IDAHO POWER®

DEMAND-SIDE MANAGEMENT

2023 ANNUAL REPORT

SUPPLEMENT 2: **EVALUATION**

MARCH 15, 2024

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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 2023, Idaho Power contracted with ADM Associates and Tetra Tech to conduct program evaluations for the Home Energy Audit (impact and process, ADM Associates), Residential New Construction (impact, Tetra Tech), Shade Tree Project (impact, Tetra Tech), Small Business Direct Install (impact, ADM Associates), and Irrigation Efficiency Rewards (impact, Tetra Tech) programs.

AM Conservation Group conducted a program summary analysis of Student Energy Efficiency Kits and Commercial Energy Savings Kits programs. Harris Utilities conducted a summary analysis for the Home Energy Report Program. The company also conducted internal analyses for the A/C Cool Credit, Flex Peak, and Irrigation Peak Rewards programs.

In 2023, Idaho Power administered 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 2023 Annual Report*, *Supplement 2: Evaluation.*

EVALUATION PLAN

Energy Efficiency 2010–2023 Program Evaluation Plans

Program Evaluation Schedule	2024	2023	2022	2021	2020	2019	2018
Residential Energy Efficiency Programs							
Educational Distributions	I				I/P		
Heating & Cooling Efficiency Program				I/P			
Home Energy Audit		I/P					
Multifamily Energy Efficiency Program							
Rebate Advantage	I/P				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			I
New Construction			I/P			I	
Retrofits			I/P			I	
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	O	I	O	I	O
Flex Peak Program	O	O	O	I/O	O	O	O
Irrigation Peak Rewards	O	O	O	I/O	O	O	O

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

Program not yet in existence:

Program Evaluation Schedule	2017	2016	2015[1]	2014	2013	2012	2011
Residential Energy Efficiency Programs							
Educational Distributions							
Heating & Cooling Efficiency Program	I/P				P	I	
Home Energy Audit	I			P			
Multifamily Energy Savings Program							
Rebate Advantage		I/P					I
Residential Energy Efficiency Education Initiative		O					
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	P						
Custom Projects	P			I/P			I
New Construction	P	I				I	
Retrofits		I			P	I	
Small Business Direct-Install							
Irrigation Energy Efficiency Programs							
Irrigation Efficiency Rewards		I/P		P/O	P/I		
Demand-Response Programs	O						
A/C Cool Credit	O	I	I	O		P	O
Flex Peak Program	O	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:

[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 8, May 10, August 17, and November 8, 2023.

Energy Efficiency Advisory Group (EEAG)
Wednesday, February 8, 2023
Idaho Power CHQ Auditorium

Present:

Alexa Bouvier – Office of Energy & Mineral Resources
Brad Heusinkveld – Idaho Conservation League
Connie Aschenbrenner – Idaho Power
Diego Rivas – Northwest Energy Coalition
Don Strickler – Simplot
Ken Robinette – Community in Action Partnership Association of Idaho
Jim Hall – WaFd Bank
Quentin Nesbitt***** – Idaho Power
Taylor Thomas – Idaho Public Utilities Commission
Tina Jayaweera – Northwest Power & Conservation Council
Wil Gehl – City of Boise

Not Present:

Sid Erwin – Idaho Irrigation Pumpers Association
Nick Sayen – Public Utility Commission of Oregon

Guest and Presenters*:

Andrea Simmonsen – Idaho Power
Annie Meyer***** – Idaho Power
Billie McWinn***** - Idaho Power
Cassie Cormier – WaFd Bank
Chellie Jensen***** - Idaho Power
Cheryl Paoli – Idaho Power
Curtis Willis – Idaho Power
Dahl Bietz – Idaho Power
Denise Humphreys – Idaho Power
Jason Talford – Idaho Public Utilities Commission
Jonathan Guynes – Idaho Power
Julie Rosandick – Idaho Power
Kathy Yi – Idaho Power
Kimberly Bakalars* – Tetra Tech
Krista West – Idaho Power
Laura Conilogue – Idaho Public Utilities Commission
Landon Barber – Idaho Power
Mark Bergum* – Tetra Tech
Michelle Toney – Idaho Power
Mindi Shodeen – Idaho Power
Russ Weedon* – Idaho Power
Shelley Martin – Idaho Power
Sheree Willhite – Idaho Power
Theresa Drake – Idaho Power
Todd Greenwell – Idaho Power
Zack Thompson – Idaho Power

