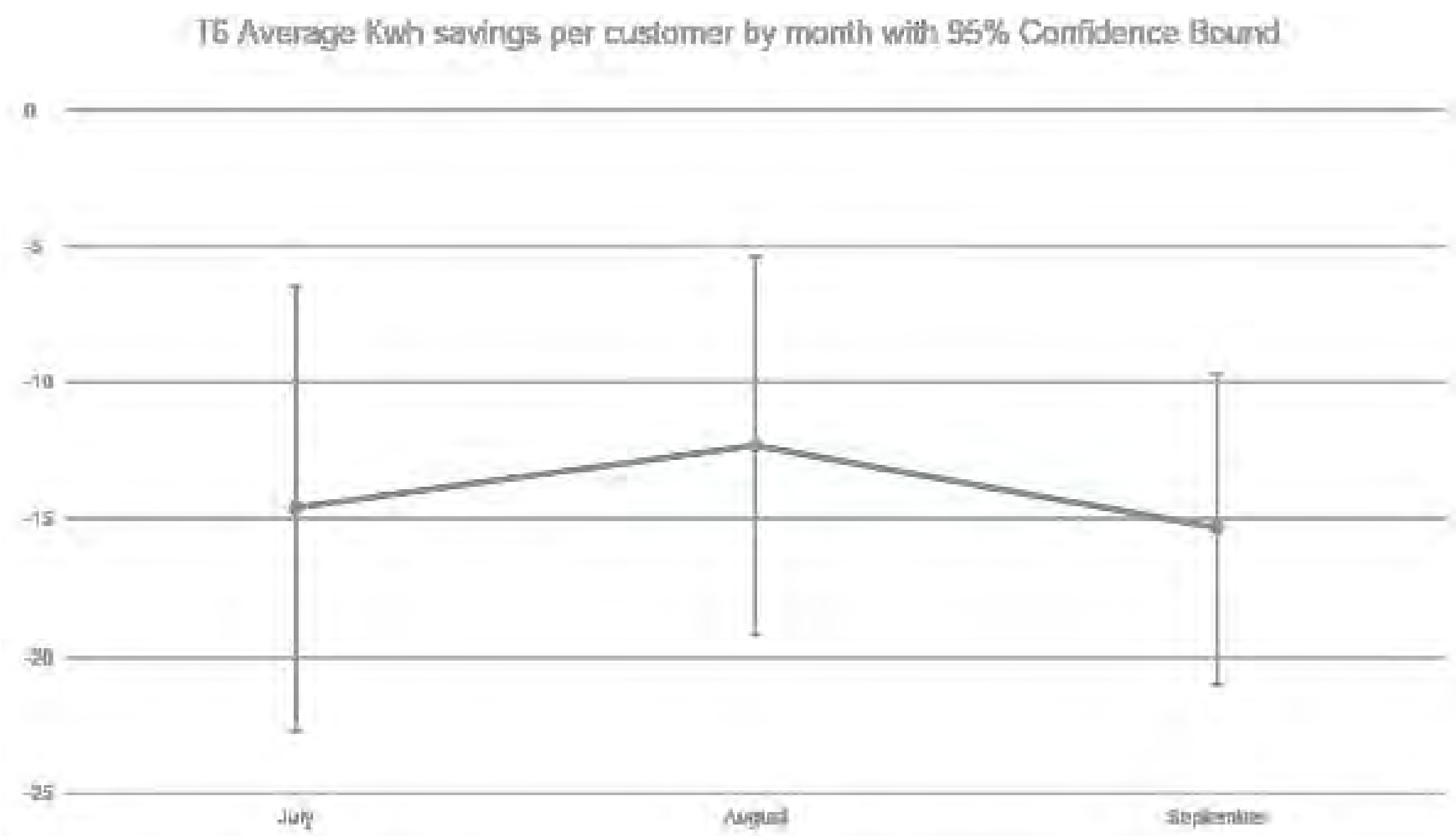
HARRIS UTILITIES

T1234 Savings Confidence Intervals



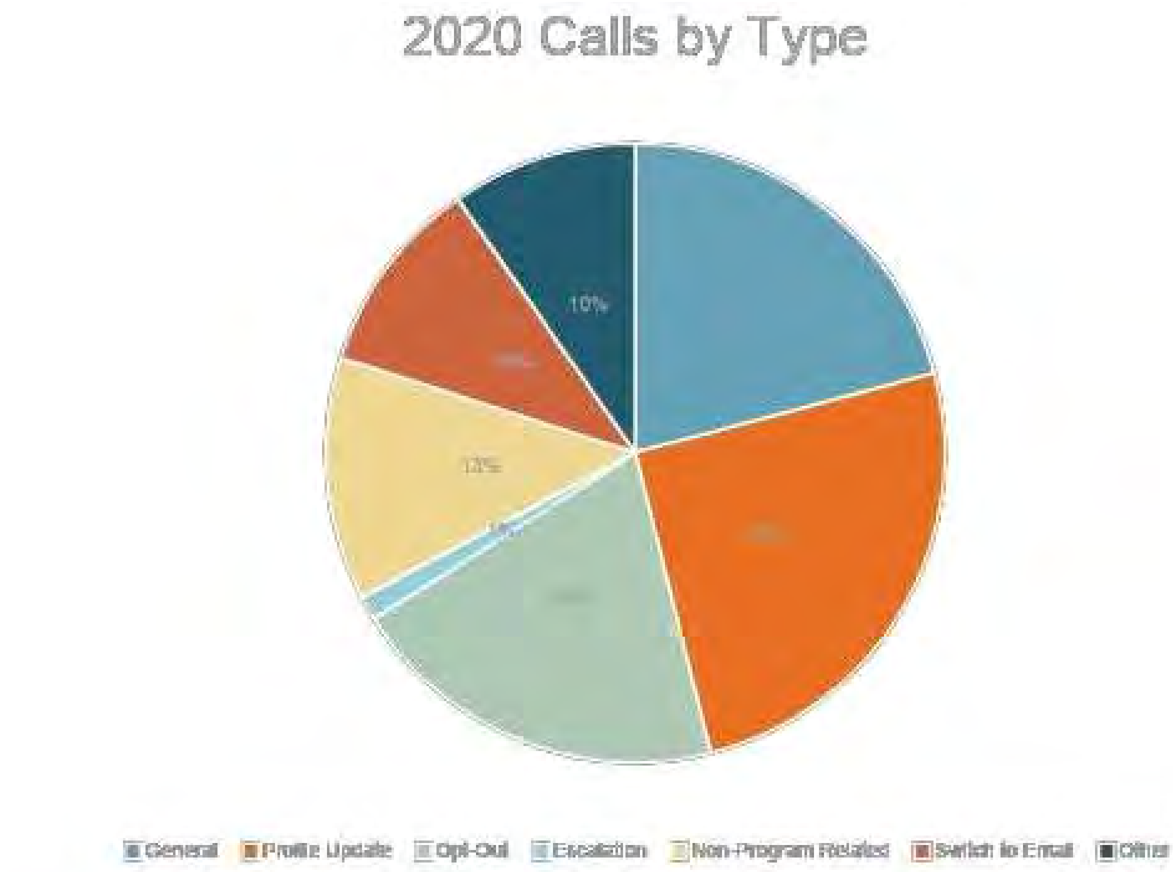
HARRIS UTILITIES

T6 Savings Confidence Intervals

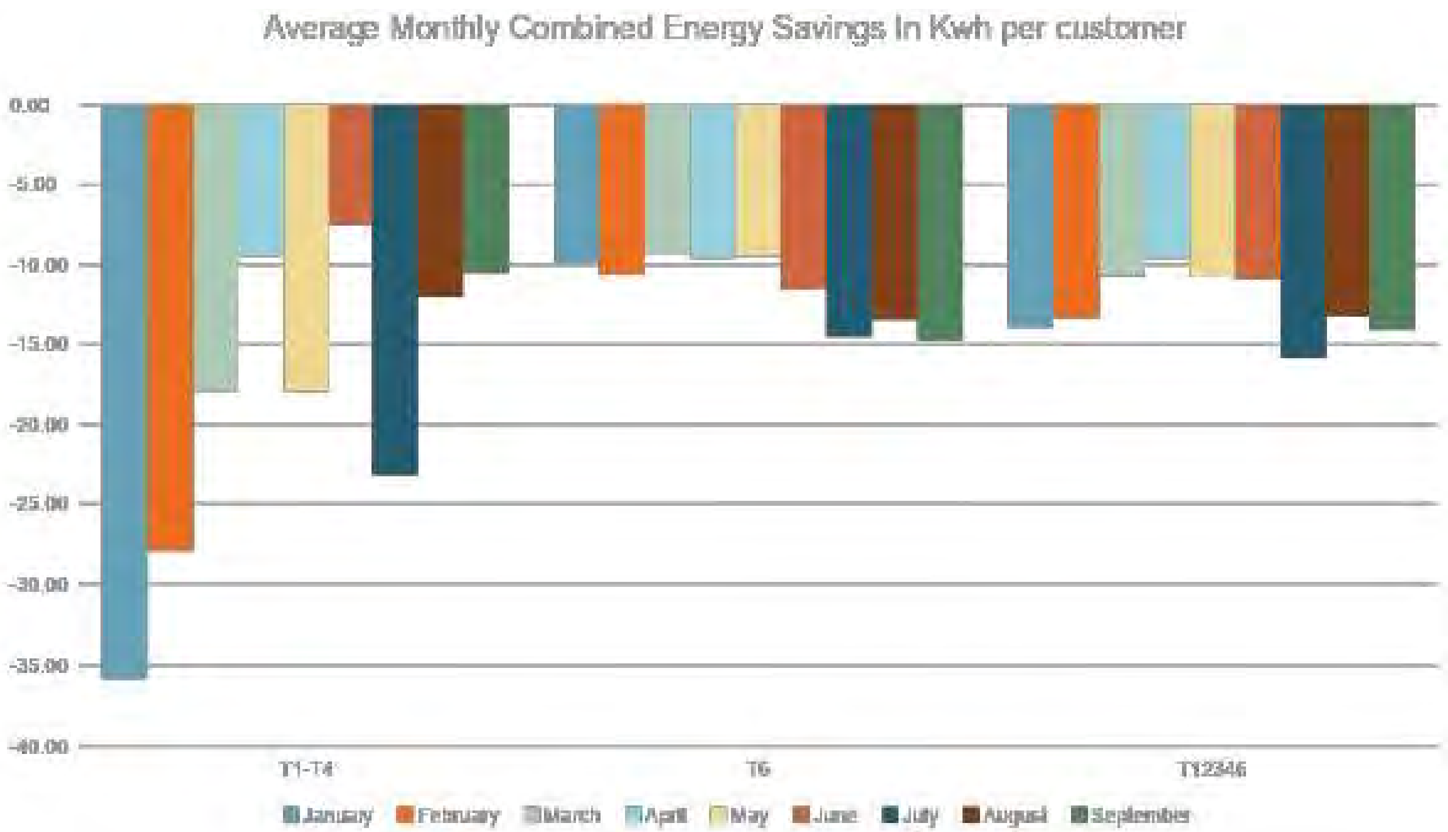


T12346 Savings Confidence Intervals

Distribution of Calls by Type

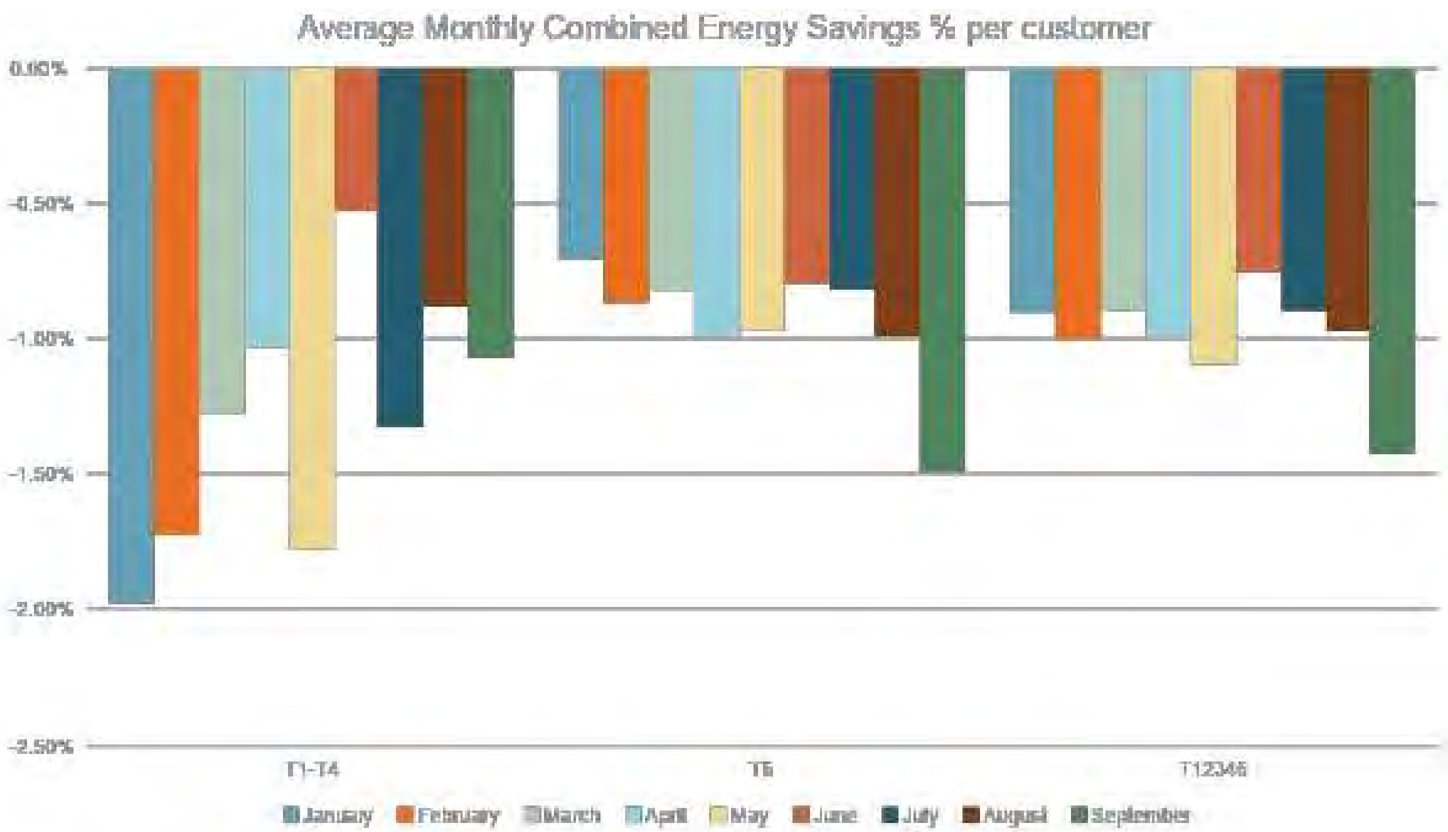


Average Energy Savings in kWh per Customer



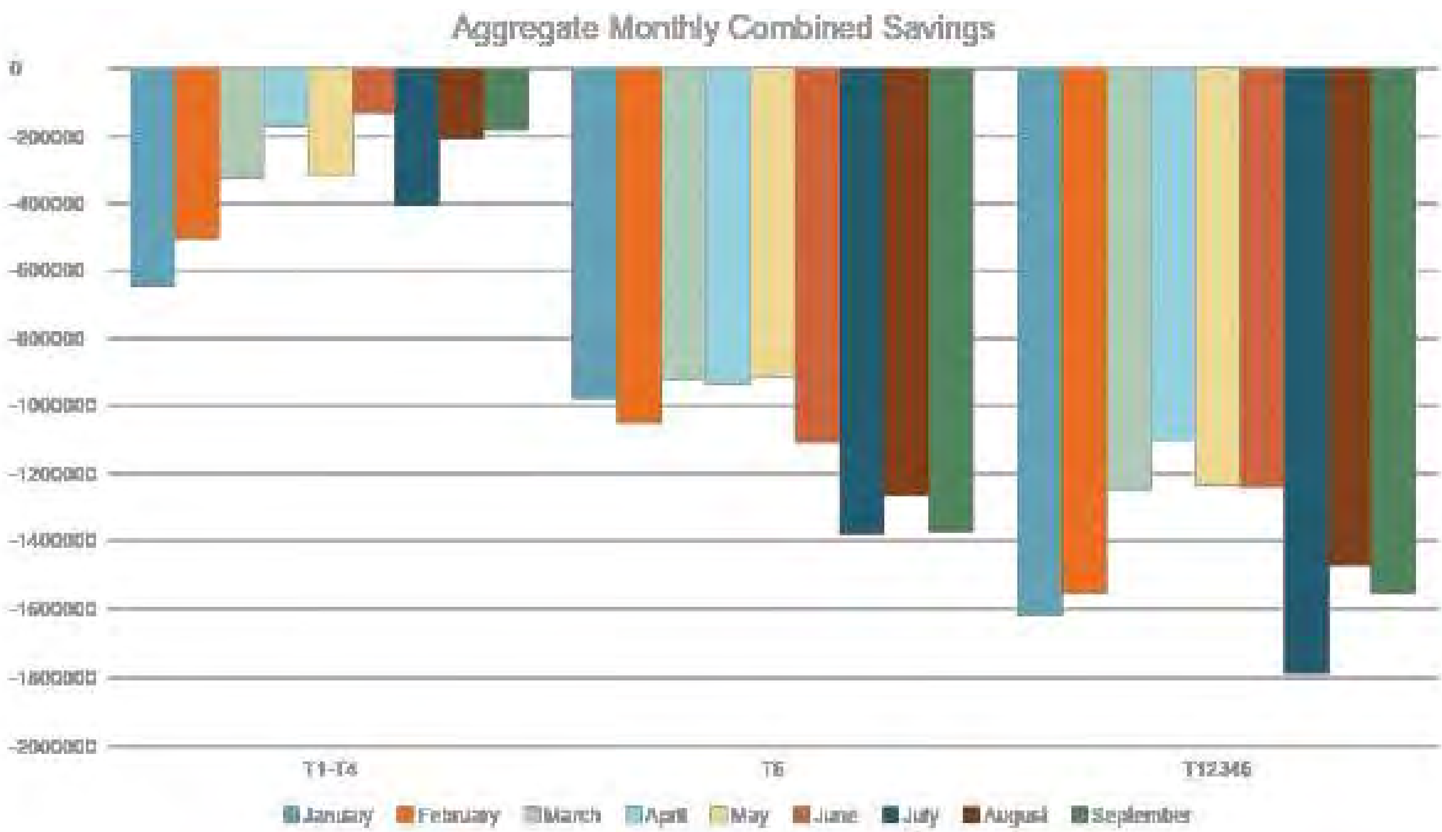
HARRIS UTILITIES

Average Monthly Energy Savings in %

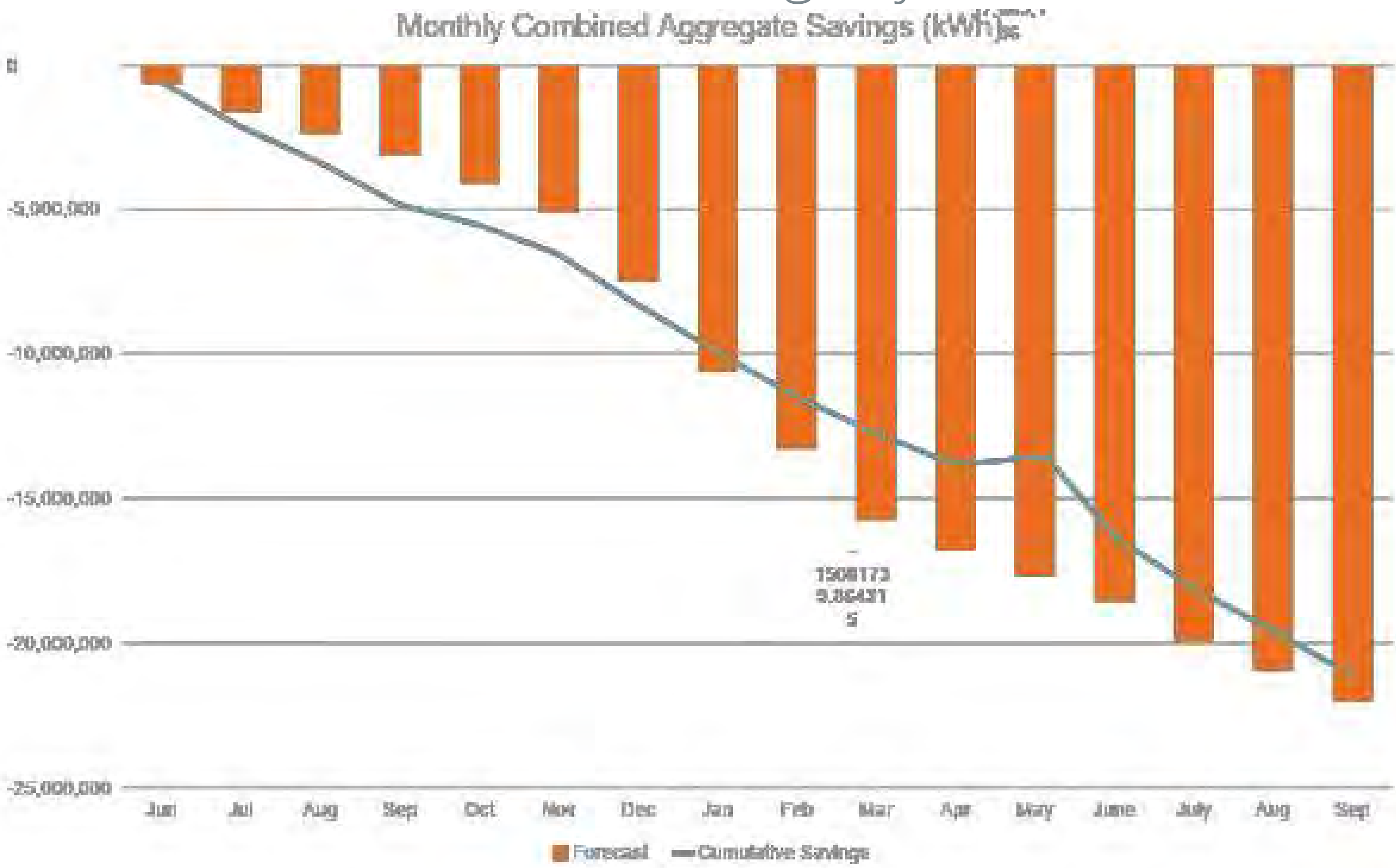


HARRIS UTILITIES

Aggregate Monthly Savings

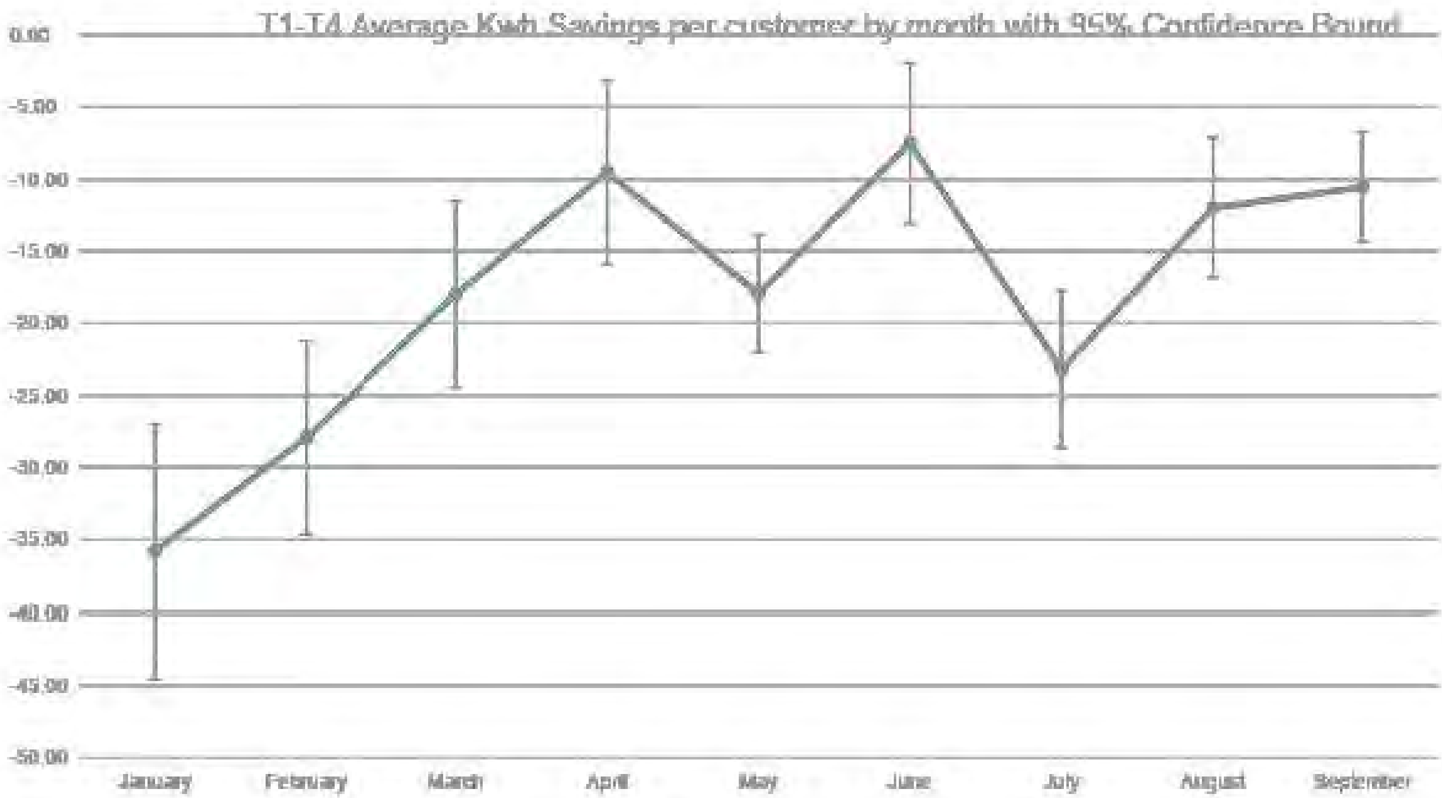


Cumulative Combined Savings by Month (kWh)