Note Takers: Michelle Toney and Kathy Yi – Idaho Power

Meeting Facilitator: Quentin Nesbitt

9:35 A.M. Announcements—Quentin Nesbitt

Quentin introduced a new member, Ken Robinette. Ken represents Community in Action Partnership Association of Idaho.

9:43 A.M. 2022 Financials & Savings—Quentin Nesbitt

Quentin presented the overall preliminary savings and costs by sector and program for both EE and DR programs for 2022 and showed the history of prior years. He reviewed and updated the group on plans for future evaluations and noted the multifamily program ending, therefore the recommendation is to not evaluate that program in 2023.

<u>Discussion</u>

One member asked if future NEEA savings are included in the Potential Study savings used for the IRP. Quentin answered that they are included, however the Potential Study only considers "known" future codes or standards.

Another member asked what happened in 2013 regarding DR program numbers. Quentin said that at that time the IRP showed the company was surplus on resources. Therefore, the company filed with the commission requesting to suspend 2 of 3 DR programs for the summer of 2013. After holding workshops with interested parties, a settlement was reached to modify the programs starting the following program season, which was approved by the Idaho and Oregon Commissions.

A member pointed out that prior to 2013 there was more capacity in the programs. Quentin explained that in 2012 the incentives were higher and after 2013 the incentives were reduced. The drop in participation was related to the incentive reduction and the lack of marketing the programs.

One member asked if the SBDI impact evaluation turned out positive would Idaho Power change the plans to end the program. Quentin advised the contract is ending and the contractor will not move forward at the current price and a higher price is not cost-effective.

Another member asked if the DR programs will be evaluated externally in 2025 and wants to know the benefits between internal & external evaluations. Quentin answered yes and the benefit is making sure internal evaluations are in line with how an external party would evaluate the programs. Also in the past, third-party evaluators have produced tools as part of the evaluation that Idaho Power has used internally to conduct future review.

9:58 A.M. Residential Programs—Billie McWinn

Billie presented the 2022 highlights, preliminary savings, and participation by program. She then provided specific updates for, Brio (marketplace transformation pilot), the potential Marketplace program, Multifamily, asked for specific feedback on AC Cool Credit marketing, and brought up the potential expansion of the AC Cool Credit program with a smart thermostat option.

<u>Residential Program Savings</u>

One member asked if Home Energy Audits and Weatherization savings were affected by COVID in 2022 as they are barely noticeable on the savings slide. Billie answered it is because these programs have smaller savings overall as compared to the larger programs.

Another member asked if Home Energy Audit program savings are low because of resource constraints due to COVID. Billie responded that the program has caught up with the pipeline of projects left from suspending in-home work during COVID, but the savings are still small.

The member asked why there was a savings increase in the Home Energy Reports program and a decrease in participation. Billie said that even as the participant count decreases due to attrition, the savings per home increases as people continue to get more reports, so the overall savings increases, however the company expects savings to stabilize now as the program is reaching maturation. Denise added that attrition is also sometimes a result of a customer opting out of the program, in which case they would stop getting the report but still be included in the overall savings.

One member asked about why Residential New Construction savings decreased while participation increased. Kathy said that new building code adoptions reduced the savings potential per home.

Brio Market Transformation Pilot

There was discussion about the differences between NEEA and Brio. Billie indicated the main difference is in the target markets. For example, NEEA sees ductless heat pumps as an already-transformed market, but conditions are different in Idaho Power's service area. Idaho Power and Avista hired Brio to take a targeted approach in recognition of the unique conditions in Idaho. The member then asked about how the effort moves the market and how it is measured. Billie answered that the approach is like NEEAs, and a market baseline is established to measure actual sales changes. Quentin added that NEEA looked at the overall northwest regional market. Brio's focus is just on Idaho and is only a pilot. While like the approach NEEA uses, the pilot will determine if another approach could be more effective in Idaho.