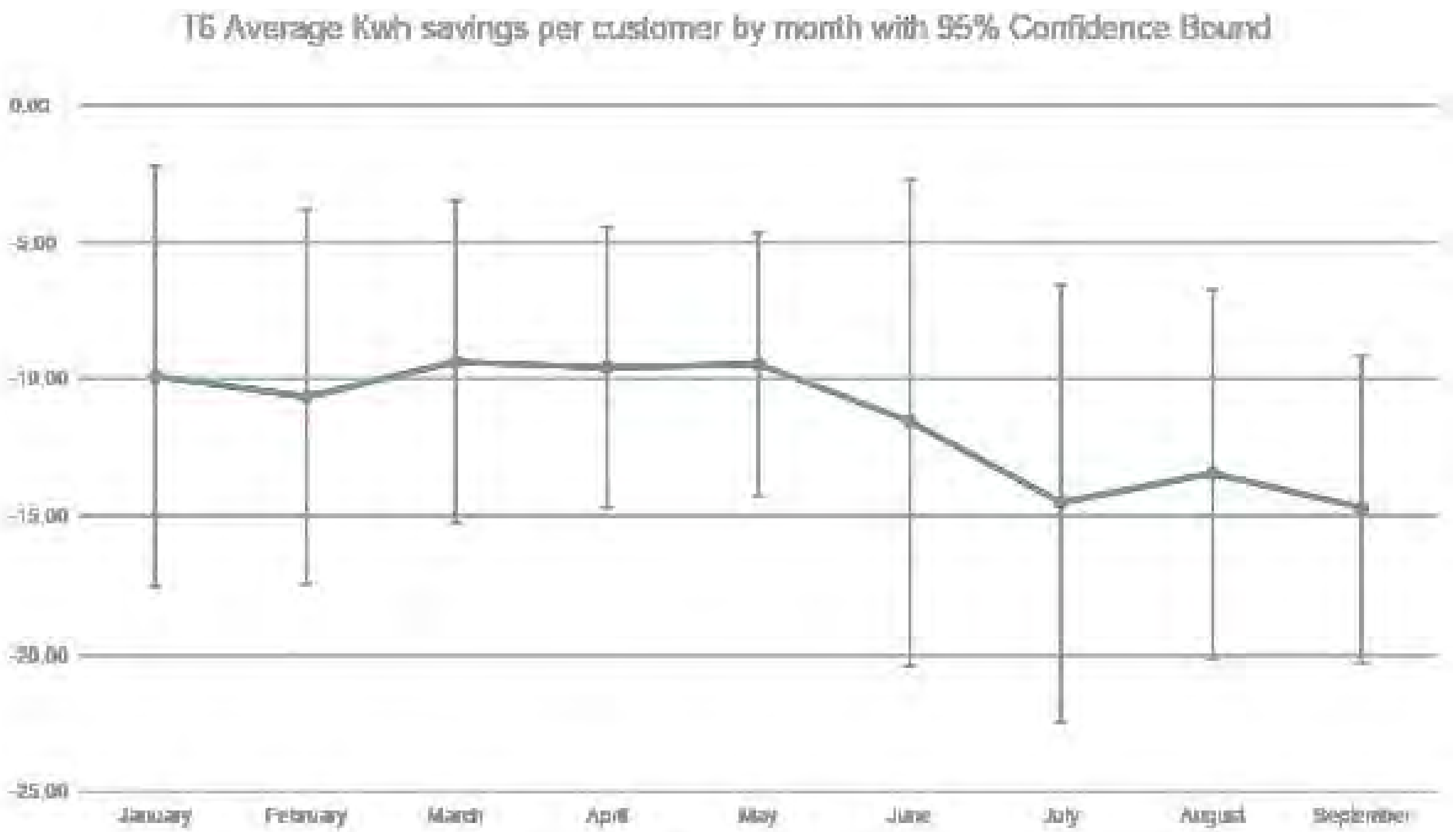
HARRIS UTILITIES

T1234 Savings Confidence Intervals

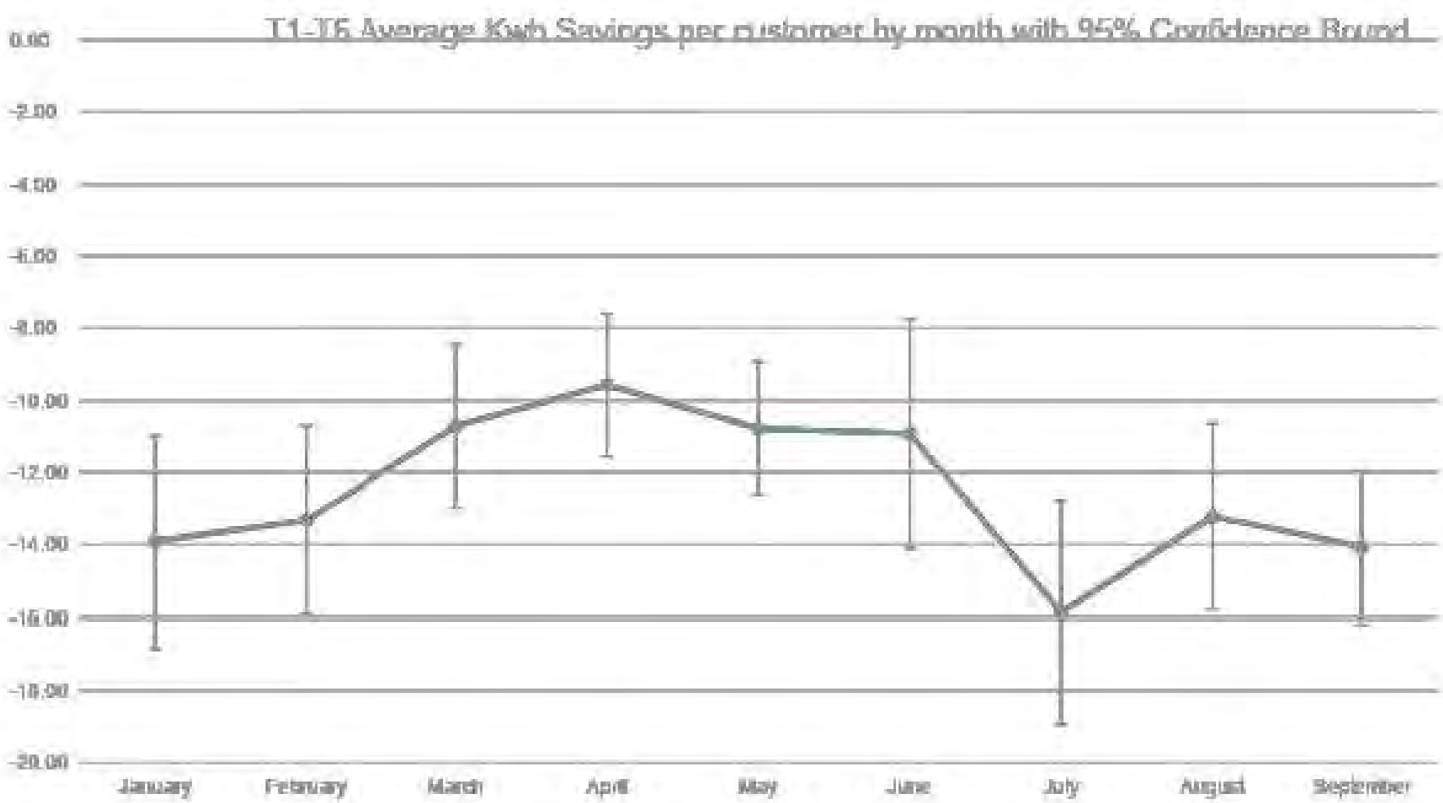


HARRIS UTILITIES

T6 Savings Confidence Intervals



T12346 Savings Confidence Intervals



Idaho Power Company Home Energy Report Program Year 2021

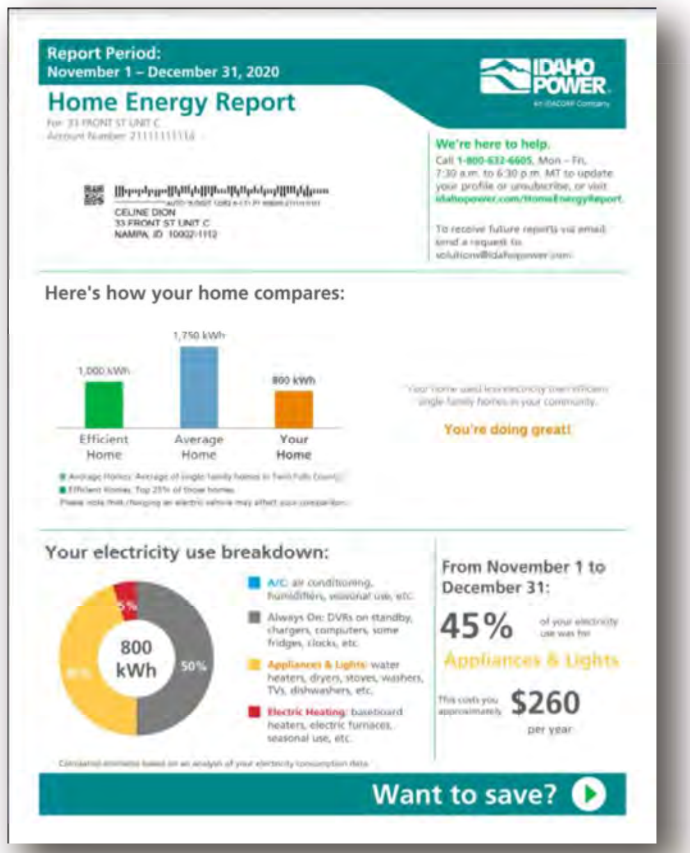
Quarterly Monitoring Report (October 1, 2021 – December 31, 2021)

Presented on February 1, 2022

HARRIS UTILITIES

Agenda

- Program Overview
- Savings Estimates
- Program Results
- Microsite and CSA Results
- Attrition and Opt-outs
- Questions



HARRIS UTILITIES

Home Energy Report Program Overview

YR4 Program Design

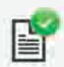
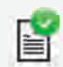
Pilot Customers Treated: **15,304**

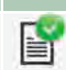
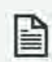
Total # of Customers Eligible for Treatment 107,211	
Group	**Size**
T1 (electric heating)	4,440
T2 (electric heating)	3,857
T3	4,794
T4	2,213
T6	91,907

Total # of Customers Eligible for Treatment Pulled at the end of each quarter.

HARRIS UTILITIES

Report Schedule

	2021											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6												

	2022											
Cohort	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6												

*T5 customers were removed from treatment in May 2020

Program Savings Summary

Savings Method Change

Old Method

Prior to Q3 2021, only customers that were active through the end of the analysis period were included in the evaluation group. This means that if a customer moved out in the third month of the quarter, their savings for the first two months of the quarter were not measured.

New Method

Per Craig Williamson's suggestion, starting in Q3 2021, data for customers who moved out during the analysis period are included *up until the date they moved out*. This is done consistently for both treatment and control groups.

Impact

Customers with less than three months will have lower consumption. This (appropriately) leads to a slightly lower average savings per customer, but it increases the total savings, since we are multiplying that average by the total count of customers who were active for any part of the quarter.

Terminology

Program Group

The program group is the term we use to refer to customers that are in the treatment group and are actively being treated with reports. These customers by default are also part of the evaluation group.

Evaluation Group

The evaluation group is the term we use to refer to customers that are in the treatment or control group and are factored into the savings evaluations. These customers may or may not be actively receiving reports.

Overview of Waves

Wave 1

- Group 1 = high heating group
- Group 3 = high overall usage group
- Group 4 = medium overall usage group
- Group 5 = low overall usage group (removed)

Wave 2

- Group 2 = high heating group

Wave 3

- Group 6 = all remaining eligible customers (added June 2020)

Quarterly Savings Summary

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	October 1, 2021 – December 31, 2021	42.83	733,430	1.23%
T6	October 1, 2021 – December 31, 2021	35.30	3,241,417	1.01%
T12346	October 1, 2021 – December 31, 2021	36.49	3,974,847	1.05%

	T1	T2	T3	T4	T6
Treatment	5,094	4,429	5,174	2,426	91,817
Control	1,257	710	3,073	2,277	12,493

Note: T&C counts captured at end of quarter

HARRIS UTILITIES

Year to Date Savings Summary

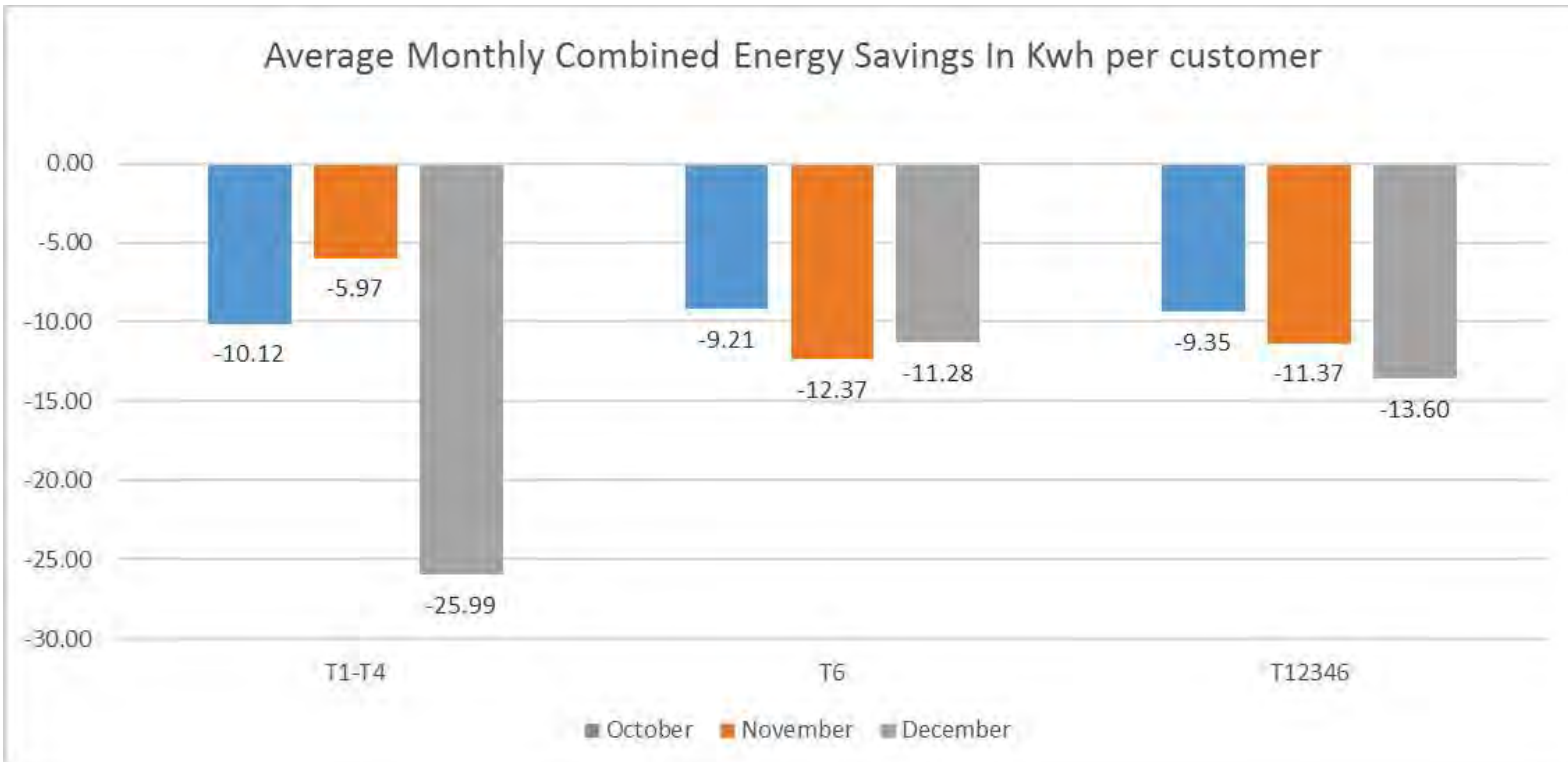
Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	January 1, 2021 – December 31, 2021	190.27	3,284,069	1.12%
T6	January 1, 2021 – December 31, 2021	144.28	13,382,802	0.98%
T12346	January 1, 2021 – December 31, 2021	151.50	16,666,871	1.00%

	T1	T2	T3	T4	T6
Treatment	5,094	4,429	5,174	2,426	91,817
Control	1,257	710	3,073	2,277	12,493

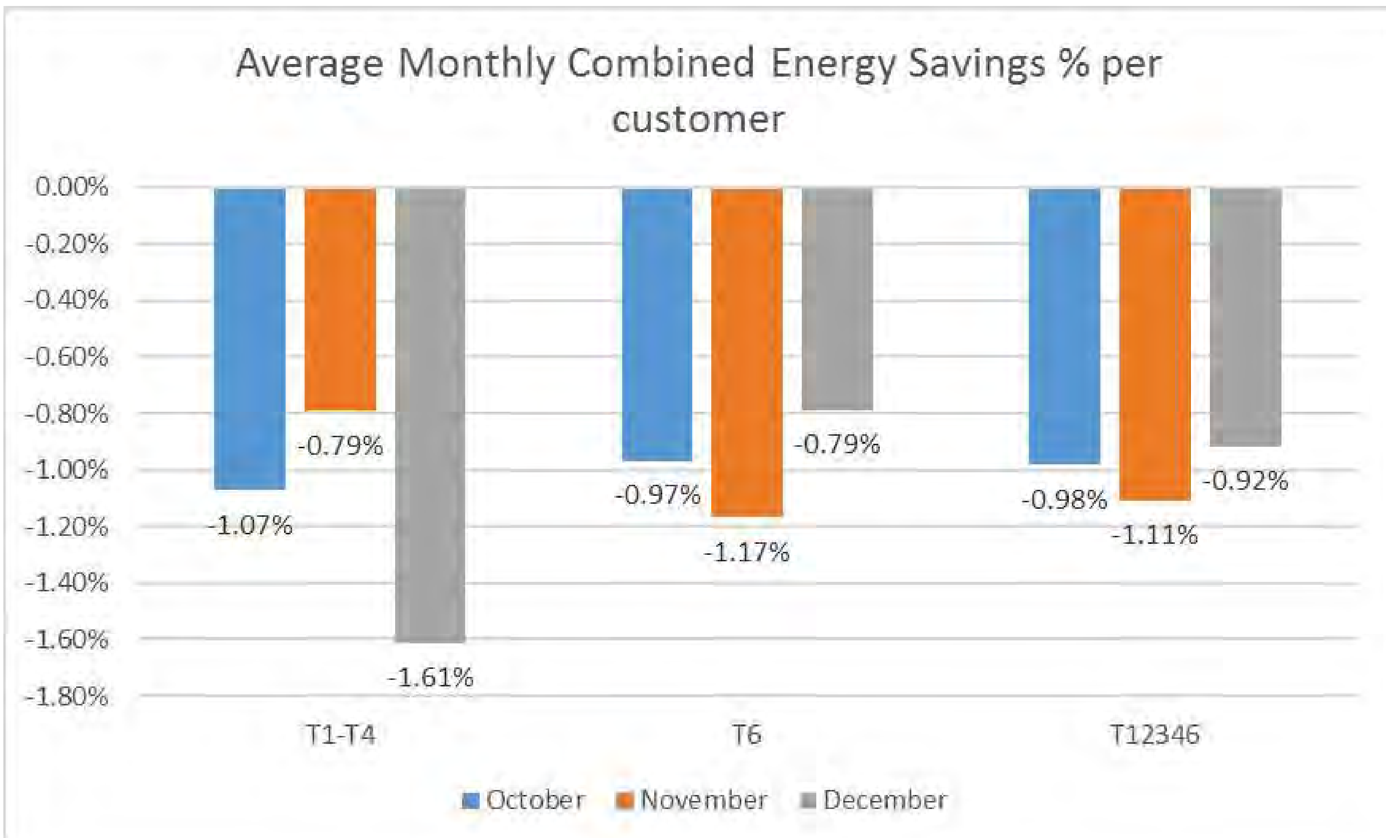
Note: T&C counts captured at end of quarter

HER Program Results

Average Energy Savings in kWh per Customer

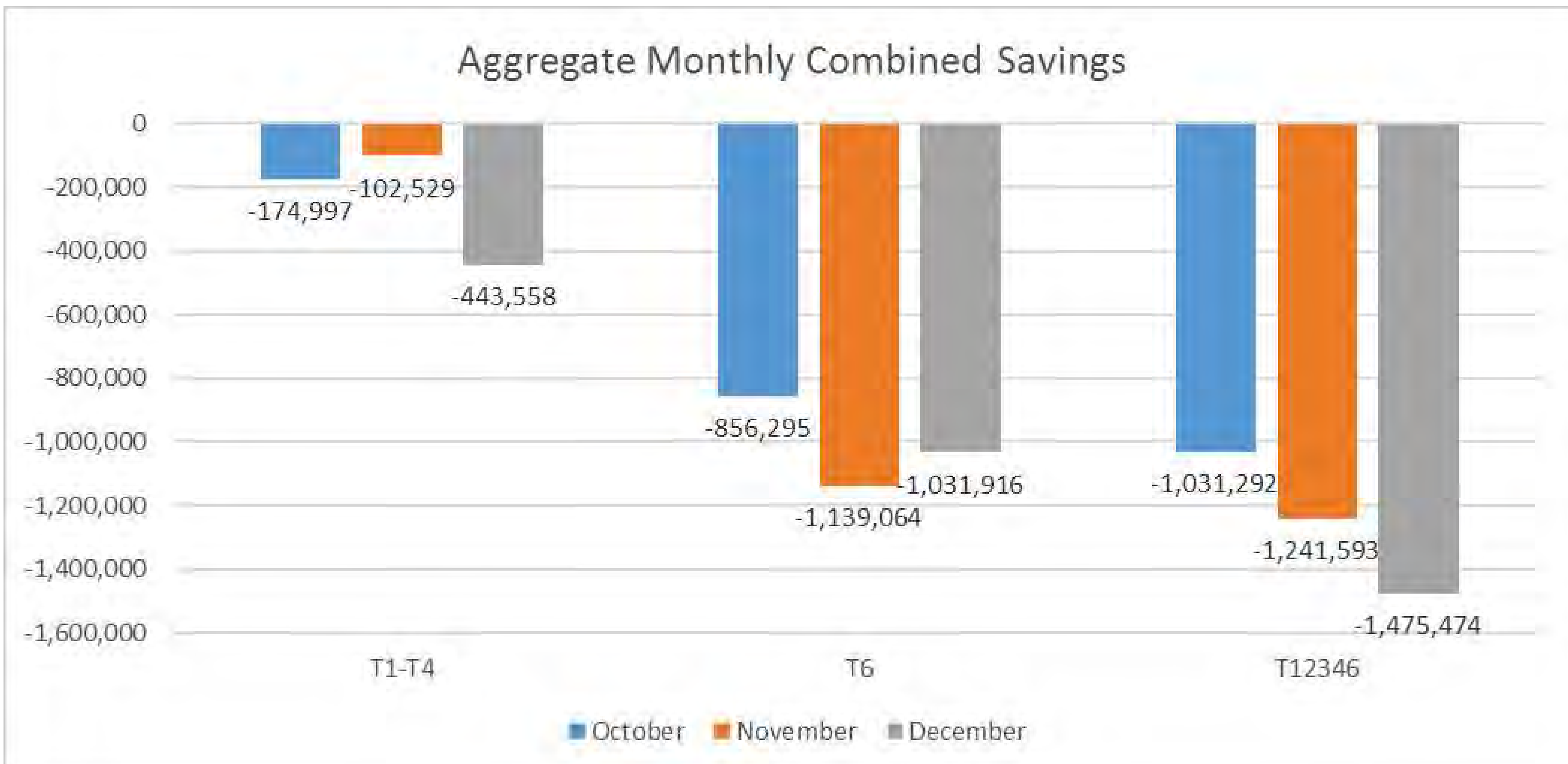


Average Monthly Energy Savings in %

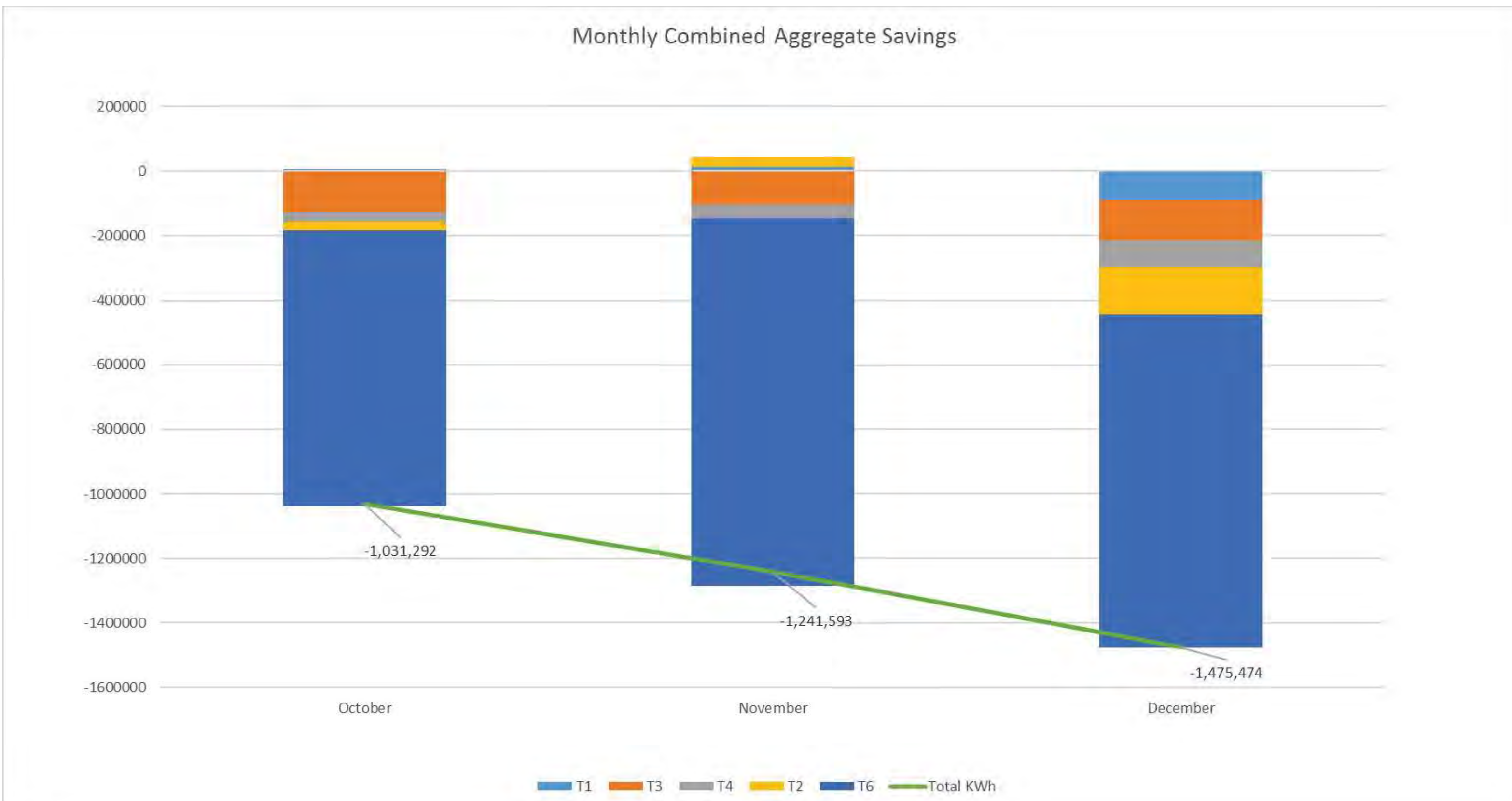


HARRIS UTILITIES

Aggregate Monthly Savings



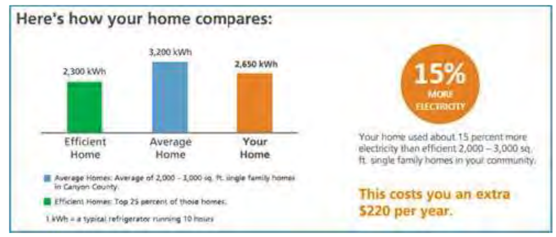
Combined Aggregate Savings by Month (kWh)

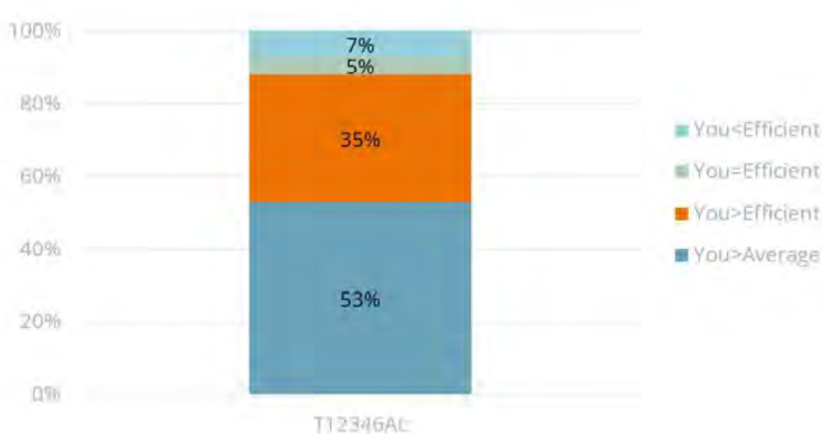


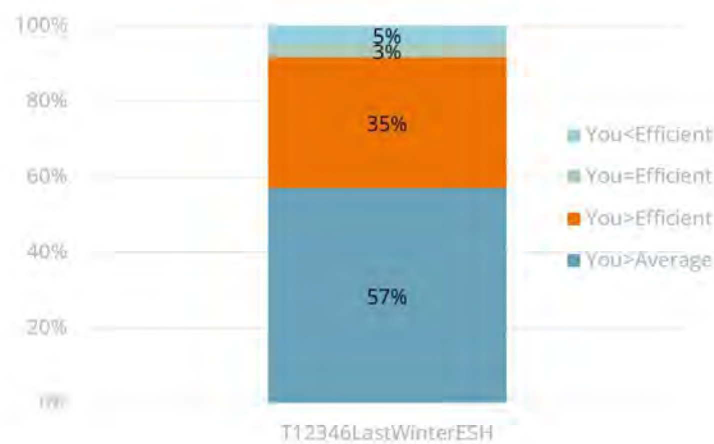
Cumulative Combined Savings by Month (kWh)

HARRIS UTILITIES

T12346 Peer Comparison Distribution







Attrition Overview – All Groups

T12345	Feb 2020	May 2020	Aug 2020	Nov 2020	Feb 2021	May 2021	Aug 2021	Nov 2021	2020/2021 Total
Permanent Removals									
Move Outs	263	238	90	470	269	214	298	271	2,113
AMI Insufficient/Negative Usage/Unsupported Rate Code (IO6)	119	0	0	0	0	0	0	103	222
Location	0	0	0	0	0	0	0	0	0
Property	2	2	0	1	0	0	57	0	62
Opt Outs	7	5	2	3	4	7	1	1	30
USPS - Non Deliverables	44	15	26	19	47	0	0	0	151
Temporary Removals									
AMI Insufficient/Negative Usage	0	67	81	33	65	48	132	105	531
Total Removals	435	327	199	526	485	225	356	375	2,928
Insufficient Benchmarking	0	0	12	0	100	4	2	4	122
Reports Delivered	**20,197**	**18,126**	**17,773**	**17,346**	**16,915**	**16,652**	**16,263**	**15,965**	**139,237**

T6	Jun 2020	Aug 2020	Sep 2020	Dec 2020	Feb 2021	May 2021	Aug 2021	Nov 2021	2020/2021 Total
Permanent Removals									
Move Outs	517	689	3,155	1,874	1,501	1,702	2,199	2,265	13,902
Unsupported Rate Code (IO6)	0							599	599
Location	28	33	207	0	377	0	0	0	645
Property	3	11	15	13	5	14	24	8	93
Opt Outs	0	63	48	26	38	38	21	28	262
USPS - Non Deliverables	1,009	1,053	964	988	314	0	0	0	4,328
Temporary Removals									
AMI Insufficient/Negative Usage	5	358	413	422	513	374	901	996	3,982
Total Removals	1,562	2,207	4,802	3,323	2,748	2,146	3,150	3,915	23,853
Insufficient Benchmarking	28	34	207	0	377	18	5	19	688
Reports Delivered	**106,941**	**105,267**	**102,314**	**100,560**	**98,238**	**96,277**	**93,791**	**91,233**	**794,621**

Attrition and Opt Out Rates

All Treatment Customers (January 2021 – December 2021)		
Permanent Removals	10,546	7.82%
Opt Outs	157	0.12%

T1234 Customers (January 2021 – December 2021)		
Permanent Removals	1,378	5.23%
Opt Outs	15	0.057%

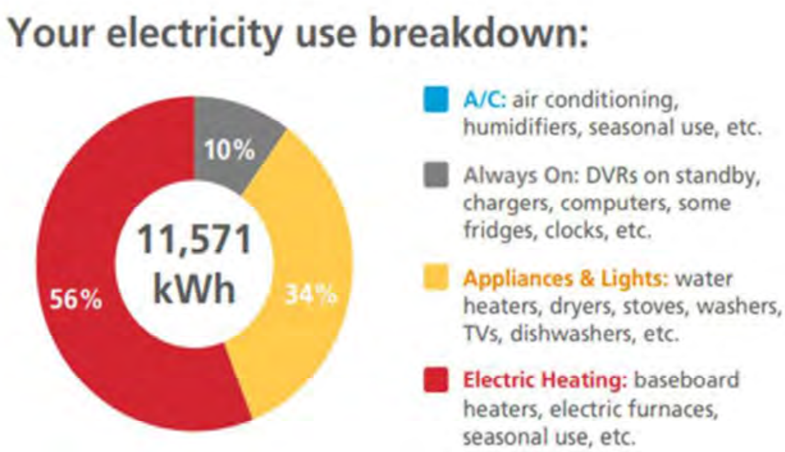
T6 Customers (January 2021 – December 2021)		
Permanent Removals	9,168	8.45%
Opt Outs	142	0.13%

HARRIS UTILITIES

Average Electricity Use Breakdown

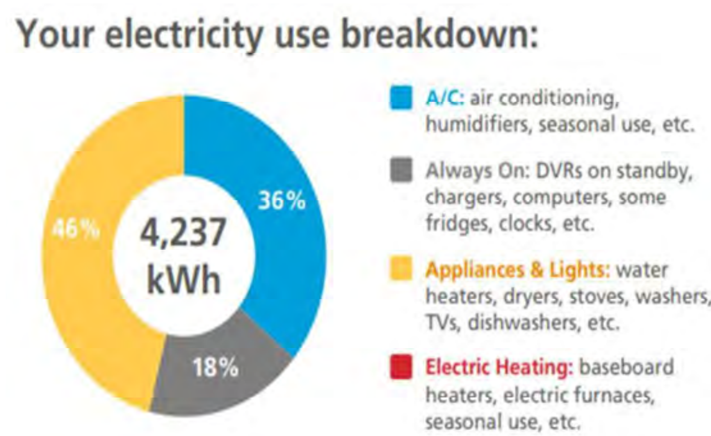
T12346 Customers

November - March ESH



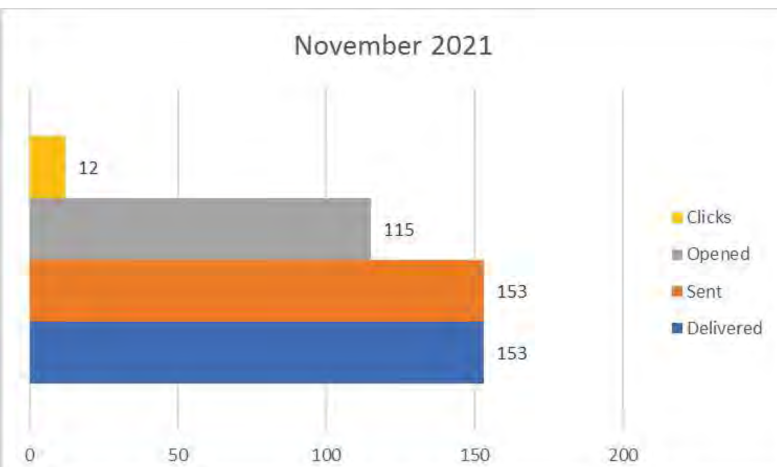
T12346 Customers

July - September AL



Email Open Rates Remain High

	May 2020	Aug 2020	Oct 2020	Nov 2020	Dec 2020	Feb 2021	May 2021	Aug 2021	Nov 2021
Total # of emails	12	55	75	16	89	106	122	126	153
Click-through Rate	25%	7.5%	7.7%	8.3%	22.6%	16.5%	4.8%	6.4%	10.4%
Open Rate	73%	73%	69%	75%	70%	75%	68%	75%	75%
Unsubscribe clicks	0	0	0	0	0	0	3	0	3
Unsubscribe rate	0%	0%	0%	0%	0%	0%	0.8%	0%	0
Click rate on rebate link	0%	0%	0%	0%	0%	4%	0	1.1%	0



- 15 total pilot customers switched to email (0.1%)
- 151 total new customers switched to email (0.14%)
- 153 total emails were delivered in November 2021

2021 Email Click-Throughs

	Feb	May	Aug	Nov
View HTML	0	0	3	6

	Feb	May	Aug	Nov
Rebates	0	0	1	0

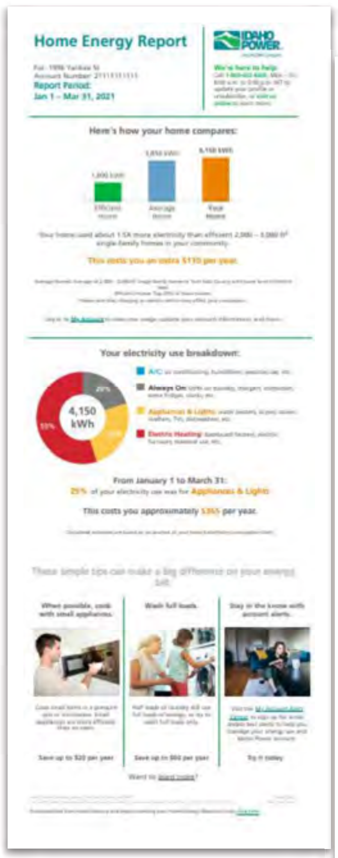
	Feb	May	Aug	Nov
MyAccount	0	1	2	3

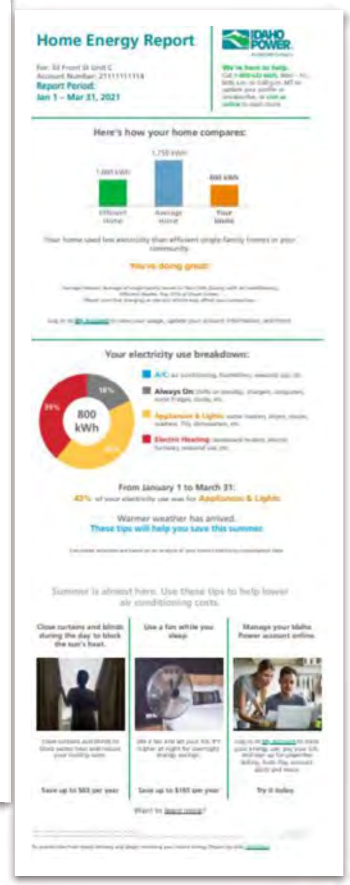
	Feb	May	Aug	Nov
FAQ	0	0	0	0

	Feb	May	Aug	Nov
Privacy	0	0	0	0

	Feb	May	Aug	Nov
Learn More	0	0	0	0

	Feb	May	Aug	Nov
Unsubscribe	0	3	0	3



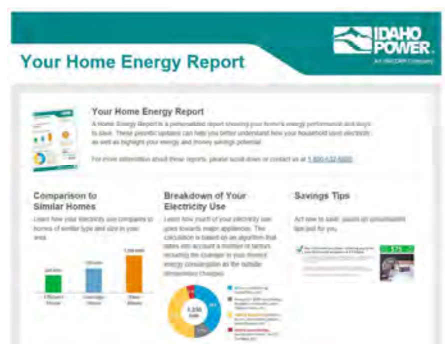


HARRIS UTILITIES

CSA & Microsite Analysis

Microsite Activity 2021

Microsite Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Unique Clicks	4	22	32	22	42	14	2	10	52	76	183	92	**551**
Total Clicks	4	27	32	22	45	14	2	16	53	76	184	92	**567**
Unique Views	10	65	5	10	40	10	2	38	10	8	49	25	**272**
Total Views	10	72	5	14	42	18	2	41	17	8	50	26	**305**



Call Center Volume Reflects Quarterly Schedule

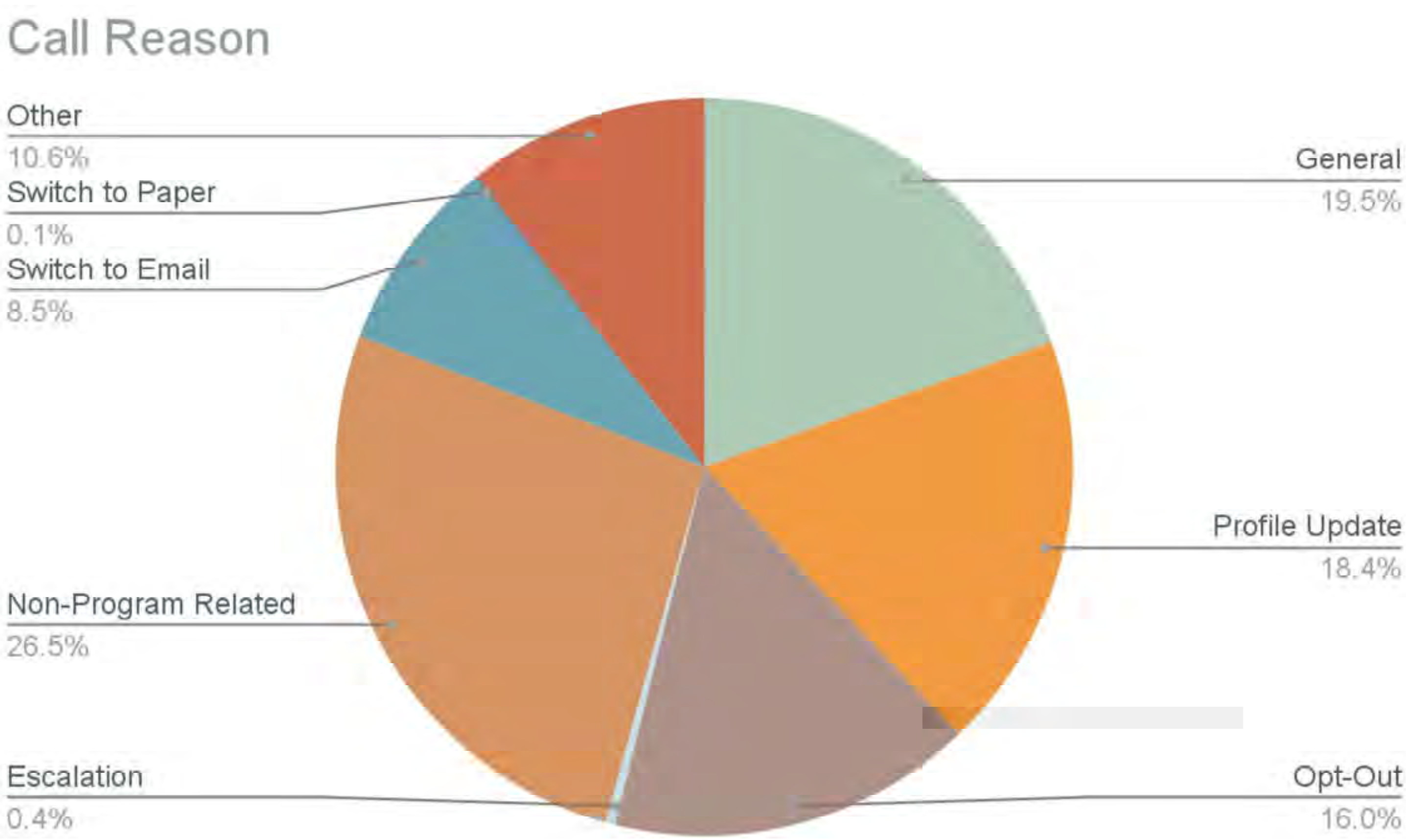
Call Reason	2021												Total
	Jan	Feb 🗎	Mar	Apr	May 🗎	Jun	Jul	Aug 🗎	Sep	Oct	Nov 🗎	Dec	
General	2	45	4	2	34	6	2	16	2	1	24	2	140
Profile Update	3	46	8	2	29	4	1	19	5	1	13	1	132
Opt-Out	3	43	1	0	20	0	0	18	0	13	16	1	115
Escalation	0	2	0	0	0	0	0	0	0	0	1	0	3
Non-Program Related	13	22	7	5	37	13	9	35	11	7	28	3	190
Switch to Email	4	15	0	0	3	1	0	23	9	0	5	1	61
Switch to Paper	0	0	0	0	0	0	0	1	0	0	0	0	1
Other	1	23	4	0	21	4	2	9	1	2	9	0	76
Total Reasons*	26	196	24	9	144	28	14	121	28	24	96	8	718

🗎 Treatment Month

	2018	2019	2020	2021
Total Calls*	411	246	1087	660

* Some customers call in for more than one reason which is why there is a variance in Total Reasons and Total Calls.

2021 Distribution of Calls by Type



Customer Insights and Comments

General Questions

- (Customer) called interested in recommendations on who to work with around windows or insulation..discussed participating contractor list for HVAC..discussed home energy audit and she actually signed up for one as we were on the phone
- Customer had questions about the report, went over EE recommendations, and also discussed some of our residential incentive programs too

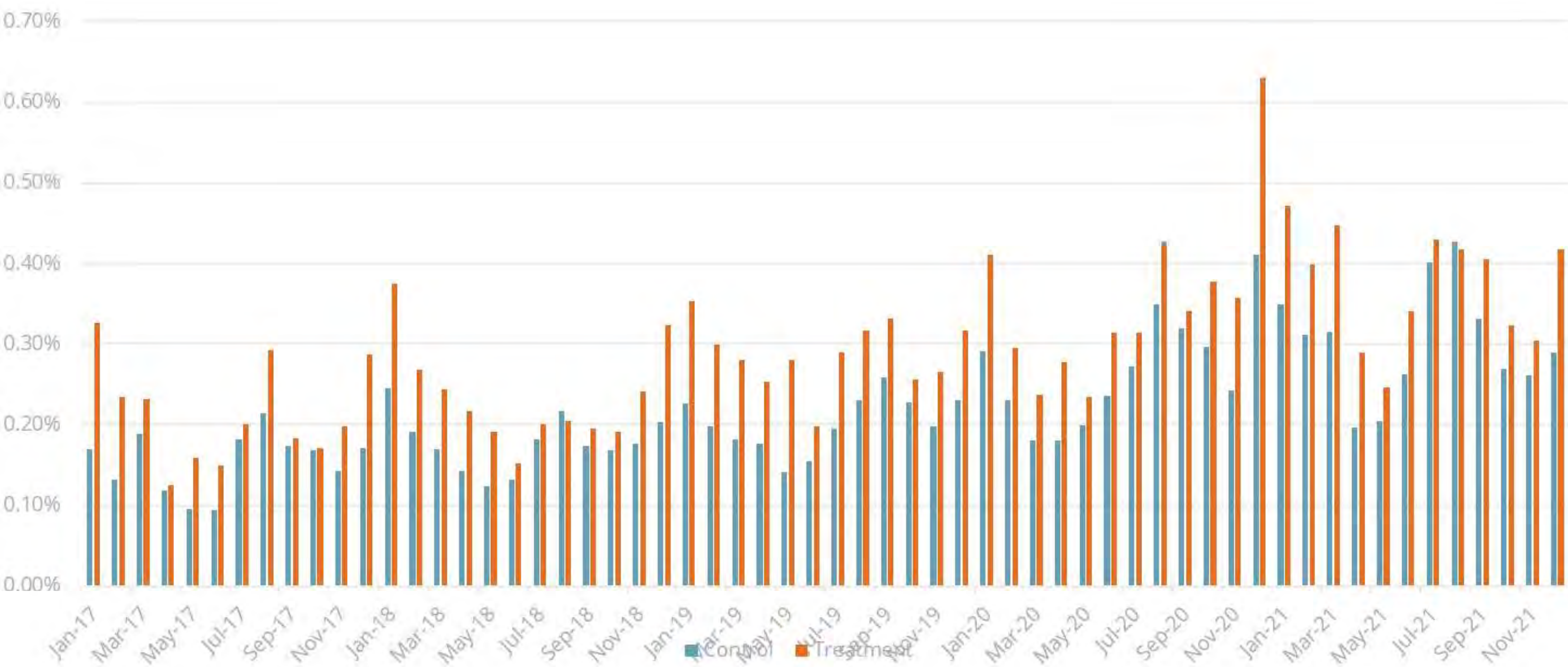
Opt-outs

- HER survey responded requested opt-out via email.
- (Customer) requested to opt out of the report. Says the report doesn't influence their energy usage. Also wanted to add, would like to no longer pay the EE Rider fee on bill and to stop printing bill inserts, newsletters, and EE programs to save money. I did stop all marketing info from their BP.
- Daughter called and said the reports upset her 86 year old mother. Daughter said the reports are insensitive because they do not consider elderly use of oxygen 24/7. She requested to be removed from the program.

Other

- Customer is concerned about the home size comparison isn't right on the report. home profile was filled out right. 5k sq ft home, but she said the report is comparing to 2.5k sq foot homes. i wasn't too sure how to help further on that matter.
- Recommendations to select an option for electric cars in the home saving center profiles
- Energy efficiency incentive questions and application help

IPC My Account Activity – HER Recipients Continue to Use My Account More Frequently



Since the beginning of the program, the treatment has been consistently more active than the control group

IO6 Customers

Overview: Starting in November, these customers were removed from the treatment group, but left in the evaluation group.

Open Question:

- Moving forward, should IO6 customers remain in the evaluation group?