Another member asked how the program is different. Billie said that it follows NEEAs model and works upstream. In this case, the primary work has been done with distributors involved in the market.

Marketplace

One member asked how a Marketplace program works and if it is solely online. Billie explained the concept is that a Marketplace program would compare energy savings potential for products while potentially showing Idaho Power rebates. The member then asked about the timing of the new RFP. Billie said the RFP will be sent out soon.

Another member asked if it would drive participation to existing programs. Billie replied that this would be designed as a new program with incentives on products not currently offered. The member then asked if the savings were claimed and how free ridership is handled. Billie said the savings would be claimed based on deemed amounts and incentives would be set with free ridership in mind.

One member asked about the prior Marketplace RFP not meeting the original objectives. Billie replied that through developing the program with the selected vendor, it became clear there were objectives that could not be met.

Multifamily

One member asked about savings opportunities for windows. Billie and Kathy indicated the savings from cooling are low due to the low number of cooling hours in the year. Currently, the summer hours are the highest value hours.

There was a question about whether there are other facilities that could have participated in the now-ended multifamily program. Billie indicated the market had been saturated.

One member asked about the proposed Multifamily program if the assumption for pools is that they have electric heating. Kathy responded that the assumption is the pool has some form of electric heat.

Another member asked about forecasted multifamily building stock, particularly with the percentage that will have electric heating and cooling. Billie responded there are not specific projections yet. The member then asked with the proposed Multifamily program, whether the incentives and the offering would be the same for gas or electric. Billie said the incentives would only be available on electric savings.

A member asked about the modeling of a facility's energy use going forward. Billie responded the company plans to use a deemed savings approach. Quentin said with New Construction it is not possible to compare it to what was there because it is new, whereas with retrofits you know what is there and you can calculate the difference.

Another member asked if the marketing will be targeted to property owners or tenants/residents. Billie answered for retrofits the company works with the owner/operator of the property. For new construction, the engagement is with developers/builders.

One member asked if low-e storm windows are included. Kathy indicated if the RTF had those numbers, those would have been relied on. The member pointed out the RTF focuses on low-rise multifamily facilities. Kathy said these numbers are a blend of both low-rise and high-rise. Under residential code, low-rise is 3 stories or less.

A member asked if self-installs will be considered for retrofits. Chellie answered that installs of certain measures would need to be in accordance with manufacture and industry standards as well as local code authorities. Some measures such as spa covers may be ok for self-installs.

<u>AC Cool Credit</u>

One questioned the lack of participation, noting that though the incentive is important it is lack of knowledge or fear that the home will get too hot, and likes offering a higher incentive. Billie clarified the company does not anticipate increasing the ongoing incentive, just offering a signup incentive for new participants.

Another member asked about the lifespan of AC Cool switches and if the company knows when they fail. Billie answered that the company is aware of them but has not seen an unreasonable number of failures. The member then asked whether the switch is transferred when someone gets a new AC unit. Billie said generally not, a contractor will reinstall the switch.

Another member asked about heat pumps eligibility. Mindi answered that the switches are not always compatible due to complicated control systems on heat pumps.

One member asked if heat pumps have lower savings. Quentin noted heat pumps have the same load in the summer as similar sized AC units.

Another member asked if the company knows how often a switch is updated on new units. Billie replied that the switch stays the same and is only updated if there is known failure.

One member asked what the need is behind extra marketing for AC Cool Credit. Billie answered that the intent is to increase the program capacity and that is achieved by increasing enrollment.

Another member asked if AC Cool Credit is just for electric homes. Billie responded no, but it is for summer air conditioning, which most gas heated homes have.

One member asked if there is a need for increased marketing. Billie said the company plans to keep up the marketing to grow the program and to keep up with natural attrition.

AC Cool Credit – Bring Your Own (smart) Thermostat Option (BYOT)

One member mentioned the DR potential study and how the potential study gave preference to AC Cool Credit potential and therefore the BYOT costs per kW from the study might not fully reflect actual cost assumptions. Quentin commented that this is one of the reasons the company issues a RFP.