HARRIS UTILITIES

Appendix

Statistical Significance of Savings Calculated – New Method

Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	42.83	16.70	2.5041E-07	TRUE	October 1, 2021 – December 31, 2021
T6	35.3	20.85	0.00045223	TRUE	October 1, 2021 – December 31, 2021
T12346 Combined	36.49	7.97	1.39704E-19	TRUE	October 1, 2021 – December 31, 2021

	T1	T2	T3	T4	T6
Treatment	5,094	4,429	5,174	2,426	91,817
Control	1,257	710	3,073	2,277	12,493

HARRIS UTILITIES

Quarterly Savings Summary – Old Method

Cohort	Treatment Period	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings
T1234	October 1, 2021 – December 31, 2021	47.71	824,596	1.16
T6	October 1, 2021 – December 31, 2021	43.06	4,015,469	1.05
T12346	October 1, 2021 – December 31, 2021	43.79	4,840,064	1.06

	T1	T2	T3	T4	T6
Treatment	5,109	4,490	5,238	2,445	93,248
Control	1,272	718	3114	2,302	12,694

HARRIS UTILITIES

Statistical Significance of Savings Calculated –Old Method

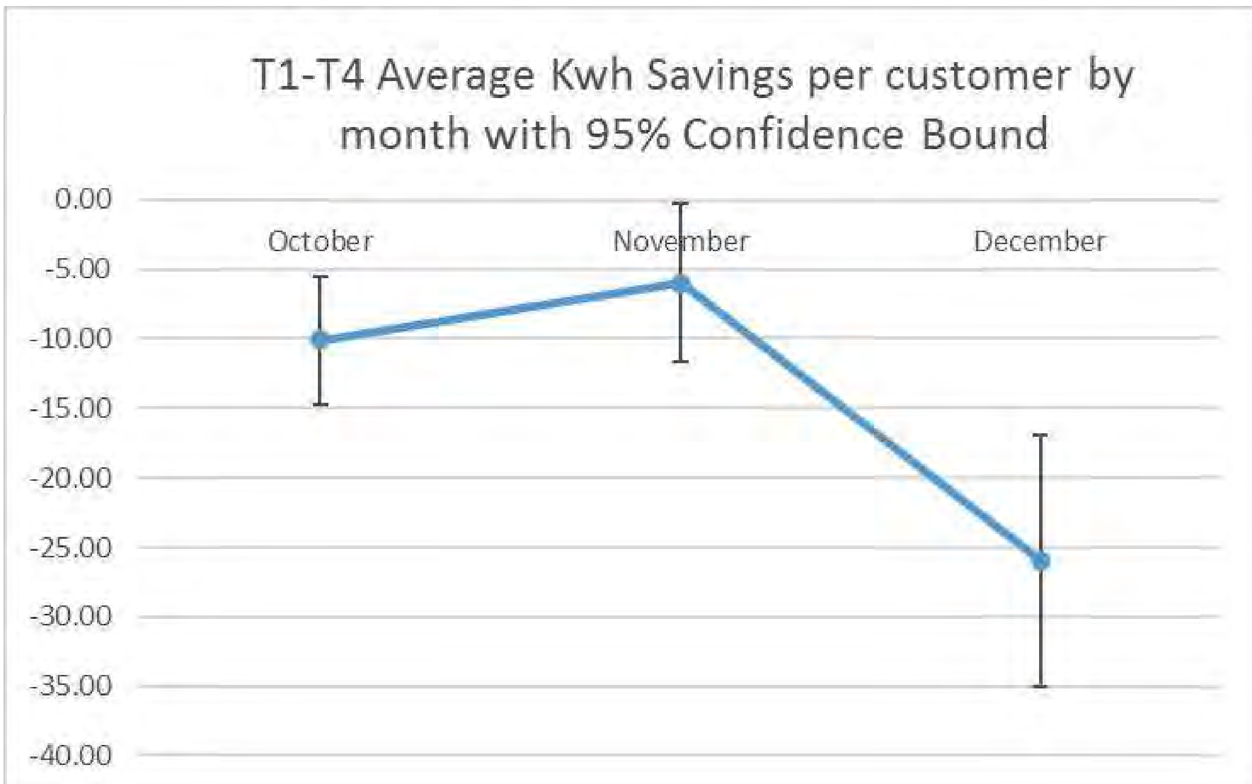
Null hypothesis = no energy savings; Alternative hypothesis = treatment is using less energy than control. Corresponds to a one-tailed test

Cohort	Average Savings (kWh) per Customer	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?	Treatment Period
T1234	47.71	12.80	1.38535E-13	TRUE	October 1, 2021 – December 31, 2021
T6	43.06	17.49	6.964E-07	TRUE	October 1, 2021 – December 31, 2021
T12346 Combined	43.79	6.67	3.41939E-38	TRUE	October 1, 2021 – December 31, 2021

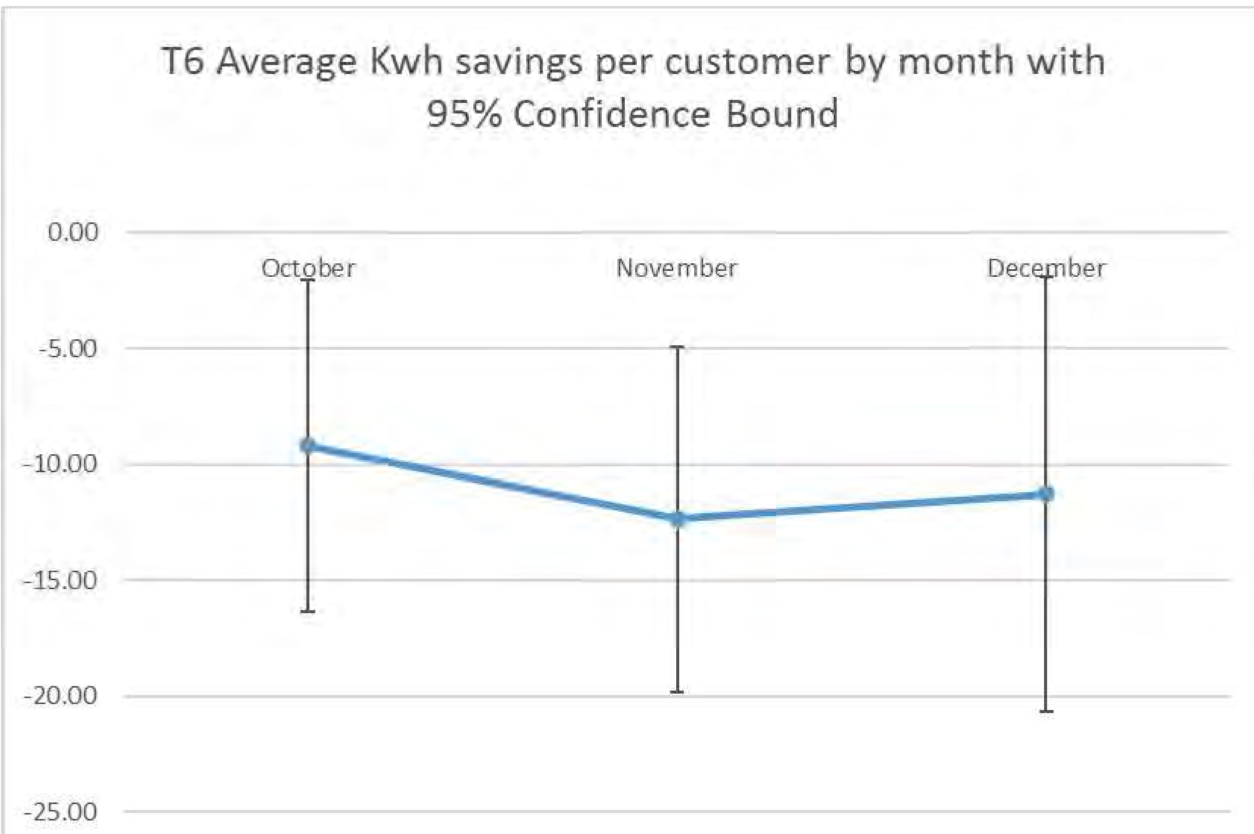
	T1	T2	T3	T4	T6
Treatment	5109	4490	5238	2445	93248
Control	1272	718	3114	2302	12694

HARRIS UTILITIES

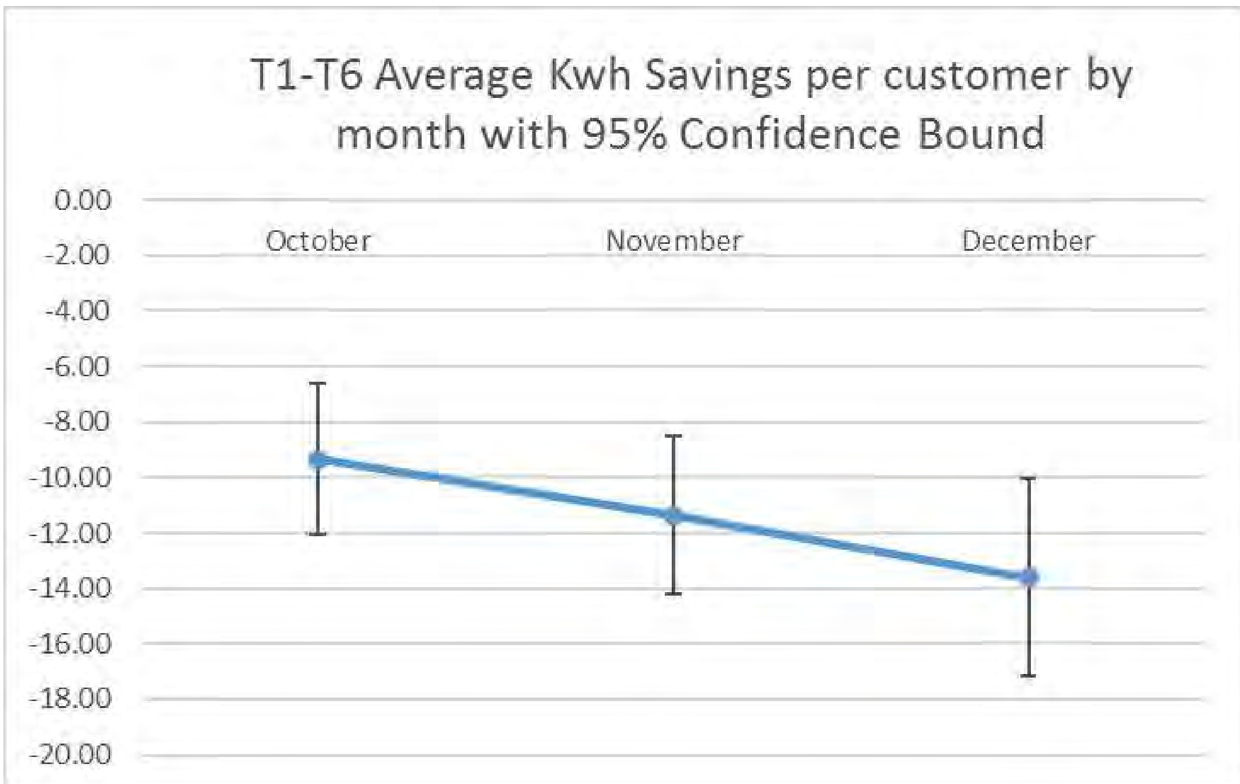
T1234 Savings Confidence Intervals



T6 Savings Confidence Intervals



T12346 Savings Confidence Intervals



Idaho Power
Commercial Energy-saving Kit
Program Summary Report
2021

Sponsored by:

Submitted by:

February 2022

Table of Contents

Restaurant Kit

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 2021 Energy-saving Kit Program. The program reached a total of 906 small business within Idaho Power's service territory, 868 small businesses located in Idaho, and an additional 38 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 868 Idaho and 38 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
   - 56,390 kWh Restaurant kit savings
   - 152,159 kWh Office kit savings
   - 8,402 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 of program participation.

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
QUICK START GUIDE
IDAHO POWER
START HERE
YOU HAVE THE POWER TO SAVE
Turn Off the Lights.
IDAHO POWER

From AM Conservation

AM Conservation (AMC), 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 AMC, 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.

Sincerely,

Stephanie Jennings
Program Manager

Retail Kit


SAVING ENERGY
Makes Good Business Sense
IDAHO POWER
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?
START HERE
QUICK START GUIDE

Idaho Power Commercial 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 AMC, and kits were shipped directly to the customer's place of business.

Quick Start Guide


QUICK START GUIDE
Español en el otro lado
IDAHO POWER.
An IDACORP Company
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This program is offered by Resource Action Programs, a Franklin Energy company, and is funded by Idaho Power customers.

QUICK STEP 4
Exit Sign LED Retrofit Kits
Exit signs operate for 24 hours a day. When using incandescent or fluorescent bulbs to illuminate those signs, the energy required can add up to significant costs and may require frequent bulb replacement. Install the Exit Sign LED Retrofit Kits to save money on your energy bill, as well as reduce your maintenance costs.
☐ Detailed instructions on how to install your Exit Sign LED Retrofit Kits are provided in your kit.
LIGHTING
TIP: Before installing, review enclosed manufacturer's installation instructions for Bayonet, Intermediate or Candelabra based LED screw-in Exit Fixture Retrofit Kit in their entirety.

QUICK STEP 1
Bathroom Faucet Aerators
Bathroom sinks are a great place to cut down on water waste. The bathroom aerator provided in your kit is easy to install and still provides plenty of water for washing hands. Aerators create billions of micro-bubbles which helps soap work more effectively while rinsing more cleanly.
☐ Install the new Bathroom Faucet Aerator from your kit.
WATER AND ENERGY
TIP: Check faucets for leaks. A faucet that drips 30 times per minute can waste over 1,000 gallons of water per year.

QUICK STEP 5
Changing Behaviors
Behavioral changes have been shown to be a very effective method to help reduce energy use and increase productivity.
☐ Get your employees involved in your organization's energy saving strategy.
☐ During closed hours turn the thermostat up during the cooling season, and down during the heating season.
☐ Try to do one thing each day that will result in a savings of water and energy. Don't worry if the savings is minimal. Every bit counts.
☐ Turn off lights in offices, storage rooms and break areas that are not in use. Light switch reminder stickers are included in the kit.
☐ Turn off cash registers and computers when the store is closed.
BEHAVIORS

QUICK STEP 2
LED BR30 Light Bulbs
LED BR30s have a bright glow that comes on instantly, so your business looks its best from morning to night. LEDs last up to 25,000 hours which means you can save time and money on replacing burned out bulbs.
☐ Replace your most-used incandescent or CFL BR30 reflector bulbs with the two LED BR30s from your kit.
LIGHTING
TIP: LEDs are a great option for recessed and track lighting. You get high quality lighting with less heat and fewer trips up the ladder to replace hard-to-reach bulbs.

AVERAGE RETAIL ENERGY USE
Office Equipment 2%
Heating 2%
Water Heating 1%
Computers 3%
Refrigeration 27%
Cooling 13%
Other 16%
Lighting 20%
Ventilation 17%
Source: Energy Information Administration, Commercial Building Energy Consumption Survey—2016.

QUICK STEP 3
LED Bulbs
Did you know that 90% of an incandescent bulb's energy use is wasted as heat? All that heat goes right into your business and increases the energy used for cooling your business in the summer. LED bulbs use 70-90% less energy than incandescent bulbs and can last up to 25 times longer. Unlike CFLs, LEDs do not contain mercury so they can be disposed of with normal waste or recycled. LEDs are also dimmable and work with most modern dimmers.
☐ Replace your most-used 60-watt bulbs with the 9-watt LED bulbs from your kit.
LIGHTING
TIP: For the most savings, place LED bulbs in fixtures that are on for at least 2-3 hours a day. Don't wait for an existing bulb to burn out; save the most by replacing them now.

SAVING ENERGY
COMPLETE AND RETURN THIS SURVEY FOR A CHANCE TO WIN a $100 eGift Card!
DON'T FORGET TO RETURN YOUR INSTALLATION SURVEY FOR A CHANCE TO WIN!

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

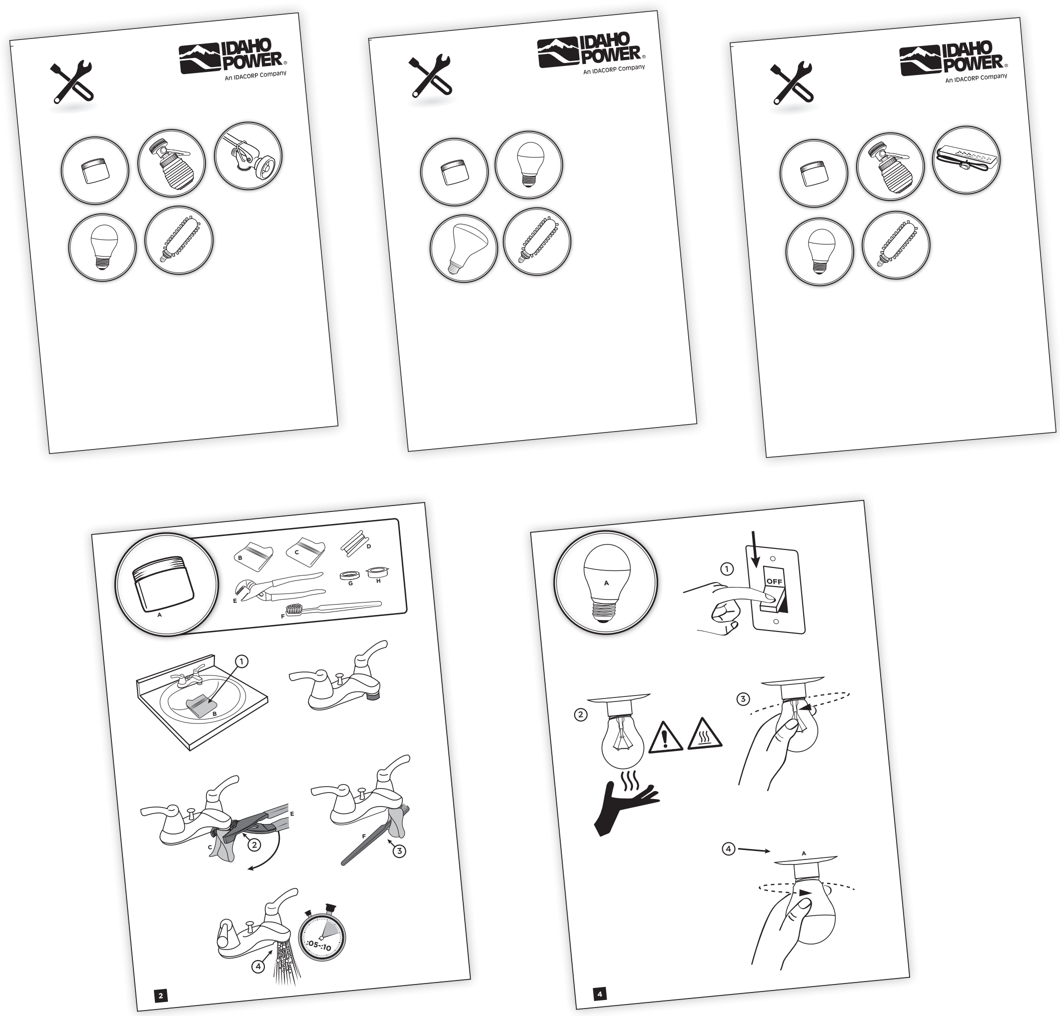
Two 9-watt LEDs

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 AMC 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 and associated shipping & fulfillment data were managed by AMC's proprietary program database.

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.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

Total Number of Participants:	**906**		
Number of Restaurant Participants:	**218**		
Number of Office Participants:	**635**		
Number of Retail Participants:	**53**		
	Annual	**Lifetime**	
Projected reduction from Pre-rinse Spray Valve retrofit:	**1,247,178**	**4,988,712**	gallons*
Measure Life: **4 years**	**27,878**	**111,511**	kWh
Projected reduction from Advanced Power Strip installation:	**38,475**	**153,899**	kWh
Product Life: **4 years**			
Projected reduction from Exit Sign LED retrofits:	**45,123**	**721,970**	kWh
Measure Life: **16 years**			
Projected reduction from 9-watt LED Light Bulbs:	**25,002**	**325,025**	kWh
Measure Life: **13 years**			

**Based on 100% installation rate*

Projected reduction from 8-watt BR30 LED Light Bulbs: **Measure Life: 13 years**	**6,797**	**88,364**	kWh
Projected reduction from Kitchen Faucet Aerator retrofit: **Measure Life: 10 years**	**1,805,846** **78,213**	**18,058,460** **782,131**	gallons kWh
Projected reduction from Bathroom Faucet Aerator retrofit: **Measure Life: 10 years**	**2,363,734** **75,263**	**23,637,339** **752,631**	gallons kWh
TOTAL PROJECTED PROGRAM SAVINGS:	**5,416,758** **296,751**	**46,684,511** **2,935,530**	gallons kWh
TOTAL PROJECTED PROGRAM SAVINGS PER BUSINESS:	**5,979** **328**	**51,528** **3,240**	gallons kWh

A. Water and Energy Savings Summary

As part of the program, participants installed retrofit efficiency measures in their small businesses. The 906 participating businesses are expected to save the following resource totals. Savings from these actions and new behaviors will continue for many years to come.

B. 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.

Kit Flyers


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
Kitchen hood VFD
We also offer incentives for new construction, major renovations, additions, expansions, change of space or custom projects.
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:
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

Appendices

Appendix A

Appendix B

Projected Savings from Pre-Rinse Spray Valve Retrofit

Pre-rinse Spray Valve retrofit inputs and assumptions:

Number of Restaurant participants:	**218**	
Deemed Savings:	**127.88**	kWh [1]
Estimated **annual** water savings:	**5,721**	gallons[2]
Measure life:	**4.0**	years[2]

Projected Electricity Savings:

Pre-rinse spray valve retrofit projects an **annual** reduction of:	**27,878**	kWh[3]
Pre-rinse spray valve retrofit projects a **lifetime** reduction of:	**111,511**	kWh

Potential Savings with 100 Percent Installation:

Pre-rinse spray valve retrofit projects an **annual** reduction of:	**1,247,178**	gallons
Pre-rinse spray valve retrofit projects a **lifetime** reduction of:	**4,988,712**	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:	**635**	
Deemed Savings:	**60.59**	kWh[1]
Product life:	**4**	years[2]

Projected Electricity Savings:

The APS retrofit projects an **annual** reduction of:	**38,475**	kWh[3]
The APS retrofit projects an **annual** reduction of:	**153,899**	kWh[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:	**218**	
Number of Office Participants:	**635**	
Number of Retail Participants:	**53**	
Deemed Savings:	**24.90**	kWh[1]
Product life:	**16**	years[1]

Projected Electricity Savings:

The Exit Sign LED retrofit projects an **annual** reduction of:	**45,123**	kWh[2]
The Exit Sign LED retrofit projects an **lifetime** reduction of:	**721,970**	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:	**218**	
Deemed Restaurant savings per lamp (average kWh):	**18.04**	kWh[1]
Lamps per Office participant:	**2**	
Number of Office participants:	**635**	
Deemed Office savings per lamp (average kWh):	**9.33**	kWh[1]
Lamps per Retail participant:	**2**	
Number of Retail participants:	**53**	
Deemed Retail savings per lamp (average kWh):	**12.86**	kWh[1]
Measure life:	**13.00**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**25,002**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**325,025**	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:	**53**	
Deemed savings per lamp (kWh):	**64.13**	kWh[1]
Measure life:	**13.0**	years[1]

Potential Savings with 100 Percent Installation:

The LED BR30 retrofit projects an **annual** reduction of:	**6,797**	kWh[2]
The LED BR30 retrofit projects a **lifetime** reduction of:	**88,364**	kWh[3]

1 Provided by Idaho Power. Savings calculated based on a 8 w LED replacing a 35 W halogen. Based on 3,800 hours of use. 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:	**218**	
Deemed Savings Restaurant Kitchen Faucet Aerator 1:	**161.49**	kWh[1]
Deemed Savings Restaurant Kitchen Faucet Aerator 2:	**130.96**	kWh[1]
Kitchen Faucet Aerators per Office kit:	**1**	
Number of Office participants:	**635**	
Deemed Savings Office Kitchen Faucet Aerator:	**22.77**	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]
Projected Electricity Savings:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**78,213**	kWh[4]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**782,131**	kWh[5]
Potential Water Savings with 100 Percent Installation:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**1,805,846**	gallons[6]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**18,058,460**	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:	**218**	
Deemed Savings Restaurant Bathroom Faucet Aerator 1:	**132.24**	kWh[1]
Deemed Savings Restaurant Bathroom Faucet Aerator 2:	**111.66**	kWh[1]
Bathroom Faucet Aerators per Office kit:	**2**	
Number of Office participants:	**635**	
Deemed Savings Office Bathroom Faucet Aerator 1:	**19.91**	kWh[1]
Deemed Savings Office Bathroom Faucet Aerator 2:	**12.53**	kWh[1]
Bathroom Faucet Aerator per Retail kit:	**1**	
Number of Retail participants:	**53**	
Deemed Savings Retail Bathroom Faucet Aerator:	**28.18**	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:	**75,263**	kWh[4]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**752,631**	kWh5

Potential Water Savings with 100 Percent Installation:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**2,363,734**	gallons[6]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**23,637,339**	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).*

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
IDAHO			
CANYON	27	95	8
CAPITAL	103	251	17
EASTERN	16	81	12
SOUTHERN	37	126	8
WESTERN	23	58	6
OREGON			
CANYON		3	
WESTERN	12	21	2
TOTAL	218	635	53
TOTAL ALL	906		

IDAHO POWER ENERGYWISE®
PROGRAM SUMMARY REPORT

2020-2021

SUBMITTED BY:

AM Conservation Group

Idaho Power EnergyWise Program Summary Report 2020-2021

Made possible by:

IDAHO POWER®
An IDACORP Company

Submitted by:

AM Conservation Group

September 2021

“They loved sharing about their timers, I had them time their showers before handing out anything. They were shocked!”

Lyna Butler, Teacher
Mill Creek Elementary School

Table of Contents

"Students loved learning how small changes can make a big impact on energy consumption."

Stephani Little, Teacher

Mill Creek Elementary School

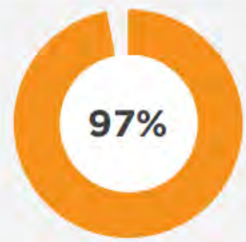
Executive Summary

AM Conservation Group, Inc. is pleased to present this Program Summary Report to Idaho Power, which summarizes the 2020-2021 Idaho Power EnergyWise Program. The program was implemented in the Idaho Power service area in the states of Idaho and Oregon by 12,446 teachers, students, and their families.

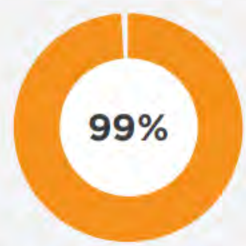
The following pages provide an overview of the program and materials, outline of program implementation, introduction to the program team, description of program enhancements, impact of the program, and summary of results from the home activities. In addition to this information, evaluations, letters, 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

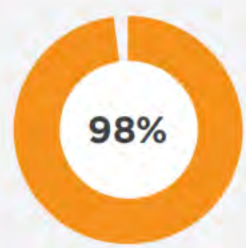
A successful program excites and engages participants. Students, parents, and teachers are asked to evaluate the program and provide personal comments. A sample of the feedback is given in the margin. ›



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.

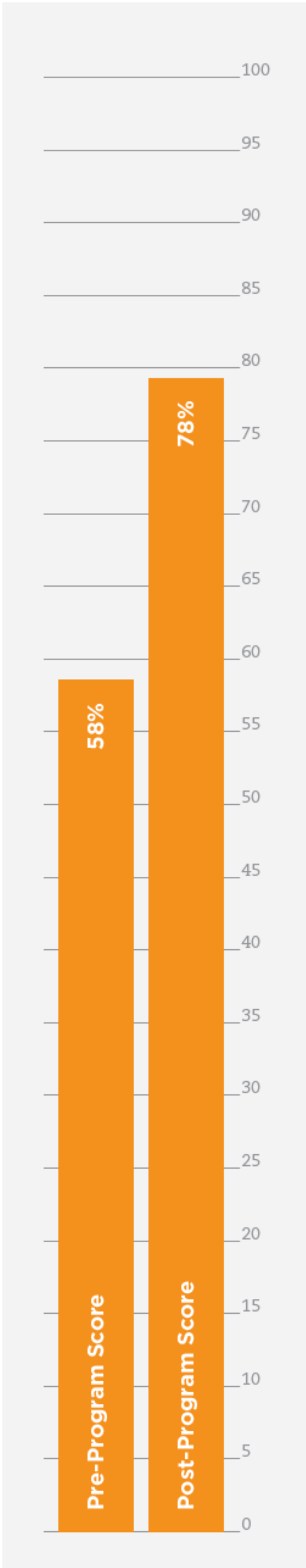


Teachers who indicated they would conduct this program again.

A summary of responses can be found in Appendix D.

Knowledge Gained

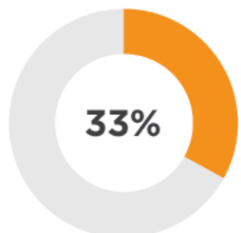
Identical tests were administered to the students prior to the program and again upon program completion to measure knowledge gained. Scores and subject knowledge improved from **58%** to **78%**.



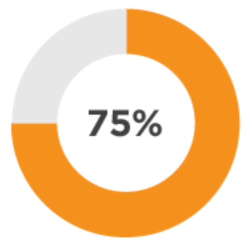
Measures Installed

Students completed take-home activities as part of the program and reported on the kit measures they installed in their homes.

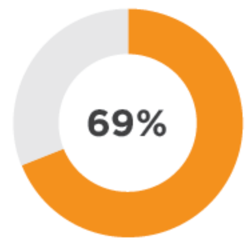
A summary of responses can be found in Appendix B.



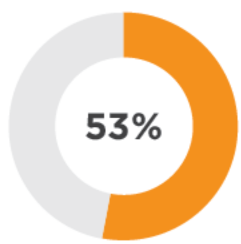
Students who reported they installed the High-Efficiency Showerhead.



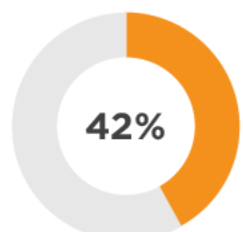
Students who indicated they installed the LED Night Light.



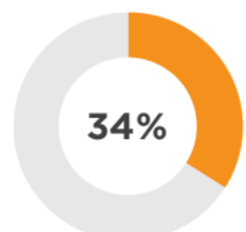
Students who reported they used the Shower Timer.



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	12,446	4,113	3,043	1,198	2,358	1,734
Students	11,993	3,970	2933	1,157	2,273	1,660
Surveys Received	3,796	891	1307	524	513	561
Percent Response	32%	22%	45%	45%	23%	34%

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	
15,959,073	gallons of water saved
2,166,583	kWh of electricity saved
56,823	therms of gas saved
15,959,073	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS	
159,590,730	gallons of water saved
23,092,183	kWh of electricity saved
568,229	therms of gas saved
159,590,730	gallons of wastewater saved

PROJECTED ANNUAL SAVINGS PER HOME	
1,282	gallons of water saved
174	kWh of electricity saved
5	therms of gas saved
1,282	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS PER HOME	
12,823	gallons of water saved
1,855	kWh of electricity saved
46	therms of gas saved
12,823	gallons of wastewater saved

***Per Idaho Power's request, the associated savings for the shower timer have not been included in savings totals.*

"The students loved the activities completed in class and implementing the items in the kit. They are still talking about it."

Michelle Montoya, Teacher
Hillsdale 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 2020-2021 program was taught in grades 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 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 Take-Home 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 AM Conservation Group, Inc. 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.

"My kid came home excited to see how the light bulbs looked different and wanted to time her showers. She wanted to check the temperature in the fridge. I enjoyed seeing her excited to make a difference."

Parent

Wilson Elementary School

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 Take-Home 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

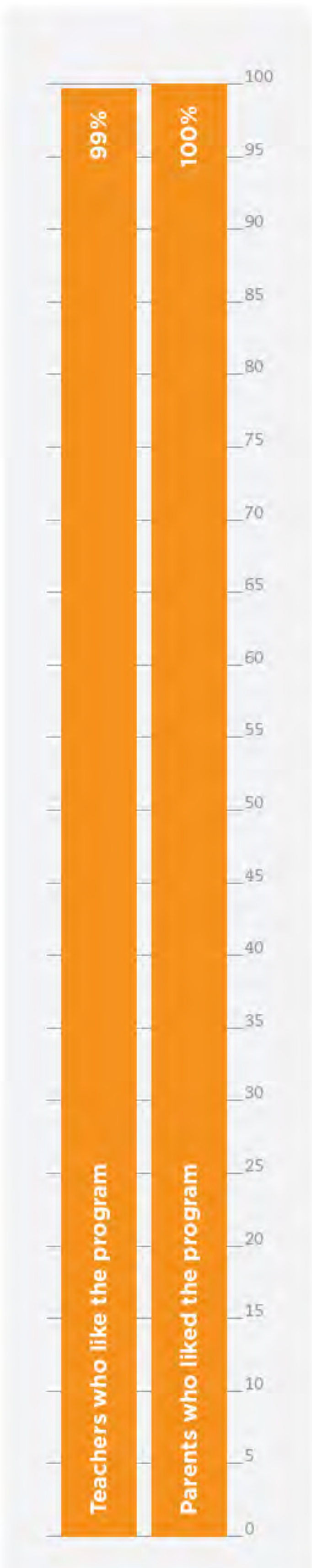
Extra Activities Booket

Teacher Survey Form

Pre/Post Student Survey Answer Keys

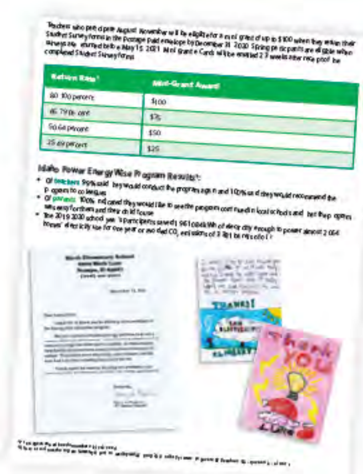
Electricity Poster

Self-Addressed Postage-Paid Envelope



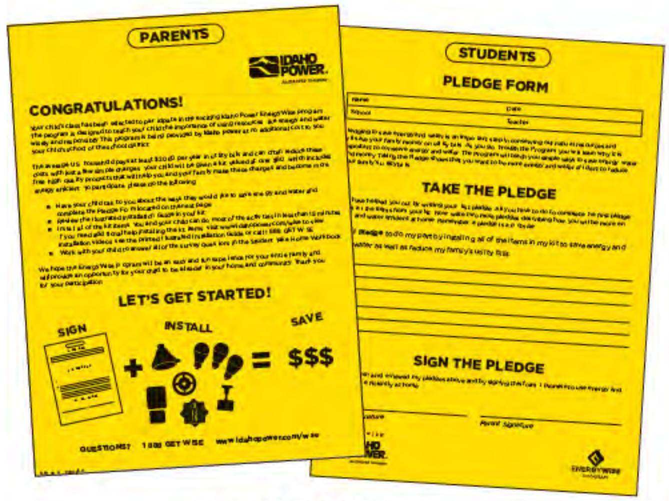
Custom Branding

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 Take-Home 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.

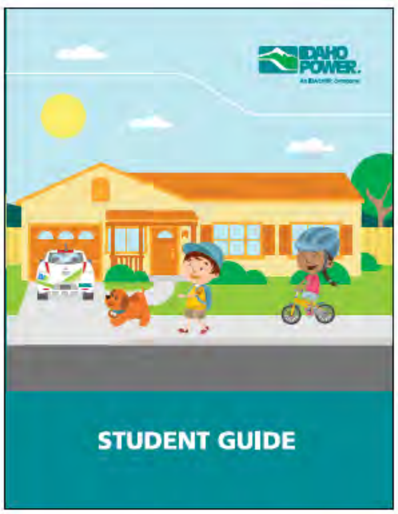


Program Materials

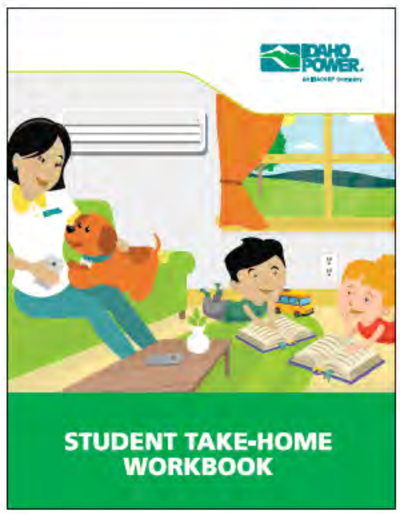
Teacher Survey Form



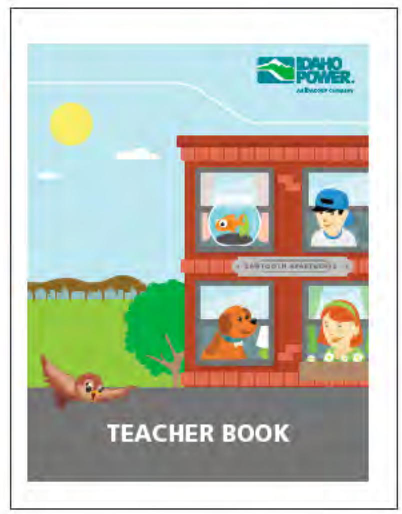
Parent Letter/Pledge Form



Student Guide



Student Take-Home Workbook



Teacher Book

Certificate of Achievement

Kit Box

Introduction Video (flash drive) Pen

"Working together with my child, learning about saving energy and why it is important."

Parent
Filer Intermediate School

Program Implementation

The 2020-2021 Idaho Power EnergyWise Program followed this comprehensive implementation schedule:

1. Identification of Idaho state academic standards & benchmarks
2. Curriculum development and refinement (completed annually)
3. Curriculum correlation to Idaho state academic standards & benchmarks
4. Materials modification to incorporate Idaho Power branding
5. Incentive program development
6. Teacher outreach and program introduction by AMCG's Outreach Team and Idaho Power EOEAs
7. Teachers enrolled in the program individually by AMCG's Outreach Team and Idaho Power EOEAs
8. Implementation dates scheduled with teachers by AMCG'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 2020-2021 school year.

AM Conservation Group, Inc. 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 AMCG, 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.

“They liked being able to take their learning home with their kits and teach their families.”

Aubrey Crisp, Teacher

Central Elementary School

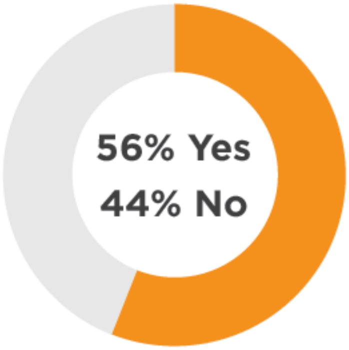
Program Impact

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:

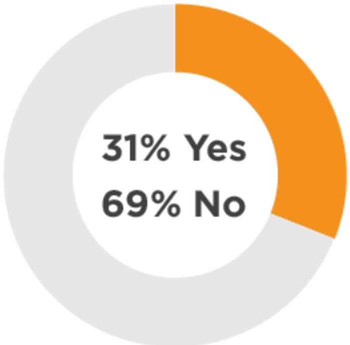
A. Home Survey for Capital Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 143 participating teachers in the Capital region, 43 (30%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 3,970 participating children in the Capital region, 1,341 (34%) returned completed surveys.

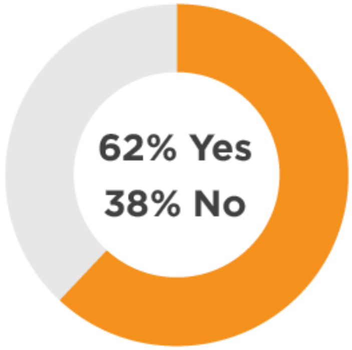
Did your family install the first 9-watt LED Light Bulb?	**Yes - 56%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 31%**
Did your family change the way they use energy?	**Yes - 62%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

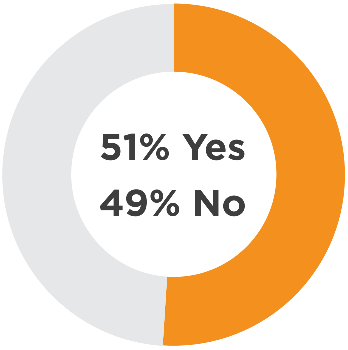


Students who indicated their family changed the way they use energy.

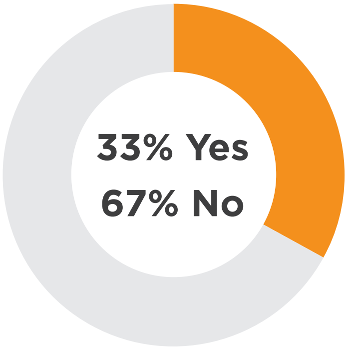
Home Survey for Canyon Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 110 participating teachers in the Canyon region, 62 (56%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,933 participating children in the Canyon region, 1,341 (46%) returned completed surveys.

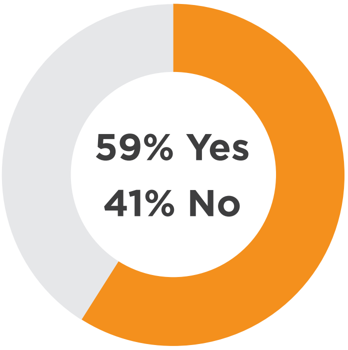
Did your family install the first 9-watt LED Light Bulb?	**Yes - 51%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 33%**
Did your family change the way they use energy?	**Yes - 59%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

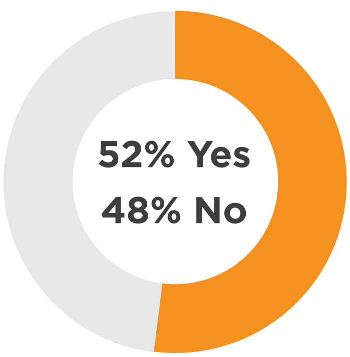


Students who indicated their family changed the way they use energy.

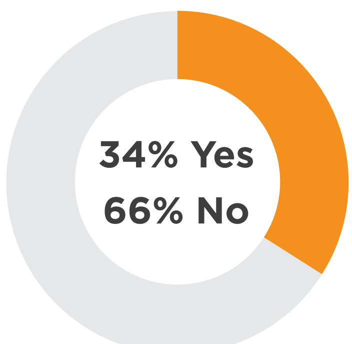
Home Survey for Eastern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 41 participating teachers in the Eastern region, 22 (54%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,157 participating children in the Eastern region, 560 (48%) returned completed surveys.

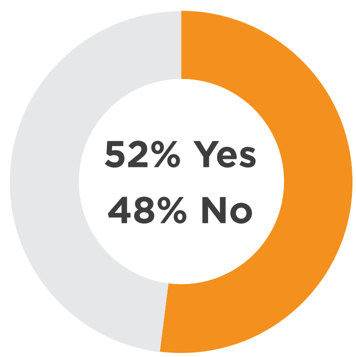
Did your family install the first 9-watt LED Light Bulb?	**Yes - 52%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 34%**
Did your family change the way they use energy?	**Yes - 52%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

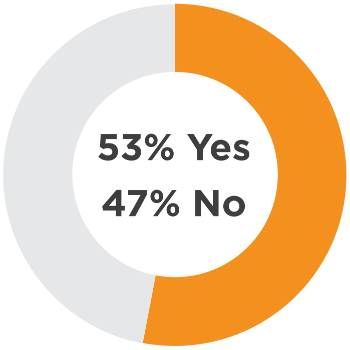


Students who indicated their family changed the way they use energy.

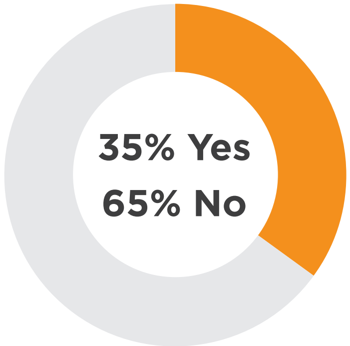
Home Survey for Southern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 85 participating teachers in the Southern region, 27 (32%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,273 participating children in the Southern region, 513 (23%) returned completed surveys.

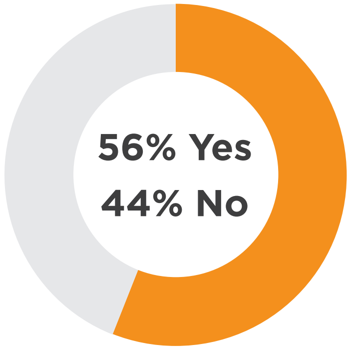
Did your family install the first 9-watt LED Light Bulb?	**Yes - 53%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 35%**
Did your family change the way they use energy?	**Yes - 56%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

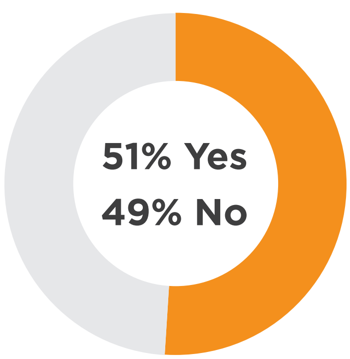


Students who indicated their family changed the way they use energy.

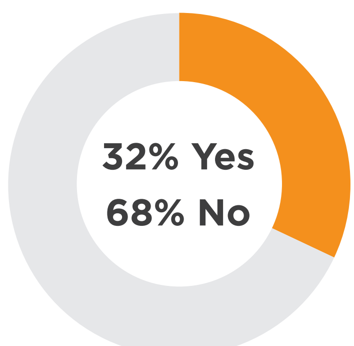
Home Survey for Western Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 74 participating teachers in the Western region, 29 (39%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,660 participating children in the Western region, 544 (33%) returned completed surveys.

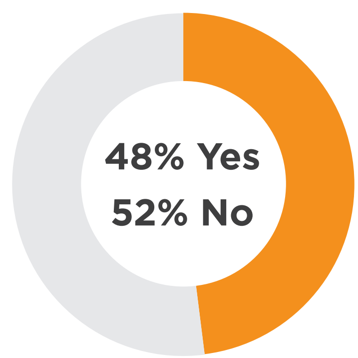
Did your family install the first 9-watt LED Light Bulb?	**Yes - 51%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 32%**
Did your family change the way they use energy?	**Yes - 48%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

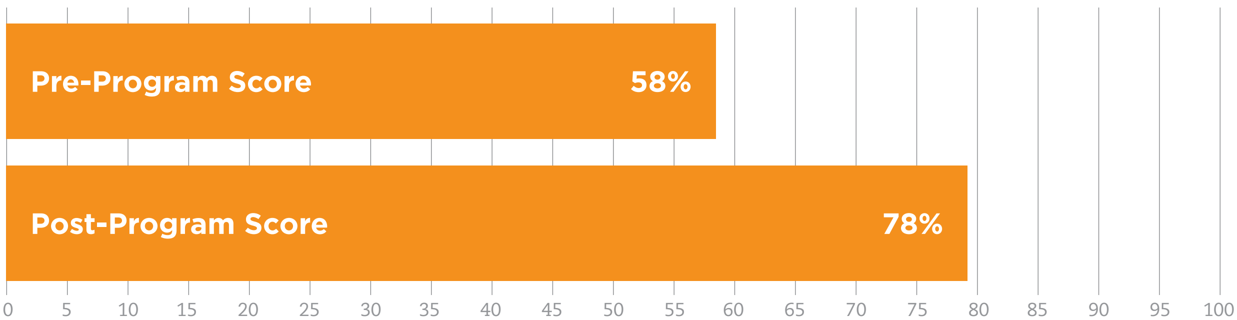


Students who indicated their family changed the way they use energy.

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 **7.8** questions correctly following participation. Of the 12,446 student households participating, 3,851 returned survey responses.

Scores improved from 58% to 78%.



Pre-Program and Post-Program Test Questions

		Pre	Post
1	Which layer of Earth do we live on?		
	Crust	62%	86%
	Mantle	8%	3%
	Inner Core	9%	3%
	Outer Core	21%	7%
2	Non-Potable water is safe to drink.		
	True	23%	11%
	False	77%	89%
3	Which of these is not a renewable resource?		
	Wind	18%	6%
	Plants	6%	3%
	Gold	59%	82%
	Animals	17%	8%
4	Saving water saves energy.		
	True	81%	94%
	False	19%	6%

Pre-Program and Post-Program Test Questions

		Pre	Post
5	Which are fossil fuels?		
	Coal	19%	10%
	Oil	13%	6%
	Natural Gas	15%	6%
	All of the above	53%	78%
6	Which type of energy is created in the process of Photosynthesis?		
	Nuclear Energy	17%	11%
	Thermal Energy	28%	22%
	Chemical Energy	31%	57%
	Electric Energy	25%	10%
7	Which Kit item will save the most natural resources?		
	Compact Fluorescent Lamp	29%	28%
	High-Efficiency Showerhead	31%	56%
	FilterTone® Alarm	22%	9%
	LED Night Light	18%	8%
8	Which major appliance uses the most energy?		
	Dishwasher	23%	16%
	Refrigerator	60%	67%
	Dryer	18%	17%
9	An LED (light emitting diode) light bulb uses more energy than an incandescent bulb.		
	True	38%	16%
	False	62%	84%
10	On-peak time is the best time to play video games.		
	True	33%	14%
	False	67%	86%

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, 12,446 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 11,993 student households participating, 3,851 returned survey responses.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

Number of Participants:	**12,446**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	15,959,073	159,590,730	gallons
Product Life: 10 years	1,107,017	11,070,166	kWh
	49,500	495,003	therms
Projected reduction from first 9-watt LED Light Bulb retrofit: Product Life: 25,000 hours (12 years)	295,421	3,545,052	kWh
Projected reduction from second 9-watt LED Light Bulb retrofit: Product Life: 25,000 hours (12 years)	232,221	2,786,653	kWh
Projected reduction from third 9-watt LED Light Bulb retrofit: Product Life: 25,000 hours (12 years)	185,533	2,226,394	kWh
Projected reduction from LED Night Light retrofit: **Product Life: 10,000 hours**	267,362	2,673,620	kWh
Projected reduction from FilterTone® installation:	79,030	790,297	kWh
Product Life: 10 years	7,323	73,226	therms
TOTAL PROGRAM SAVINGS:	15,959,073	159,590,730	gallons
	2,166,583	23,092,183	kWh
	56,823	568,229	therms
TOTAL PROGRAM SAVINGS PER HOUSEHOLD:	1,282	12,823	gallons
	174	1,855	kWh
	5	46	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 453 participating teachers, 129 returned teacher program evaluation surveys.

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

98% of participating teachers indicated they would enroll in the program again given the opportunity.

99% of participating teachers indicated they would recommend the program to their colleagues.

What did students like best about the program? Explain.

"They loved sharing about their timers, I had them time their showers before handing out anything. They were shocked!"
Lyna Butler, Mill Creek Elementary School

"Students loved learning how small changes can make a big impact on energy consumption."
Stephani Little, Mill Creek Elementary School

"The students loved the activities completed in class and implementing the items in the kit. They are still talking about it."
Michelle Montoya, Hillsdale Elementary School

"Students loved the opportunity to learn how power is made and where it comes from. They also liked the free kits."
Rose Marie Warrell, Oakley Elementary School

"They liked being able to take their learning home with their kits and teach their families."
Aubrey Crisp, Central Elementary School

"Students really connected with the materials and lessons."
Angela Zweifel, Hunter Elementary School

"The students loved the LED Bulbs and showerhead. They were suprised how much water they used and wasted."
Jillian Cole, Eagle Hills Elementary School

"They loved the kit! They enjoyed learning about peak time and how they could boss their family around to save water and energy."
Katie Ward, Purple Sage Elementary School

"They loved the kits and the readings. They were amazed that the refrigerator uses the most energy. We also loved the classroom activities."
Kim Birkinbine, Silver Trail Elementary School

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

What did you like best about the program? Explain.