11:07 A.M. – Break

11:21 A.M. Commercial, Industrial, & Irrigation Programs—Chellie Jensen

Chellie presented Commercial, Industrial and Irrigation 2022 highlights, preliminary participation, savings, and updates for each program.

Retrofits

One member asked why the kWh savings were up when projects were lower. Chellie answered that the difference is the size of the projects. There were less projects, but some large projects in 2022 caused the overall savings to be higher.

Custom Projects

One member asked if the company is marketing DR programs to those C&I customers that are participating in the custom projects. Chellie indicated the Customer Projects engineers to do combined customer assessments of EE & DR opportunities to help identify DR capabilities that customers may be overlooking.

Commercial Energy Saving Kits (CSK)

One member asked if CSKs were cost effective prior to the savings changes. Kathy responded the largest driver is the installation rates of items in the kits. Based on past survey results on those installations, the program appeared cost-effective, however the evaluation found those installation rates were lower. Also, with the lighting savings going away, cost-effectiveness will be a challenge.

Another member asked if the remaining kits will be distributed before June. Chellie answered the kits are produced as ordered and there is no backlog of inventory.

Campus Cohort

One member said this cohort is a good idea and that many college-aged students may be more responsive participants. Chellie said depending on which type of customers sign up, this can be like our school cohort where students are engaged.

Another member asked if multiple buildings must be in one area or can they be in different cities. Chellie stated this cohort is for where the buildings are in the same area.

Flex Peak

One member then asked with the automated option for Flex Peak how the switches will function and if the company is looking to just turn off or to turn down equipment. Chellie answered that a signal is sent to the device to activate a relay, and it is up to the customer to control their systems. Some customers might integrate the switch to their system with software that initiates a customer's programed load shed sequence.

Another member asked how participants who might participate in the automatic Flex Peak program will differ from irrigation customers. Chellie said that while the device is the same, primarily the incentive structure, baseline and some of the program parameters are different.

12:08 P.M. – Lunch

12:46 P.M. Marketing—Annie Meyer

Annie presented an overview of program marketing. She went over marketing information that has gone out to customers including bill inserts, DR marketing, winter contest, EE tips, what is new in 2023, and what is coming soon (Good Energy).

1:00 P.M. C&I New Construction and Retrofits Evaluations—Tetra Tech, Kimberly Bakalars and Mark Bergum

Kimberly presented the C&I Energy Efficiency Retrofits and New Construction program process evaluation. She discussed program background, market actors, evaluation methodology, process results, and recommendations

Mark presented the C&I Energy Efficiency Retrofits and New Construction program options impact evaluation results and discussed the recommendations by program option. He then wrapped up his presentation with comments on the expected future reduction in lighting savings due to updated codes.

Impact Evaluation New Construction

One member had a question on how baseline code years are selected for each project for the New Construction Program option. Mark answered that that the code used is based on the official building code in place at the beginning of that project's design. The member then asked how the company would move forward or what would happen to the program if the state reduced or removed the code. Quentin answered that this program looks at how far a building exceeds code, if such a code reduction were to happen the company would likely still draw a line that represents the code. The member asked if codes regress, would the company keep the 2018 standards. Quentin said the company would evaluate what to do if that happened. Mark added that other states implement new construction programs where codes are different, and just make their program standards above the code.

1:40 P.M. Education & Outreach with Customers—Russ Weedon

Russ Weedon discussed how Idaho Power engages communities highlighting what the Education and Outreach Energy Advisors roles are. He showed how the team is connecting with the community through energy education with presentations at schools, organizations, and other event participation.

Discussion

One member asked about Idaho Power's clean energy goals. Russ stated the decision for the 2045 goal is broad and will require technological changes to make the goal attainable.

2:12 P.M. Wrap-up/Open Discussion

Member Comments:

The presentations were interesting. Excited to see how things are changing with lighting going away.

Thank you for all your hard work and pushing through these dynamic times. I am looking forward to seeing how things you are working on turn out.

I appreciate everyone's time. It is good to see everyone and meet in person.

It is so nice to be back in person. It feels good to be in a room with people who care. This meeting took time, hard work, with one thing in mind, Idaho Power customers.

I have a huge amount of appreciation for doing things in person you are always easy to work with. Glad to see the presentations. In-person meetings are better, thank you.

It is great to be back. It is so hard for me to do these meetings virtually. We're using those incentives for lighting. It is neat what you are doing in schools.

I enjoy in-person meetings, it is good to be back. I would encourage you to think about greenhouse gases and what impact EE has on that as we get into renewables. Renewables are a dream for everyone.

Sorry I am not there in person. Thank you for accommodating us who are virtual.

We enjoy Idaho Powers quarterly updates its helpful to our operations.

I encourage meetings to be in person. There's better dialog and the level of participation is higher.

Quentin mentioned the plan for the rest of the 2023 meetings are to be virtual. However, we are open to changing that. Our next meeting is May 10th. We had lots of discussion and Idaho Power appreciates the dialogue and questions. We find value in the in-person meetings, but we do have people out of the area. It is not easy for Oregon staff to travel so it is nice to try and find balance.

2:19 P.M. Meeting Adjourned

Energy Efficiency Advisory Group
(EEAG) Wednesday, May 10, 2023
Virtual meeting Via-WebX

Present:

Alexa Bouvier – Office of Energy and Mineral Resources
Brad Heusinkveld – Idaho Conservation League
Connie Aschenbrenner – Idaho Power
Diego Rivas – Northwest Energy Coalition
Don Strickler – Simplot
Wil Gehl – City of Boise
Ken Robinette – Community in Action Partnership Association of Idaho
Peter Kernan – Public Utility Commission of Oregon
Quentin Nesbitt – Idaho Power
Sidney Erwin – Idaho Irrigation Pumpers Association
Taylor Thomas – Idaho Public Utilities Commission
Tina Jayaweera - NW Power & Conservation Council

Not Present:

Jim Hall – WaFd Bank

Guests and Presenters*:

Andee Morton – Idaho Power
Alexis Freeman* – Idaho Power
Annie Meyer* – Idaho Power
Becky Arte Howell – Idaho Power
Billie McWinn* - Idaho Power
Chellie Jensen* - Idaho Power
Cheryl Paoli – Idaho Power
Curtis Willis – Idaho Power
Dahl Bietz – Idaho Power
Denise Humphreys – Idaho Power
Jason Talford – Idaho Public Utilities Commission
Kathy Yi – Idaho Power
Krista West – Idaho Power
Laura Conilogue – Idaho Public Utilities Commission
Landon Barber – Idaho Power
Michelle Toney – Idaho Powe
Nathan Black – Idaho Power
Shelley Martin – Idaho Power
Sheree Willhite – Idaho Power
Ray Short – Idaho Power
Theresa Drake – Idaho Power
Todd Greenwell – Idaho Power

Note Takers:

Michelle Toney (Idaho Power) with Kathy Yi (Idaho Power)

Meeting Facilitator: Quentin Nesbitt

9:35 A.M. Announcements—Quentin Nesbitt

Quentin started the meeting and went over the agenda and then introductions. There were no questions or comments regarding February notes.

Connie mentioned the company filed its annual DSM prudence request in Idaho, on March 15th, along with the DSM report for 2022 program operations. The link to the DSM report is available at idahopower.com.

9:45 A.M. 2023 YTD Financials & Savings—Quentin Nesbitt

Quentin presented the YTD 2023 expenses and savings by program. He discussed the evaluations and went over a change with the impact & process evaluations for the Heating & Cooling Efficiency Program. The company plans to move this impact & process evaluation from 2024 to 2025.

Discussion

One member asked why there were no Process Evaluations for the DR programs. Quentin answered they have been performed, but it was prior to 2018. Quentin mentioned that it is something the company will consider including in 2025 when a third-party Impact Evaluation is planned.

A member asked about the category of "Other Evaluations." Quentin responded that it is to designate that the evaluation was completed internally and not by a third-party.