"I have been teaching this program for 11 years now. I love the materials have been adjusted over the years to make the explanation clear and easy for students to understand. Great program. I enjoy it."
Katie Strawser, Melba Elementary

"The students enjoy the open discussion format. The students were engaged and continually used vocabulary words for their reading."
Marie Rockwood, Melba Elementary

"I enjoyed how easily the program is laid out and the engaging science experiments."
Stephanie Gunstream, Melba Elementary

"Making the kids aware of all reason to conserve energy."
Alicia Cody, Stoddard Elementary School

"I though the whole program was excellent. I used it to stand out my energy and electricity unit."
Craig Ockermen, Stoddard Elementary School

"I like that it fits right in our standards. This is just something extra to do. This is a great resource for these standards."
Maggie Stump, Summit Elementary School

"It's simple to follow teacher lessons and activities. The generous supplies for the students to help be good stewards of the Earth."
Anissa Bramlet, Pioneer School Of The Arts

"The whole program was very valuable. Power outage had just cost 21 lives in Texas so added to the importance and impact to students."
Cassie Young, Vale Elementary School

"Its a good student workbook with great ideas!"
Karen Klus, Henry L Slater Elementary School

"I liked the activities and relation to the common core standards."
Jill McBride, Vale Elementary School

"The kits were fun. The organization of the book was well done."
Mary Black, Haines Elementary School

"I liked that it provided information to the kids that they could relate to and reflect on such as water usage (shower) and electricity (video games)"
Allisyn Ferdig, South Baker Intermediate School

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

What would you change about the program? Explain.

"Possibly make a grade specific program? Really, nothing, it is a great program!"
Cassie Royse, Filer Intermediate School

"Since more schools are implementing 'Distance Learning' having access to digital versions of the student workbooks would be very helpful. Maybe add a pdf version to the thumb drive?"
Katie Strawser, Melba Elementary

"I have some homeless students, this makes some of the activities hard to do for them."
Kelli Clark, Filer Intermediate School

"We just need more time to teach it."
Alicia Cody, Stoddard Elementary School

"Students and parents are either going to do it or not. The same students and parents that are hard to motivate to do things were the same ones for this project."
Craig Ockermen, Stoddard Elementary School

"It would be very helpful to have power point & videos for each chapter to engage. Students more through visual representation."
Stacy Mount, Westside Elementary School

"I think the program works well. Don't change a thing."
John Anderson, Lewis and Clark Elementary

"The vocabulary was hard for students to understand. More explanation to describe main words."
Kelly Leguineche, Richfield School

"Can't think of anything!"
Leslie Wheeler, Filer Intermediate School

"Nothing! It's great."
Alison Parrott, Fruitland Middle School

"More puzzles activities after lessons. They LOVE those!"
Stacey Lakey, Summit Elementary School

"Nothing. I love this program!"
Meko Myers, Valley View Elementary School

"The home activities, a lot of parents won't help so maybe making some they can do themselves."
Lacie Christensen, Claude A. Wilcox Elementary School

E. Parent/Guardian Program Evaluation

Parent involvement with program activities and their children is of paramount interest to both Idaho Power and teachers in the program. When parents take an active role in their child's education it helps the schools and strengthens the educational process considerably. When students successfully engage their families in retrofit, installation, and home energy efficiency projects, efficiency messages are powerfully delivered to two generations in the same household. The program is a catalyst for this family interaction, which is demonstrated by feedback from Parent/Guardian Program Evaluations. The following is feedback from the Parent/Guardian Program Evaluations for the Idaho Power EnergyWise Program. Of the 11,993 participating families, 57 parents returned program evaluation surveys.

Parent Response

(A summary of responses and regional data can be found in Appendix E)

100% of participating parents indicated that the program was easy to use.

98% of participating parents indicated they would continue to use the kit items after the completion of the program.

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?

"I really appreciated you showing my son how he can keep conserving energy. The hands-on aspect was great!"
Longfellow Elementary School

"I like that the children are aware of things they can help with to save money."
Filer Intermediate School

"My kid came home excited to see how the light bulbs looked different and wanted to time her showers. She wanted to check the temperature in the fridge. I enjoyed seeing her excited to make a difference."
Wilson Elementary School

"Working together with my child and learning about saving energy and why it is important."
Filer Intermediate School

"It was easy to do with the kids, we had everything we needed, and the results were cool to see."
Eagle Hills Elementary School

"The easy way that the uses of renewable and non-renewable resources are explained."
Hunter Elementary School

"That she is more aware of how much energy she is wasting in our home."
Hunter Elementary School

"That it teaches people to not be wasteful and save our planet."
Riverside 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?

"The kit was great and easy to use with my students. It was a very knowledgeable program."
Willow Creek Elementary School

"We appreciate kids learning at an age before habit of wastefulness takes hold. This should teach good habits which will help our planet."
Riverside Elementary School

"I think they did a great job teaching the kids about power and how to use it. I hope you continue this program; it really works."
Rock Creek Elementary

"Thank you! This was practical, fun, and great life lessons!"
Eagle Hills Elementary School

"Thank you, Idaho Power!"
Garden Valley Elementary

"Good idea and it makes us think of conservation. Thank you."
Groveland Elementary

"Before we put the alarm my grandma was happy because the furnace is quiet, and she likes to watch the news. The whole family loves it. Now we can know when the filter need change."
Harrison Elementary School

"Great job!!"
Homedale Elementary

"Great program, love it!"
Ronald Reagan Elementary School

"You are doing great. Thank you."
St Edwards Catholic School

"Glad my child was interested; hope we can save!"
White Pine Elementary School

"Its great. Kids need to know about saving energy."
Filer Intermediate School

"Thank you for teaching kids about conserving energy." **, Lewis and Clark Elementary**

F. Teacher Letters

February 12, 2021

Dear Idaho Power,

THANK YOU SO MUCH for your generous donation to our students!

I am very impressed with the Energywise Program. The curriculum was informative, easy to use, and comprehensive; it included a pre-test and post-test, detailed lessons in a Teacher's Guide as well as text, practice activities, vocabulary, and lab activities in a Student Guide. The energy kit gave each student FREE energy-saving items, such as a showerhead, shower timer, nightlight, and three LED bulbs. My students were so excited! They were also given a student workbook to help them learn how to save energy with each item in the kit. The program even included a certificate of achievement and bracelet for each student who completed the program. You thought of everything!

We had ample opportunities to discuss why and how to save energy with all that the curriculum had to offer. I really saw a mindset shift as we progressed through the program.

I feel honored to have been selected to participate in Energywise. I hope to be able to complete this program again for classes in the future.

Thanks for everything!

Sincerely,

Alison Parrott

6th grade teacher
Fruitland Middle School
Fruitland, Idaho

Melba Elementary School

Learners Today, Leaders Tomorrow

PO Box 185 ~ 521 Carrie Rex Avenue
Melba, Idaho 83641
phone 208-495-2508 ~ fax 208-495-1142
www.melbaschools.org
Ashli Nelson, Principal

November 19, 2020

Idaho Power
An IDACORP Company
750 4th Street
Sparks, NV 89431-9998

Dear Idaho Power Energy Wise Program:

My 6th grade class completed the Energy Wise activity this past three weeks. The program was interesting and fun for the 6th grade instruction. The students learned a great deal and we enjoyed the supplemental activities.

The 6th graders were very excited to participate in the edible activities. They can never have enough cookies or candy bars. They enjoyed the vinegar and baking soda activities. They especially enjoyed when I couldn't get the balloon popped off the bottle and I couldn't get it back on fast enough - fluid went everywhere.

This was my fourth year of the Energy Wise program, and I enjoy the activity immensely. I would love the opportunity to have the activity again in my class. This year we used the lessons as part of our curriculum.

Thank you for this great program and the opportunity to share it with my 6th graders.

Sincerely,

Marie Rockwood
Melba Elementary
Melba Idaho

May 13, 2021

Idaho Power,

Thank you so much for your EnergyWise Program.

I have done this program for the last two years, and it has been a wonderful addition to my fifth grade classroom. We decided to do this program in the spring this year because of our crazy school year. I definitely think this program fits better into my fall science curriculum and will be changing back to that timing next year.

This program is easy for families and gets some much-needed Energy savings materials into the hands of my families I teach.

Thank you for reaching out to the teachers in your area to help educate our children, and their families.

Thank you again,

Katie Tunca

Katie Tunca
5th grade teacher
Garfield Elementary
Boise School District
(208)854-4950
katie.tunca@boiseschools.org

Teacher Letters

(continued)

Dear Idaho Power,

Our classroom was given energy kits, classroom workbooks, and student take-home workbooks. Thank you for sending us these materials; it was very generous of you. We had a lot of fun experimenting and using the kits. Our class knows more about conservation of energy, now that our lessons are complete. Thanks again for going out of your way to make these lessons and the kits.

Sincerely,
Crew 18 + Ms Callahan

12/14/20

Dear Idaho Power,

THANK YOU so much for allowing us to have some fun & learn about Idaho Power & our Earth! The kids were so thrilled to each get a kit to take home—so very generous of your company to provide those for each student! (:)

We loved learning fun facts like the refrigerator uses the most energy & all about renewable resources. It was fun to hear they went home & had discussions with their families about what we talked about in class! Thank you again! (:)

-Katie Ward

Dear Idaho Power,

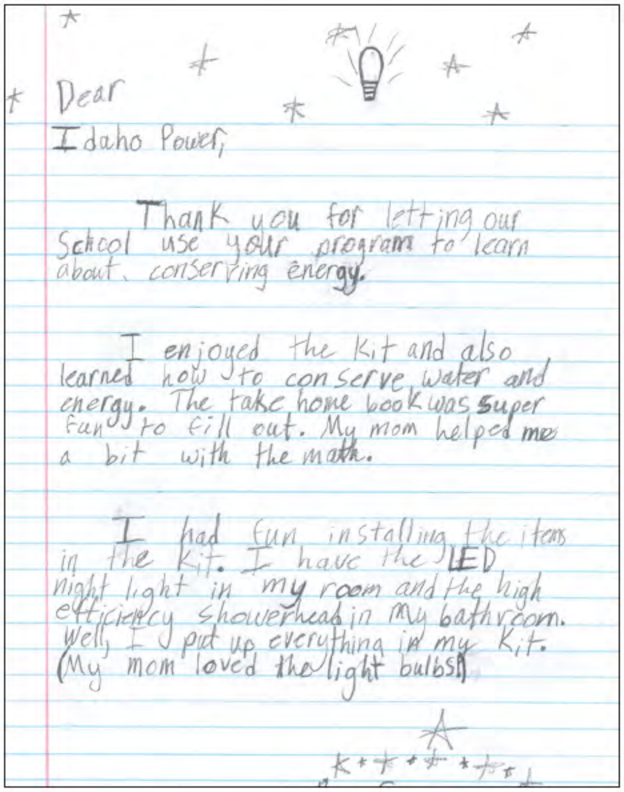
I wanted to thank you for the opportunity to teach the Idaho Power Program. The program is so easy to use and well planned out. I love that the standards are included. Everything about the program is well thought out for teachers to implement easily. The parent feed back is amazing as well. The students have said that they love the shower timer and that they take less time in the shower. Many of them have said that since it is their year to take home the kit, that they get to have the night light in their bedrooms (older siblings have theirs in their bedrooms). This is my second year implementing the program since Covid was an issue last year and we didn't get to complete it, and again this year I enjoyed it. The other aspect that I want to thank you for is the fact that you value the time that we are taking to complete the program and for giving us a grant in exchange. That means so much and makes me feel valued. I love teaching this program year after year and I hope that Idaho Power continues to do it.

Gratefully,

Sarah Williams

Spalding STEM Academy 4th Grade Teacher

G. Student Letters

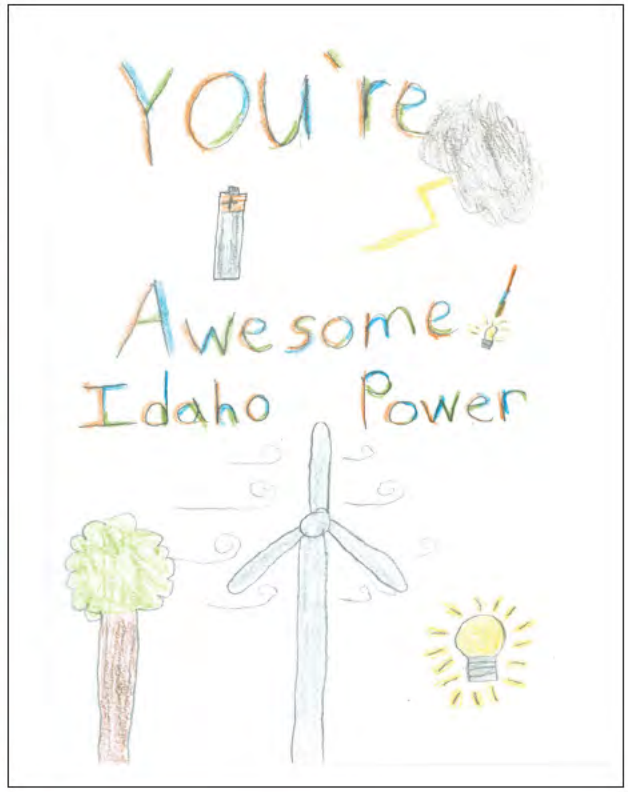


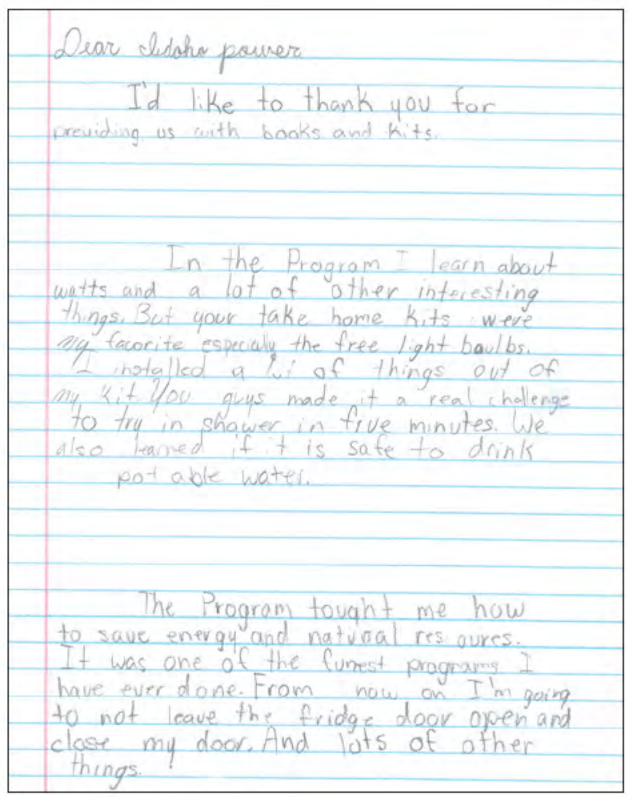
Dear
Idaho Power,

Thank you for letting our School use your program to learn about conserving energy.

I enjoyed the Kit and also learned how to conserve water and energy. The take home book was super fun to fill out. My mom helped me a bit with the math.

I had fun installing the items in the Kit. I have the LED night light in my room and the high efficiency showerhead in my bathroom. Well, I put up everything in my Kit. (My mom loved the light bulbs!)





Dear Idaho power

I'd like to thank you for providing us with books and kits.

In the Program I learn about watts and a lot of other interesting things. But your take home kits were my favorite especially the free light baulbs. I instgalled a lot of things out of my kit. You guys made it a real challenge to try in shower in five minutes. We also learned if it is safe to drink pot able water.

The Program taught me how to save energy and natural res ources. It was one of the funest programs I have ever done. From now on I'm going to not leave the fridge door open and close my door. And lots of other things.

Student Letters

(continued)

I daho power rocks and rules

IDAHO POWER

Dear,

I would like to thank you for for letting my grade do this stuff. The Kit taught me a lot.

In the program, You guy taught me to save energy at my house. You al'so taught me how to help my parents with the money bills. You helped me learn how to save electricity.

This progam help ed me change the way I use electicity at my house. Thank you so much

December 4 2020

Dear idaho power

Thank you for sending us the light bulb kit. I tried the shower head. It was pretty cool.And I put the temperature thing in my fridge. I didn't know that the fridge could get that cold. I would rather read the idaho power book than the science book any time.

Dear Idaho Power,

Thank you for teaching us about electricity. I feel like I have been saving more energy. I loved the shower timer that was cool. I also loved the LED light bulb.

Sincerely,

Student Letters

(continued)

December 4, 2020

Dear Idaho Power:

Thank you for sending us that kit. My mom loves the 5min timer cause she always loses track of time. So now she takes shorter showers and thank you for the light bulbs. My light just went out so we changed the light. Thank you for the filter for the sink my dad and mom like it cause it tells them when the filter is full.

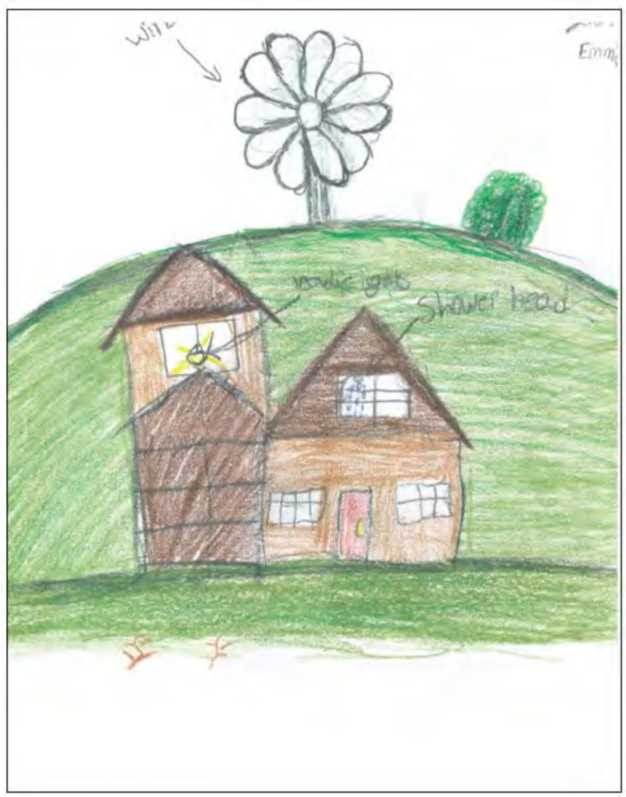
Thank you very much for the kit!

Dear Idaho power, Thank you for helping me learn about energy. You have givin me homework to learn about the tems in the kit. Also you let me know what is safe to drink potable and non-potable.

In the program, I did not know gold was non renewable or that I had wasted alot of money on the water bill.

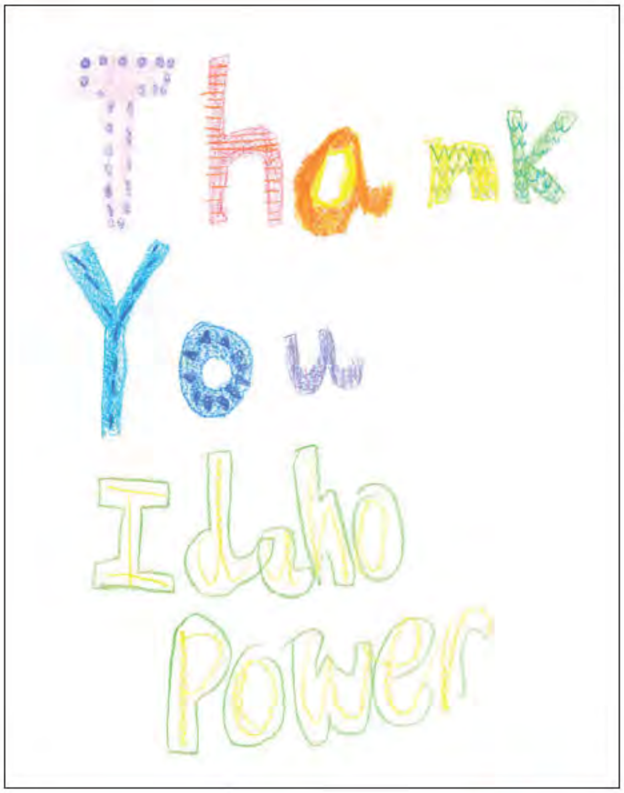
The program taught me to save water, energy and recycle plastic bottles. I will try to conserve energy.

Sincerely,



Student Letters

(continued)



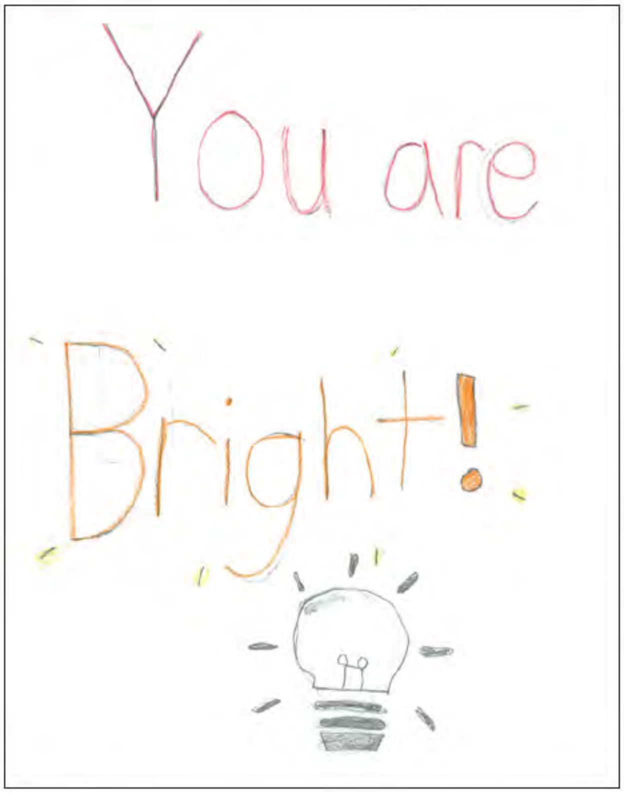
December 4 2020

Dear Idaho Power

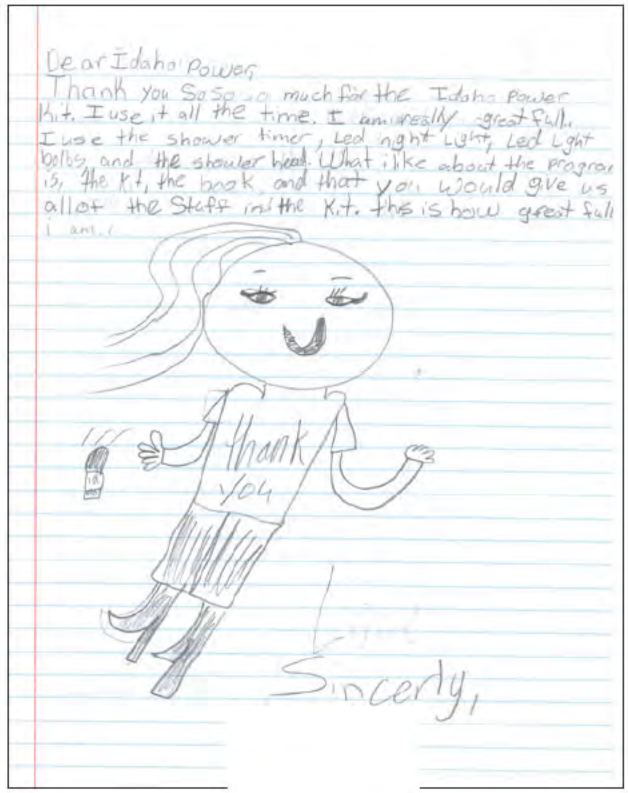
Thank you for your work Books. They were awesome. The best thing ever. Now we use our light bulb now to take down our power bill. We learned a lot and we learned about the phantom load. Then when we finished our book I was so happy.

Sincerely,

(continued)

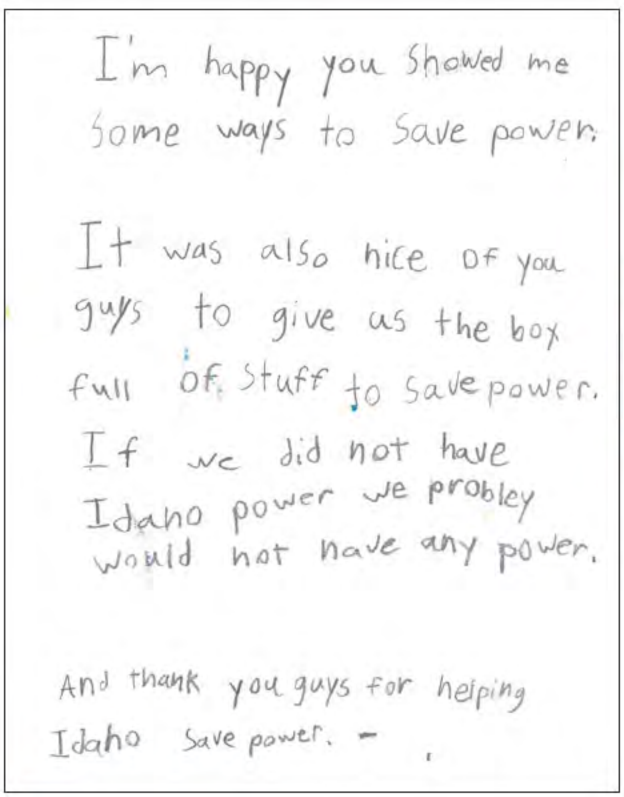


You are Bright!



Dear Idaho Power,
Thank you So So so much for the Idaho Power Kit. I use it all the time. I am really great full. I use the shower timer, Led night Light, Led Light bolbs and the shower head. What i like about the program is, the Kit, the book and that you would give us all of the Stuff in the Kit. this is how great full i am.!

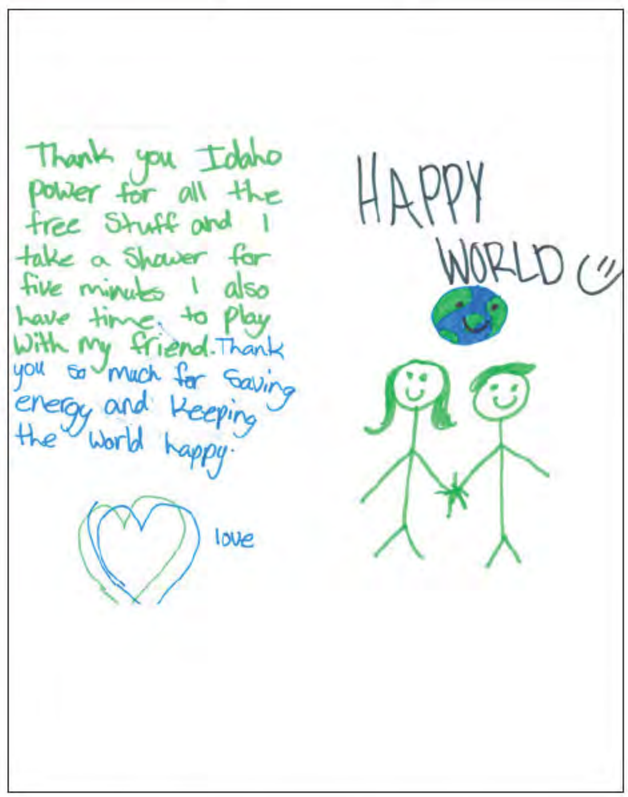
Sincerly,



I'm happy you Showed me some ways to Save power.

It was also nice of you guys to give us the box full of Stuff to Save power. If we did not have Idaho power we probley would not have any power.

And thank you guys for helping Idaho Save power. -



Thank you Idaho power for all the free Stuff and I take a Shower for five minutes I also have time to play with my friend. Thank you so much for Saving energy and Keeping the World happy.

Student Letters

(continued)

Dear Idaho Power,

Thank you for the kit I love it. I use the shower timer the most. Thank you for teaching us about natral resorces. I'm also thankful for you giving u electricity. I love this whole program, I'll keep saving energy.

Sincerely,

Thank You Idaho Power

December 4, 2020

Dear idaho Power :

Thank you for sending us the stuff i had Lots of fun with the kit my family doesn't Waste electricity we conserve it Our family reuses plastic grocery sacks I would rather read about electricity Than science. I'm so glad we got the Books you very much.

Scenery,

Dear IDaho PoWeR,

Thank you for the Kit! I'm using the cool stuff that was in the box to save energy. I like the kit because it has all these items that my family and I use. During the program I learned how to save energy, how to save water, and how to do things without electricity. Thank you IDaho Power for showing me how to save electricity.

Sincerely,

“My students loved the kits but they really liked being able to educate their parents.”

Sharon Shaw, Teacher

Amity 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:	5.18	people[1]
Average number of full bathrooms per home:	2.05	full bathrooms per home[1]
% of water heated by gas:	47.21%	[1]
% of water heated by electricity:	52.79%	[1]
Installation / participation rate of:	32.76%	[1]
Average Showerhead has a flow rate of:	2.07	gallons per minute[1]
Retrofit Showerhead has a flow rate of:	1.26	gallons per minute[1]
Number of participants:	12,446	[1]
Shower duration:	7.80	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:	15,959,073	gallons[4]
Showerhead retrofit projects a **lifetime** reduction of:	159,590,730	gallons[5]
Projected Electricity Savings:		
Showerhead retrofit projects an **annual** reduction of:	1,107,017	kWh[2,6]
Showerhead retrofit projects a **lifetime** reduction of:	11,070,166	kWh[2,7]
Projected Natural Gas Savings:		
Showerhead retrofit projects an **annual** reduction of:	49,500	therms[2,8]
Showerhead retrofit projects a **lifetime** reduction of:	495,003	therms[2,9]

1 Data Reported by Program Participants.

2 (2016). Water Research Foundation® Residential End Uses of Water Version 2, Executive Report.

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 FilterTone® Alarm Installation

FilterTone® Installation Inputs and Assumptions:

Annual energy (electricity) use by a central air conditioner:	2,196	kWh[1]
Annual energy (natural gas) use by a central space heating or furnace:	442	ccfs[1]
Annual energy (natural gas) use by a central space heating or furnace:	458	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:	23.27%	[4]
Number of participants:	12,446	[4]
Discount Rate (electricity):	29%	[9]
Discount Rate (natural gas):	40%	[10]
% of participants with Ducted Electric Space Heating	28%	[11]

Projected Electricity Savings:

The FilterTone installation projects an **annual** reduction of:	79,030	kWh[5]
The FilterTone installation projects a **lifetime** reduction of:	790,297	kWh[6]

Projected Natural Gas Savings:

The FilterTone installation projects an **annual** reduction of:	7,323	therms[7]
The FilterTone installation projects a **lifetime** reduction of:	73,226	therms[8]

1 U.S. Department of Energy, Energy Information Administration 2015, Annual Household site end-use consumption by fuekl in the West.

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 furnace x Projected increase in efficiency (natural gas) x Installation rate x Number of participants

8 Annual energy (natural gas) use by furnace x Projected increase in efficiency (natural gas) x Installation rate x Number of participants x Product life

9 Data reported by program participants. (71% of program participants reported having central air conditionin)

10 Data reported by program participants. (40% of program participants reported having natural gas as a main source of heating)

*** 1 ccf to 1.037 therm conversion (U.S. Energy Information Administration, Updated June 1, 2021)*

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:	**52.89**	watts[3]
Installation / participation rate of:	**52.73%**	[3]
Number of participants:	**12,446**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**295,421**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**3,545,052**	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:	**52.03**	watts[3]
Installation / participation rate of:	**42.27%**	[3]
Number of participants:	**12,446**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**232,221**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,786,653**	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:	**51.41**	watts[3]
Installation / participation rate of:	**34.27%**	[3]
Number of participants:	**12,446**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**185,533**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,226,394**	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:	**75.45%**	[3]
Number of participants:	**12,446**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light retrofit projects an **annual** reduction of:	**267,362**	kWh[4]
The Energy Efficient Night Light retrofit projects a **lifetime** reduction of:	**2,673,620**	kWh[5]

1 Assumption (12 hours per day)

2 Product life provided by manufacturer

3 Data reported by program participants

4(kWh per year x Number of participants) x Installation rate

5((kWh per year x Number of participants) x Installation rate) x Effective useful life

Home Check-Up

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	12,446	4,113	3,043	1,198	2,358	1,734
Students	11,993	3,970	2,933	1,157	2,273	1,660
Surveys Received	3,796	891	1,307	524	513	561
Percent Response	32%	22%	45%	45%	23%	34%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What type of home do you live in?						
Single Family Home (Mobile)	9%	7%	9%	10%	9%	11%
Single Family Home (Manufactured)	10%	6%	10%	14%	12%	11%
Single Family Home (Built)	65%	73%	65%	60%	62%	61%
Multi-Family (2-4 units)	9%	7%	9%	10%	10%	9%
Multi-Family (5-20 units)	5%	5%	5%	6%	6%	4%
Multi-Family (21+ units)	2%	2%	2%	1%	1%	3%
2 Was your home built before 1992?						
Yes	38%	32%	28%	51%	44%	51%
No	62%	68%	72%	49%	56%	49%
3 Is your home owned or rented?						
Owned	74%	76%	74%	73%	74%	73%
Rented	26%	24%	26%	27%	26%	27%
4 How many kids live in your home (age 0-17)?						
1	11%	11%	10%	12%	11%	13%
2	30%	36%	28%	27%	28%	30%
3	27%	28%	26%	24%	27%	28%
4	18%	13%	19%	23%	22%	14%
5+	14%	12%	17%	15%	13%	14%

Due to rounding of numbers, percentages may not add up to 100%

Home Check-Up

(continued)

		Total	Capital	Canyon	Eastern	Southern	Western
5	How many adults live in your home (age 18+)?						
	1	10%	11%	9%	11%	8%	14%
	2	68%	72%	68%	67%	69%	64%
	3	13%	10%	14%	14%	14%	12%
	4	5%	4%	5%	4%	6%	5%
	5+	4%	3%	4%	3%	3%	5%
6	Does your home have a programmable outdoor sprinkler system?						
	Yes	64%	77%	73%	45%	55%	43%
	No	36%	23%	27%	55%	45%	57%
7	Does your home have a programmable thermostat?						
	Yes	76%	83%	80%	62%	75%	69%
	No	24%	17%	20%	38%	25%	31%
8	What is the main source of heating in your home?						
	Natural Gas	40%	51%	47%	34%	28%	19%
	Electric Heater	44%	39%	38%	48%	56%	52%
	Propane	5%	3%	4%	6%	6%	7%
	Heating Oil	1%	1%	1%	1%	1%	1%
	Wood	5%	3%	4%	4%	6%	13%
	Other	5%	4%	5%	7%	2%	8%
9	What type of air conditioning unit do you have?						
	Central Air Conditioner	71%	81%	79%	50%	65%	61%
	Evaporative Cooler	6%	5%	7%	7%	6%	6%
	Room Unit	13%	8%	8%	24%	16%	20%
	Don't Have One	10%	6%	6%	19%	12%	14%
10	Does your home have a Dishwasher?						
	Yes	84%	91%	90%	71%	75%	77%
	No	16%	9%	10%	29%	25%	23%

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	61%	50%	55%	74%	69%	75%
	1	32%	41%	39%	20%	22%	20%
	2	5%	6%	4%	4%	6%	5%
	3	1%	1%	2%	1%	2%	1%
	4+	1%	1%	1%	0%	1%	0%
12	How many full bathrooms are in your home?						
	1	22%	15%	16%	34%	26%	33%
	2	56%	55%	64%	44%	56%	52%
	3	17%	22%	16%	19%	16%	12%
	4	3%	6%	3%	2%	2%	2%
	5+	1%	2%	1%	0%	0%	0%
13	How many toilets are in your home?						
	1	16%	10%	10%	28%	20%	26%
	2	43%	32%	44%	45%	53%	51%
	3	31%	41%	38%	22%	20%	18%
	4	7%	12%	6%	4%	5%	3%
	5+	3%	5%	2%	1%	2%	2%
14	How is your water heated?						
	Natural Gas	47%	62%	51%	43%	34%	30%
	Electricity	53%	38%	49%	57%	66%	70%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	12,446	4,113	3,043	1,198	2,358	1,734
Students	11,993	3,970	2,933	1,157	2,273	1,660
Surveys Received	3,796	891	1,307	524	513	561
Percent Response	32%	22%	45%	45%	23%	34%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What is the flow rate of your old showerhead?						
0 - 1.0 GPM	10%	10%	10%	9%	11%	11%
1.1 - 1.5 GPM	15%	15%	16%	16%	13%	14%
1.6 - 2.0 GPM	22%	22%	22%	18%	24%	20%
2.1 - 2.5 GPM	25%	27%	23%	23%	23%	32%
2.6 - 3.0 GPM	17%	16%	18%	24%	17%	10%
3.1+ GPM	11%	10%	11%	10%	11%	13%
2 Did you install the new High-Efficiency Showerhead?						
Yes	33%	31%	33%	34%	35%	32%
No	67%	69%	67%	66%	65%	68%
3 If you answered "yes" to question 2, what is the flow rate of your new showerhead?						
0 - 1.0 GPM	22%	26%	22%	20%	18%	25%
1.1 - 1.5 GPM	40%	37%	38%	40%	48%	46%
1.6 - 1.75 GPM	37%	37%	40%	40%	35%	30%
4 Did you use the Shower Timer?						
Yes	69%	70%	71%	65%	66%	68%
No	31%	30%	29%	35%	34%	32%
5 Did your family install the first 9-watt LED Light Bulb?						
Yes	53%	56%	51%	52%	53%	51%
No	47%	44%	49%	48%	47%	49%

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	13%	12%	14%	12%	14%	11%
60-watt	37%	41%	37%	31%	36%	36%
75-watt	17%	14%	20%	16%	17%	14%
100-watt	10%	13%	10%	8%	6%	10%
Other	23%	19%	19%	32%	28%	29%
7 Did your family install the second 9-watt LED Light Bulb?						
Yes	42%	45%	42%	42%	42%	39%
No	58%	55%	58%	58%	58%	61%
8 If you answered "yes" to question 7, what is the wattage of the incandescent bulb you replaced?						
40-watt	13%	11%	14%	13%	13%	13%
60-watt	36%	41%	37%	31%	31%	35%
75-watt	18%	19%	19%	16%	18%	15%
100-watt	9%	9%	10%	8%	8%	6%
Other	25%	21%	20%	32%	30%	30%
9 Did your family install the third 9-watt LED Light Bulb?						
Yes	34%	37%	35%	34%	32%	32%
No	66%	63%	65%	66%	68%	68%
10 If you answered "yes" to question 9, what is the wattage of the incandescent bulb you replaced?						
40-watt	13%	13%	16%	11%	14%	10%
60-watt	33%	39%	32%	28%	31%	35%
75-watt	17%	14%	22%	14%	17%	15%
100-watt	10%	11%	10%	12%	7%	5%
Other	26%	23%	21%	36%	30%	34%
11 Did your family install the FilterTone® Alarm?						
Yes	23%	26%	24%	22%	25%	15%
No	77%	74%	76%	78%	75%	85%

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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	18%	25%	18%	12%	19%	14%
3 - 4 Degrees	19%	19%	20%	16%	21%	18%
5+ Degrees	13%	10%	13%	12%	14%	15%
Didn't Adjust Thermostat	50%	46%	49%	59%	47%	54%
13 How much did your family turn up the thermostat in summer for cooling?						
1 - 2 Degrees	18%	22%	17%	15%	17%	16%
3 - 4 Degrees	19%	21%	20%	12%	19%	15%
5+ Degrees	14%	13%	13%	9%	16%	20%
Didn't Adjust Thermostat	50%	44%	49%	63%	49%	48%
14 Did you install the LED Night Light?						
Yes	75%	74%	77%	74%	75%	76%
No	25%	26%	23%	26%	25%	24%
15 Did your family lower your water heater settings?						
Yes	21%	26%	22%	18%	22%	15%
No	79%	74%	78%	82%	78%	85%
16 Did your family raise the temperature on your refrigerator?						
Yes	18%	23%	18%	14%	16%	13%
No	82%	77%	82%	86%	84%	87%
17 Did you complete the optional online energy use activity?						
All of it	8%	10%	6%	7%	8%	7%
Some of it	20%	23%	19%	17%	26%	15%
None	72%	67%	75%	76%	66%	78%
18 Did you work with your family on this Program?						
Yes	57%	62%	59%	51%	59%	48%
No	43%	38%	41%	49%	41%	52%

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	51%	56%	51%	48%	49%	46%
No	49%	44%	49%	52%	51%	54%
20 Did your family change the way they use energy?						
Yes	57%	62%	59%	52%	56%	48%
No	43%	38%	41%	48%	44%	52%
21 How would you rate the Idaho Power EnergyWise® Program?						
Great	45%	49%	45%	48%	42%	41%
Pretty Good	40%	39%	40%	39%	44%	41%
Okay	11%	9%	12%	11%	11%	14%
Not So Good	3%	3%	3%	2%	3%	4%

Due to rounding of numbers, percentages may not add up to 100%

Participant List

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Eastern	Aberdeen Middle School	Marci Bradley	1	60	Yes
Capital	Adams Elementary School	Casey Gagnepain	1	24	No
Capital	Adams Elementary School	Elizabeth James	1	27	No
Capital	Adams Elementary School	Troy Kagee	1	26	No
Capital	Adams Elementary School	Siimone Mansfield	1	25	No
Western	Aiken Elementary School	Patty Eidson	1	20	No
Western	Aiken Elementary School	Candace Zugner	1	20	No
Southern	Alturas Elementary School	Kiley Hoefer	1	60	No
Capital	American Heritage Girls Troop	Hope Ryan	1	8	No
Capital	Amity Elementary School	Shirley Bryant	1	22	No
Capital	Amity Elementary School	Megan Fuller	1	23	No
Capital	Amity Elementary School	Jeff Hansen	1	18	No
Capital	Amity Elementary School	Sharon Shaw	1	18	Yes
Western	Annex Charter School	Dean Seward	1	6	No
Capital	Barbara Morgan STEM Academy	Jami Alties	1	27	No
Capital	Barbara Morgan STEM Academy	Adam Burwell	1	26	No
Capital	Barbara Morgan STEM Academy	Ricky Clark	1	23	No
Capital	Barbara Morgan STEM Academy	Lindsey Corey	1	26	No
Capital	Barbara Morgan STEM Academy	Brian Holden	1	28	No
Capital	Barbara Morgan STEM Academy	Jamie Schildknecht	1	27	No
Southern	Bellevue Elementary School	Christine Blackstead	1	20	No
Southern	Bickel Elementary	Rachel Idso	1	12	No
Southern	Bickel Elementary	Gwenda Lockwood	1	12	No
Southern	Bickel Elementary	Tiffany Patterson	1	19	No
Canyon	Birch Elementary School	Brenda Fly	1	21	Yes
Canyon	Birch Elementary School	Gina Fuerguson	1	21	Yes
Canyon	Birch Elementary School	Juilana Lookhart	1	24	Yes
Canyon	Birch Elementary School	MaryJo Pegram	1	21	Yes
Capital	Boise Montessori Academy (5th)	Maiya Vink	1	6	No
Capital	Boise Montessori Academy (6th)	Maiya Vink	1	6	No
Capital	Boise Online Schoool Sustainability Club	Erin Stutzman	1	23	Yes
Southern	Buhl Middle School	Caroline Barger	1	103	Yes
Southern	Buhl Middle School	Donovan Dahl	1	100	No
Canyon	Calvary Christian School	Jodi Brown	1	20	No
Western	Cambridge Elementary School	Rich Hollon	1	16	Yes
Southern	Carey Public School	Jan Morey	1	13	Yes
Southern	Castleford Elementary School	Carrie March	1	28	No

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Western	Cavalry Christian Academy	Carr	1	8	No
Capital	Cecil Andrus Elementary	Karla Morton	1	25	No
Canyon	Centennial Elementary School	Doris Atherton	1	20	Yes
Canyon	Centennial Elementary School	Diane Gharring	1	23	No
Canyon	Centennial Elementary School	Jamie Hoesing	1	21	Yes
Canyon	Central Canyon Elementary School	Amy Allmaras	1	23	No
Canyon	Central Canyon Elementary School	Alisha Creelman	1	22	No
Canyon	Central Canyon Elementary School	Tahnee Freeman	1	22	No
Canyon	Central Canyon Elementary School	Kristen Gordon	1	30	Yes
Canyon	Central Canyon Elementary School	Allyson Sanchez	1	23	No
Canyon	Central Canyon Elementary School	Charlotte Thomas	1	29	No
Canyon	Central Canyon Elementary School	Ashley VanVorous	1	30	No
Canyon	Central Elementary School	Aubrey Crisp	1	20	Yes
Canyon	Central Elementary School	Patty McMahon	1	17	Yes
Canyon	Central Elementary School	April Wesley	1	20	No
Capital	Chief Joseph School Of The Arts	Linda Conry	1	25	Yes
Capital	Chief Joseph School Of The Arts	Kimberly Honea	1	26	No
Capital	Chief Joseph School Of The Arts	Julie Pantenburg	1	26	No
Capital	Christine Donnell School of Arts	Tyler Bishop	1	25	No
Capital	Christine Donnell School of Arts	Tamara Duthie	1	22	No
Capital	Christine Donnell School of Arts	Amy Hymas	1	23	No
Eastern	Chubbuck Elementary School	Christenia Coast	1	75	No
Eastern	Claude A. Wilcox Elementary School	Lacie Christensen	1	25	Yes
Eastern	Claude A. Wilcox Elementary School	Monique Gannon	1	26	Yes
Eastern	Claude A. Wilcox Elementary School	Tricia Hemsley	1	26	Yes
Capital	Cole Valley Christian Schools	Melissa Thompson	1	75	No
Western	Community Collaborative Homeschool	Kimberly Bowers	1	12	Yes
Western	Community Collaborative Homeschool	Kimberly Bowers	1	14	Yes
Capital	Compass Public Charter School	Julie Maynard	1	120	No
Eastern	Connor Academy Public Charter School	Jolene Hurst	1	32	No
Eastern	Connor Academy Public Charter School	Kelly Watson	1	32	No
Western	Council Elementary School	Brenna Cada	1	22	No
Western	Crane Elementary School	Tami Cornell	1	22	No
Western	Crane Elementary School	Erin Jenks	1	22	No
Canyon	Desert Springs Elementary School	Janice Cook	1	25	Yes
Canyon	Desert Springs Elementary School	Stacey Pearson	1	25	Yes

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Desert Springs Elementary School	Janelle Smith	1	25	Yes
Canyon	Desert Springs Elementary School	Jackie Sodaro	1	25	Yes
Capital	Desert View Christian School	Anita Brown	1	10	No
Capital	Discovery Elementary School	Ashley Kalinski	1	30	No
Eastern	Donald D. Stalker Elementary School	Lisa Clark	1	3	Yes
Eastern	Donald D. Stalker Elementary School	LaNita McRae	1	5	Yes
Eastern	Donald D. Stalker Elementary School	LaNita McRae	1	3	Yes
Western	Donnelly Elementary	Brakae Campbell	1	15	Yes
Western	Donnelly Elementary	Melissa Maini	1	22	No
Western	Double O Elementary School	Karla Beaubien	1	1	No
Western	Drewsey Elementary School	Jodi Miller	1	8	No
Capital	Eagle Hills Elementary School	Noell Bautista	1	30	No
Capital	Eagle Hills Elementary School	Jillian Cole	1	30	Yes
Capital	Eagle Hills Elementary School	Brian Fischer	1	30	No
Capital	Eagle Hills Elementary School	Samantha Purcell	1	25	Yes
Canyon	East Canyon Elementary	Annie Anderson	1	25	No
Canyon	East Canyon Elementary	Amber Faille	1	32	No
Canyon	East Canyon Elementary	Madelyn Wall	1	25	No
Capital	East Elementary School	Sarah Nicklaus	1	22	No
Capital	East Elementary School	Christine Scholte	1	25	No
Capital	East Elementary School	Kristy Shain	1	25	No
Capital	Eliza Hart Spalding Elementary School	Shawna Brenna	1	22	No
Capital	Eliza Hart Spalding Elementary School	Brian Jensen	1	24	No
Capital	Eliza Hart Spalding Elementary School	Krista Johnson	1	26	Yes
Capital	Eliza Hart Spalding Elementary School	Sarah Williams	1	25	Yes
Eastern	Ellis Elementary School	Cody Perry	1	8	Yes
Eastern	Ellis Elementary School	Diana Son	1	6	Yes
Canyon	Endeavor School	Holly Picard	1	66	No
Canyon	Falcon Ridge Charter	Patti Covell	1	34	Yes
Southern	Filer Elementary School	Stacie Beem	1	22	No
Southern	Filer Elementary School	Tina Black	1	21	Yes
Southern	Filer Elementary School	Jo Borup	1	21	No
Southern	Filer Elementary School	Trent Cline	1	24	No
Southern	Filer Elementary School	Andrea Garner	1	23	No
Southern	Filer Intermediate School	Kelli Clark	1	25	Yes
Southern	Filer Intermediate School	Robyn Flint	1	23	No
Southern	Filer Intermediate School	Kelly Grayson	1	26	No

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Southern	Filer Intermediate School	Katelynn Hulsey	1	25	No
Southern	Filer Intermediate School	Anna Rife	1	27	No
Southern	Filer Intermediate School	Cassie Royse	1	25	Yes
Southern	Filer Intermediate School	Kara Smith	1	24	No
Southern	Filer Intermediate School	Sarah Wendell	1	24	Yes
Southern	Filer Intermediate School	Leslie Wheeler	1	25	Yes
Capital	Forge International School	Caitlin Holzapple	1	50	No
Eastern	Fort Hall Elementary School	Ryan Rosenfeld	1	20	Yes
Eastern	Fort Hall Elementary School	Tyler Wood	1	25	No
Canyon	Freemont Middle School	Heather Griffith	1	60	No
Canyon	Freemont Middle School	Erin Laughlin	1	83	No
Capital	Frontier Elementary	Mary Allen	1	23	No
Capital	Frontier Elementary	Jenny Clark	1	23	No
Western	Fruitland Elementary School	Ish Green	1	24	No
Western	Fruitland Elementary School	Linda Langley	1	25	Yes
Western	Fruitland Elementary School	Heather Llanas	1	24	No
Western	Fruitland Elementary School	Stacy Wescott	1	24	No
Western	Fruitland Middle School	Jaris Lewis	1	30	Yes
Western	Fruitland Middle School	Alison Parrott	1	28	Yes
Western	Fruitland Middle School	Chance Stringer	1	28	No
Western	Fruitland Middle School	Lisa Tes	1	28	No
Western	Fruitland Middle School	Aubrey Wilson	1	28	No
Capital	Galileo STEM Academy	Gina Kwid	1	83	Yes
Western	Garden Valley Elementary	Jan Ward	1	27	No
Capital	Garfield Elementary School	Sonia Galaviz	1	20	No
Capital	Garfield Elementary School	Katie Tunca	1	20	Yes
Eastern	Gate City Elementary School	Kallie Lopez	1	80	No
Eastern	Gem Prep Pocatello	Mallory England	1	25	Yes
Eastern	Gem Prep Pocatello	Rebecca Hart	1	25	No
Capital	Glenns Ferry Elementary	Brenna Fisher	1	21	No
Capital	Glenns Ferry Elementary	Tracy Humphreys	1	21	No
Capital	Glenns Ferry Elementary	Michael Price	1	19	No
Capital	Glenns Ferry Middle School	Liza Martin	1	40	Yes
Southern	Gooding Elementary/Middle School	Marne Curtis	1	24	Yes
Southern	Gooding Elementary/Middle School	Julynn Dillard	1	25	No
Southern	Gooding Elementary/Middle School	Dakota Dodge	1	25	No

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Southern	Gooding Elementary/Middle School	Nicole Kindred	1	24	No
Southern	Gooding Elementary/Middle School	Samantha Leija	1	24	No
Southern	Gooding Elementary/Middle School	Angela Miller	1	24	No
Southern	Gooding Elementary/Middle School	Kate Rippee	1	25	No
Capital	Grace Jordan Elementary School	Darwood Ashmead	1	25	No
Capital	Grace Jordan Elementary School	Jason Fewkes	1	25	No
Capital	Grace Jordan Elementary School	Rebekah Spille	1	25	No
Eastern	Green Acres Elementary School	Rachel Thomas	1	21	No
Eastern	Green Acres Elementary School	Kathy Walker	1	21	Yes
Canyon	Greenhurst Elementary School	Josh Gaines	1	25	No
Canyon	Greenhurst Elementary School	Katy Soares	1	25	No
Canyon	Greenhurst Elementary School	Tonya Tawes	1	23	No
Eastern	Groveland Elementary	Kaitlin Hall	1	20	No
Eastern	Groveland Elementary	Megan Thornley	1	20	No
Southern	Hagerman Elementary School	Melissa Kast	1	20	No
Western	Haines Elementary School	Mary Black	1	10	Yes
Southern	Hansen Elementary School	Mike Rush	1	25	No
Western	Harper Charter School	Carman Lovell	1	16	Yes
Western	Harper Charter School	Marie Torland	1	20	No
Southern	Harrison Elementary School	Corissa Johns	1	25	No
Southern	Harrison Elementary School	Chelsea Kelly	1	25	Yes
Western	Henry L Slater Elementary School	Karen Klus	1	19	Yes
Western	Henry L Slater Elementary School	Emma Roberts	1	14	No
Western	Henry L Slater Elementary School	Josh Weible	1	20	No
Canyon	Heritage Community Charter	Perla Abad	1	30	No
Canyon	Heritage Community Charter	Martha Jones	1	30	No
Canyon	Heritage Community Charter	Sarah Mead	1	30	No
Canyon	Heritage Community Charter	Matt Mullanix	1	30	No
Capital	Hidden Springs Elementary School	Sonja Smith	1	24	No
Capital	Highlands Elementary School	Eileen Beatty	1	21	Yes
Capital	Highlands Elementary School	Katrina Burkhardt	1	21	No
Capital	Highlands Elementary School	Gretchen Carter	1	9	No
Capital	Hillcrest Elementary School	Janet Howell	1	24	No
Capital	Hillcrest Elementary School	Jesse Randolph	1	24	No
Capital	Hillsdale Elementary School	Angie Fraas	1	30	Yes
Capital	Hillsdale Elementary School	Hannah Kessler	1	30	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Hillsdale Elementary School	Michelle Montoya	1	30	Yes
Capital	Hillsdale Elementary School	Jocelyn Robinson	1	30	Yes
Southern	Hollister Elementary	Susan Hamby	1	18	Yes
Eastern	Holy Spirit Catholic School	Faith Rudebusch	1	36	No
Western	Homedale Elementary	Nicole Rennaker	1	24	No
Southern	Horizon Elementary School	Gayle Butts	1	20	No
Southern	Horizon Elementary School	Michelle Powell	1	22	No
Western	Horseshoe Bend Elementary School	Laura Johnsen	1	16	No
Capital	Hunter Elementary School	Rene Bilkiss	1	30	Yes
Capital	Hunter Elementary School	Diane Escandon	1	30	Yes
Capital	Hunter Elementary School	Rebecca Lenon	1	25	Yes
Capital	Hunter Elementary School	Angela Zweifel	1	30	Yes
Western	Huntington School	Sterling McKinney	1	9	Yes
Southern	I.B. Perrine Elementary School	Layne Ficklin	1	25	No
Southern	I.B. Perrine Elementary School	Teresa Finch	1	25	No
Southern	I.B. Perrine Elementary School	Carli Moffitt	1	25	No
Canyon	Idaho Arts Charter School (K-4)	Kathy LeCheminant	1	30	No
Canyon	Idaho Arts Charter School (K-4)	Dan Rushing	1	30	No
Southern	Idaho School For The Deaf And The Blind	Katie Larsen	1	13	No
Southern	Idaho School For The Deaf And The Blind	Tim Ledington	1	12	No
Southern	Idaho School For The Deaf And The Blind	Aditya Sharma	1	12	No
Eastern	Idaho Science & Technology Charter School	Lydia Beck	1	41	No
Eastern	Idaho Science & Technology Charter School	Bryce Salmon	1	43	No
Southern	Immanuel Lutheran School	Candance Jensen	1	15	No
Canyon	Indian Creek & Ross Elementary School	Rachel Cyr	1	26	Yes
Canyon	Indian Creek & Ross Elementary School	Katie Harding	1	26	Yes
Canyon	Indian Creek & Ross Elementary School	Alyssa Hutchins	1	26	No
Canyon	Indian Creek & Ross Elementary School	Yvette Marshall	1	26	No
Eastern	Inkom Elementary School	Adam Call-Feit	1	22	No
Capital	Inspire Virtual Charter School	Nikki Briggs	1	150	No
Capital	Joplin Elementary School	Kirsten Grover	1	54	No
Western	Kenneth Carberry Elementary School	Alissa Combe	1	29	No
Western	Kenneth Carberry Elementary School	Karen Nichols	1	29	No
Western	Kenneth Carberry Elementary School	Paige Parker	1	27	Yes
Western	Kenneth Carberry Elementary School	Katrina Savitz	1	29	No
Southern	Kimberly Elementary School	Rachelle Mueller	1	75	No

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Lake Ridge Elementary School	Deanna Menssen	1	25	Yes
Canyon	Lake Ridge Elementary School	Tanya Scheibe	1	25	No
Canyon	Lake Ridge Elementary School	Amy Taylor	1	25	Yes
Canyon	Lake Ridge Elementary School	Laura VanDerschaaf	1	26	No
Canyon	Lewis & Clark Elementary	Caitlyn McConnell	1	16	Yes
Canyon	Lewis & Clark Elementary	Adam Trowbridge	1	16	Yes
Canyon	Lewis & Clark Elementary	Meghan Willard	1	16	Yes
Eastern	Lewis and Clark Elementary	John Anderson	1	22	Yes
Eastern	Lewis and Clark Elementary	Stacy Briner	1	22	Yes
Eastern	Lewis and Clark Elementary	Tamara Palmer	1	22	Yes
Southern	Lighthouse Christian School	Brooklyn Vander-Stelt	1	28	No
Canyon	Lincoln Elementary School	Balen Rosencrantz	1	50	No
Capital	Longfellow Elementary School	Julie Albert	1	16	Yes
Capital	Longfellow Elementary School	Toni Novotny	1	15	No
Capital	Mary McPherson Elementary School	Jackie K.	1	30	No
Capital	Mary McPherson Elementary School	Dusti Steiner	1	30	No
Capital	Mary McPherson Elementary School	Derek Wilber	1	28	No
Western	May Roberts Elementary School	Katherine Burke	1	25	No
Western	McCain Middle School	John Graversen	1	80	No
Western	McCain Middle School	Joyann Williams	1	120	No
Capital	McMillan Elementary School	Judie Bradburn	1	18	No
Capital	McMillan Elementary School	Cerridwen Tesch	1	18	No
Canyon	Melba Elementary	Stephanie Gunstream	1	24	Yes
Canyon	Melba Elementary	Marie Rockwood	1	22	Yes
Canyon	Melba Elementary	Katie Strawser	1	24	Yes
Capital	Meridian Cub Scout Pack 165	Dennis Bankhead	1	17	Yes
Capital	Meridian Elementary	Rebecca Biazon	1	35	No
Capital	Meridian Elementary	Hailey Bucklin	1	19	No
Capital	Meridian Elementary	Shelby Dreves	1	18	No
Canyon	Mill Creek Elementary School	Lindsey Burgess	1	20	No
Canyon	Mill Creek Elementary School	Lyna Butler	1	23	Yes
Canyon	Mill Creek Elementary School	Stephani Little	1	20	Yes
Canyon	Mill Creek Elementary School	Jill Mesecher	1	22	Yes
Canyon	Mill Creek Elementary School	Staci Miller	1	20	Yes
Capital	Monroe Elementary School	Krista Anderson	1	8	No
Capital	Monroe Elementary School	Kari Cluff	1	22	No

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Monroe Elementary School	Mitch Fiderlick	1	19	No
Capital	Morley Nelson Elementary School	Alisha Coy	1	25	No
Capital	Morley Nelson Elementary School	AnnaMarie Schafer	1	25	No
Canyon	Nampa Christian School	Zachary Dwello	1	56	Yes
Western	New Plymouth Elementary School	Christy Norris	1	25	Yes
Western	New Plymouth Elementary School	Jessica Tanner	1	24	Yes
Western	New Plymouth Elementary School	Dorothy Woods	1	25	Yes
Capital	North Elementary	Rosemary Ash	1	24	Yes
Capital	North Elementary	Sherri Redmond	1	24	Yes
Capital	North Elementary	Denise Weis	1	24	Yes
Western	Nyssa Elementary School	Carrie Aguas	1	23	No
Western	Nyssa Elementary School	Paula Barnhart	1	18	Yes
Western	Nyssa Elementary School	Tricia Book	1	18	No
Western	Nyssa Elementary School	Rachelle Phillips	1	18	No
Western	Nyssa Elementary School	Miguel Segura	1	23	No
Southern	Oakley Elementary School	Rose Marie-Warrell	1	16	Yes
Western	Ola Elementary School	Amy Davis	1	4	No
Canyon	Owyhee Elementary	Christa Roesberry-Barber	1	28	Yes
Canyon	Owyhee Elementary	Jason Zastrow	1	28	Yes
Capital	Owyhee Elementary School	Sheryce Davis	1	20	Yes
Western	Park Intermediate	Kathleen Cahill	1	24	No
Western	Park Intermediate	Trent Jones	1	24	No
Western	Park Intermediate	Emily McLeod	1	24	No
Western	Park Intermediate	Jessica Mosley	1	24	Yes
Western	Park Intermediate	Grace Sharp	1	24	Yes
Canyon	Park Ridge Elementary School	Courtney Craner	1	36	Yes
Canyon	Park Ridge Elementary School	Allison Garrison	1	24	Yes
Canyon	Park Ridge Elementary School	Misty Oakes	1	33	No
Canyon	Park Ridge Elementary School	Camille Trent	1	33	Yes
Canyon	Park Ridge Elementary School	Andrea Wallin	1	24	Yes
Western	Parma Middle School	Debbie Kelly	1	73	Yes
Capital	Peregrine Elementary School	Barbara Nesbit	1	23	No
Capital	Peregrine Elementary School	Carri Thornburg	1	22	Yes
Western	Pine Eagle Elementary School	Whitney Chandler	1	18	No
Western	Pine Eagle Elementary School	Rebecca Thorn	1	13	No
Western	Pine Eagle Elementary School	Ashley Unquera	1	14	No

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Pioneer School Of The Arts	Nadine Bennett	1	26	Yes
Capital	Pioneer School Of The Arts	Anissa Bramlet	1	26	Yes
Capital	Pioneer School Of The Arts	Brent Jons	1	26	No
Capital	Pioneer School Of The Arts	Cindy Potts	1	26	No
Capital	Ponderosa Elementary School	Kelli Lemken	1	25	No
Capital	Ponderosa Elementary School	Deborah Lichter	1	25	Yes
Capital	Ponderosa Elementary School	Veronica McAchran	1	25	No
Southern	Popplewell Elementary School	Cathy Butenschoen	1	29	No
Southern	Popplewell Elementary School	Olivia Byers	1	25	No
Southern	Popplewell Elementary School	Bill Clements	1	25	No
Southern	Popplewell Elementary School	Melinda Fontana	1	25	No
Capital	Prairie Elementary/Jr High School	Stephanie Lewis	1	7	No
Capital	Prospect Elementary	Daly Hull	1	28	No
Capital	Prospect Elementary	Sophia Roe	1	28	Yes
Capital	Prospect Elementary	Kit Shuman	1	28	No
Capital	Prospect Elementary	Sharleen Thurston	1	28	Yes
Canyon	Purple Sage Elementary School	Shalynn Carpenter	1	30	Yes
Canyon	Purple Sage Elementary School	Melissa McPherson	1	23	Yes
Canyon	Purple Sage Elementary School	Katie Ward	1	24	Yes
Southern	Raft River Elementary School	Jordan Truman	1	30	No
Canyon	Reed Elementary	Adrianna Cuchillo	1	18	No
Canyon	Reed Elementary	Jennifer Dolan	1	18	Yes
Canyon	Reed Elementary	Mary Holmes	1	15	Yes
Canyon	Reed Elementary	Arielle Jensen	1	19	Yes
Southern	Richfield School	Lorri Henson	1	14	No
Southern	Richfield School	Kelly Leguineche	1	16	Yes
Eastern	Ridge Crest Elementary School	Jacalyn Bombard	1	23	Yes
Western	Riggins Elementary School	Laura Merabelle	1	13	No
Capital	River Valley Elementary School	Vicki Noel	1	80	No
Capital	Riverside Elementary School	Brooke Andrews	1	25	No
Capital	Riverside Elementary School	Christina Widner	1	25	No
Southern	Rock Creek Elementary	Andy Arenz	1	27	No
Southern	Rock Creek Elementary	Pauli Connelly	1	27	No
Southern	Rock Creek Elementary	Julie Delia	1	27	Yes
Southern	Rock Creek Elementary	Rochelle Jones	1	26	No
Western	Rockville Elementary School	Sharon Green	1	1	No
Capital	Rolling Hills Public Charter	Rachel Stewart	1	30	No

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Rolling Hills Public Charter	Rachel Stewart	1	60	No
Canyon	Ronald Reagan Elementary School	Ella Curtis	1	30	Yes
Canyon	Ronald Reagan Elementary School	Nicole Kemp	1	30	Yes
Canyon	Ronald Reagan Elementary School	Lisa Martell	1	17	No
Capital	Roosevelt Elementary School	Alicia Bradshaw	1	25	No
Canyon	Sacajawea Elementary School	Terra Hurd	1	28	Yes
Canyon	Sacajawea Elementary School	Elizabeth Prall	1	26	No
Canyon	Sacajawea Elementary School	Penny Washburn	1	26	Yes
Capital	Sacred Heart School - Boise	Maria Joyce	1	25	No
Capital	Sacred Heart School - Boise	Naomi Kerns	1	19	No
Capital	Sage International School of Boise	Ryan Freers	1	46	No
Capital	Sage International School of Boise	Bryce Mercer	1	55	No
Southern	Sawtooth Elementary School	Tracie Jones	1	25	No
Southern	Sawtooth Elementary School	Mary Rios	1	25	No
Southern	Sawtooth Elementary School	Karen Wach	1	25	Yes
Capital	Seven Oaks Elementary School	Jennifer DeMarini	1	80	Yes
Capital	Shadow Hills Elementary School	Jillian Greer	1	25	No
Capital	Shadow Hills Elementary School	Janell Irwin	1	25	No
Capital	Shadow Hills Elementary School	Christy Schwehr	1	25	No
Capital	Shadow Hills Elementary School	Jill Vines	1	25	No
Southern	Shoshone Elementary School	Denice Christiansen	1	44	No
Capital	Siena Elementary School	Hannah Lulloff	1	29	No
Capital	Siena Elementary School	Kathline Patterson	1	11	No
Capital	Siena Elementary School	Jennifer Shirley	1	20	No
Canyon	Silver Trail Elementary School	Kim Birkinbine	1	27	Yes
Canyon	Silver Trail Elementary School	Dan Hoehne	1	30	Yes
Canyon	Silver Trail Elementary School	Allison Silsby	1	30	No
Canyon	Skyway Elementary School	Mark Elli	1	28	Yes
Canyon	Skyway Elementary School	Michelle Hammond	1	28	Yes
Canyon	Skyway Elementary School	Elizabeth Pierce	1	28	No
Canyon	Skyway Elementary School	Casi Spengler	1	28	Yes
Canyon	Skyway Elementary School	Jamie Warren	1	28	Yes
Canyon	Snake River Elementary	Heather Packer	1	17	No
Canyon	Snake River Elementary	Matea Schindel	1	17	Yes
Canyon	Snake River Elementary	Lindsay Strong	1	17	Yes
Western	South Baker Intermediate School	Erin Callahan	1	16	Yes
Western	South Baker Intermediate School	Allisyn Ferdig	1	15	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Western	South Baker Intermediate School	Victoria Howard	1	14	No
Southern	St Edwards Catholic School	Cortney Allison	1	14	Yes
Canyon	St. Paul's Catholic School	Jessica Bice	1	9	No
Canyon	St. Paul's Catholic School	Jessica Bice	1	9	No
Capital	Star Elementary School	Cinda Bodell	1	28	No
Capital	Star Elementary School	Angela Fulkerson	1	28	No
Capital	Star Elementary School	Joyanna Galan	1	28	Yes
Capital	Star Elementary School	Carmi Scheller	1	28	Yes
Eastern	Stoddard Elementary School	Alicia Cody	1	20	Yes
Eastern	Stoddard Elementary School	Fairley Faroni	1	20	Yes
Eastern	Stoddard Elementary School	Craig Ockerman	1	20	Yes
Southern	Stricker Elementary School	Kelly Depew	1	25	No
Southern	Stricker Elementary School	Michael Graefe	1	21	No
Southern	Stricker Elementary School	Kristen Lewis	1	23	Yes
Southern	Stricker Elementary School	Craig Maki	1	25	Yes
Southern	Stricker Elementary School	Heather Pesola	1	21	No
Southern	Stricker Elementary School	Heather Reed	1	21	Yes
Southern	Stricker Elementary School	Daniel Zunino	1	25	No
Southern	Summit Elementary School	John Derr	1	23	Yes
Southern	Summit Elementary School	Stacey Lakey	1	24	Yes
Southern	Summit Elementary School	Veronica Medda	1	21	No
Southern	Summit Elementary School	Tracy Park	1	25	No
Southern	Summit Elementary School	Maggie Stump	1	24	Yes
Southern	Summit Elementary School	Audra Thompson	1	20	Yes
Southern	Summit Elementary School	Kimberly Wallace	1	24	Yes
Southern	Summit Elementary School	Anne Winder	1	25	Yes
Southern	Summit Elementary School	Brad Winder	1	25	Yes
Western	Sweet Montour Elementary School	Sherry Evans	1	20	No
Eastern	Syringa Elementary School	Aubrey Eldredge	1	29	No
Eastern	Syringa Elementary School	Cindel Vasquez	1	26	Yes
Southern	Syringa Mountain Charter School	Shawn Myers	1	25	No
Eastern	Tendoy Elementary	Adam Finlayson	1	23	No
Eastern	Tendoy Elementary School	Kelly Ellsworth	1	4	Yes
Capital	The Village Charter School	Paige Norman	1	26	No
Canyon	Thomas Jefferson Charter School	Susan Green	1	33	No
Eastern	Tyhee Elementary School	Amy Bare	1	25	No
Eastern	Tyhee Elementary School	Katie Brunger	1	29	No
Eastern	Tyhee Elementary School	E'Laine Khang	1	26	No

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Eastern	Tyhee Elementary School	Haley Luce	1	26	No
Capital	Ustick Elementary School	Monica Alarcon	1	32	No
Capital	Ustick Elementary School	Tera Craner	1	32	No
Capital	Ustick Elementary School	Brenda Johnson	1	32	No
Capital	Ustick Elementary School	Lauren Mabe	1	26	No
Capital	Ustick Elementary School	Steve Thompson	1	27	Yes
Western	Vale Elementary School	Jill McBride	1	18	Yes
Western	Vale Elementary School	Cassie Young	1	16	Yes
Capital	Valley View Elementary School	Meko Myers	1	16	Yes
Capital	Valley View Elementary School	Shawna Wood	1	16	Yes
Canyon	Van Buren Elementary School	Becky Gans	1	30	No
Canyon	Van Buren Elementary School	Jenny Hartvigsen	1	30	No
Canyon	Van Buren Elementary School	Aimee Stacy	1	30	No
Canyon	Van Buren Elementary School	Cindy Wells	1	28	Yes
Canyon	Vision Charter School	Evie Griswold	1	32	No
Western	W.W. Jones Elementary School	Vicki McConnell	1	6	Yes
Canyon	Washington Elementary School	Kyle Backlund	1	25	No
Canyon	Washington Elementary School	Heather Mueller	1	26	Yes
Canyon	Washington Elementary School	Chris Wilcox	1	24	Yes
Southern	Wendell Middle School	Dani Bonawitz	1	27	Yes
Southern	Wendell Middle School	Jaci Heizer	1	27	No
Southern	Wendell Middle School	Dan Kuka	1	27	Yes
Southern	Wendell Middle School	Jayme Mcdonald	1	27	No
Canyon	West Canyon Elementary	Andrea Chester	1	27	Yes
Canyon	West Canyon Elementary	Sirrah Elliott	1	27	Yes
Canyon	West Canyon Elementary	Emmerie Smith	1	27	Yes
Capital	West Elementary School	Nadia Aflague	1	23	Yes
Capital	West Elementary School	Travis Henke	1	20	Yes
Capital	West Elementary School	Tricia Henke	1	20	Yes
Western	Westside Elementary School	Shauna Bain	1	25	Yes
Western	Westside Elementary School	Amy Brownell	1	25	Yes
Western	Westside Elementary School	Stacy Mount	1	25	Yes
Western	Westside Elementary School	Sarah Nesbitt	1	25	Yes
Capital	White Pine Elementary School	Marisa Jordan	1	24	Yes
Capital	White Pine Elementary School	Lise Messerschmitt	1	18	No
Capital	White Pine Elementary School	Maran O'Meara	1	23	No
Capital	White Pine Elementary School	Katie Tucker	1	19	No

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Whitney Elementary School	Jeni Elson	1	20	No
Capital	Whitney Elementary School	Cristina Joseph	1	25	Yes
Capital	Whitney Elementary School	Eden Rodriguez	1	20	Yes
Western	Wilder Elementary School	Rosemary Lootens	1	22	Yes
Eastern	William Thomas Middle School	Kelly Coleman	1	120	Yes
Canyon	Willow Creek Elementary School	Kim Chierici	1	31	Yes
Canyon	Willow Creek Elementary School	Nicole Gibbs	1	29	Yes
Canyon	Willow Creek Elementary School	Kayla Stone	1	28	Yes
Western	Willowcreek Elementary School	Marti Bair	1	21	No
Western	Willowcreek Elementary School	Lacey Peasley	1	21	No
Canyon	Wilson Elementary School	Keelee Babcock	1	25	No
Canyon	Wilson Elementary School	Afton McSherry	1	26	No
Canyon	Wilson Elementary School	Debbie Peterson	1	30	No
Southern	Wood River Middle School	Daniel Gralenski	1	90	No

TOTALS	453	11993	
TOTAL PARTICIPANTS	12446		

TOTAL PARTICIPATING 2020-2021 TEACHERS	453	183	40%	YES
		270	60%	NO
TOTAL STUDENT SURVEYS RETURNED	3,796			
TOTAL INCENTIVE PAID OUT	$16,175			
FULL YEAR SURVEY RETURN PERCENTAGE	32%			

Teacher Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	453	143	110	41	85	74
Surveys Received	129	28	49	15	15	22
Percent Response	28%	20%	45%	37%	18%	30%

	Number	Percent
1 The materials were clearly written and well organized.		
Strongly Agree	93	73%
Agree	33	26%
Disagree	1	1%
Strongly Disagree	1	1%
2 The products in the Kit were easy for students to use.		
Strongly Agree	72	56%
Agree	52	41%
Disagree	4	3%
Strongly Disagree	0	0%
3 Students indicated that their parents supported the program.		
Yes	108	88%
No	15	12%
4 Would you conduct this Program again?		
Yes	125	98%
No	2	2%
5 Would you recommend this program to other colleagues?		
Yes	127	99%
No	1	1%
6 If my school is eligible for participation next year, I would like to enroll.		
Yes	122	95%
No	7	5%

Due to rounding of numbers, percentages may not add up to 100%

Parent/Guardian Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	12,446	4,113	3,043	1,198	2,358	1,734
Surveys Received	57	14	14	6	10	13
Percent Response	0.46%	0.34%	0.46%	0.50%	0.42%	0.75%

Total Parent Responses	57	
	Number	Percent
1 Was the Program easy for you and your child to use?		
Yes	57	100%
No	0	0%
2 Will you continue to use the Kit items after the completion of the Program?		
Yes	56	98%
No	1	2%
3 Would you like to see this Program continued in local schools?		
Yes	57	100%
No	0	0%

Due to rounding of numbers, percentages may not add up to 100%

AM Conservation Group