9:55 A.M. Residential Programs—Billie McWinn

Billie presented the YTD savings, changes, and participation by program. She then provided specific updates for the Heating & Cooling program, the Lighting Buy-down program, Welcome Kits, AC Cool Credit (ACCC) and the new multifamily program exploration.

Discussion

<u>Heating & Cooling Program</u>

One member stated there will be an uptick with Heat Pump applications because of the federal money coming in and asked if the company is tracking that or receiving feedback. Billie responded that the company is tracking trends and availability of those funds.

One member asked if the ductless heat pump (DHP) incentives are different depending on the number of heads. Todd Greenwell answered that the incentive is the same regardless of the number of heads. The member suggested looking at the impact of head counts.

One member asked how much the savings differ on heat pump water heater (HPWH) between retrofits and new construction. Kathy Yi responded that it's complicated because there are so many different application combinations. As an example, the new construction HPWH savings can be up to 10% lower or higher than the similar existing home application, depending on the situation.

One member asked how the company will educate the public about the new federal efficiency standards. Todd Greenwell responded that there is a regionally accepted plan between the old ratings and the new ratings that will be used to assist the public in understanding the new standards and that both the old and new rating requirements are on the incentive program's website and application forms. The member added that there is some questioning about that plan. Todd replied that the plan was to use multipliers created by the Consortium for Energy Efficiency using data from manufacturers who tested products to both the old and new test methods prior to the January 2023 effective date of the new standards. Todd agreed with the EEAG member that the RTF may end up doing additional testing to obtain their own empirical data to potentially tweak those multipliers if necessary.

One member asked if the company has any information on the number of customers in specific areas with propane, oil, or natural gas heating that can be used for marketing the ducted ASHP measure. Kathy answered that the company has end-use data on this, but it is not perfect. Billie stated that in 2020 a probable list of those customers was created, and the company marketed the heat pump incentives directly to about 6,300 customers that likely heat with propane/oil. Billie also mentioned the company can look to refresh that list to be able to market this new incentive level.

Lighting Buydown

One member commented that they appreciate the company's efforts to stay on top of the lighting program changes and making the transition smooth.

Welcome Kits

One member asked if the new kits are cost effective. Billie replied that the kits are not cost-effective, but they are intended to increase energy efficiency knowledge and awareness of Idaho Power incentive programs as an educational item.

AC Cool Credit (ACCC)

One member asked about the marketing plan and suggested increasing the incentive. Billie answered that it is something the company regularly reviews.

One member asked if residential customers could enroll anytime. Billie answered yes.

Bring Your Own Thermostat (BYOT)

One member asked what kind of system and tracking would be in place for BYOT & ACCC overlap. Billie answered that a plan would be created that ensures customers are allowed to participate in one program or the other, but that would not encourage customers to switch programs.

One member thanked the team for looking into BYOT and asked how the energy efficiency incentive for a smart thermostat would be aligned with BYOT participation. Billie said incentives are being evaluated separately because customers can use a smart thermostat regardless of whether they participate in BYOT. Also, the energy efficiency incentive applies to a broader list of manufacturers of smart thermostats that do not offer DR capability.

Another member asked if the BYOT is expected to be a different incentive than ACCC because of the different costs associated with it. Billie answered that the plan would be to offer the same incentive on an annual basis. However, an enrollment incentive for BYOT would likely be offered, whereas the company has not offered the same for ACCC due to the cost of the switch.

One member asked if the company would capture the energy efficiency savings from BYOT participants. Billie answered that energy efficiency savings would be claimed if the customer applied for an incentive through the Heating & Cooling Efficiency (H&CE) program. The company could, however, market both the H&CE program smart thermostat incentive and the DR program incentives together to customers that do not already have a smart thermostat.

One member asked if the company would account for BYOT program opt outs. Billie responded that the vendor would provide data showing the total number of people opting out and this would influence load reduction results.

10:32 A.M. – Break

10:44 A.M. Commercial, Industrial, & Irrigation Programs—Chellie Jensen

Chellie presented year-to-date updates, participation and savings numbers, changes, and challenges for the commercial, industrial, and irrigation programs. She also provided an update on Peak Rewards & Flex Peak enrollment and what actions the company is taking to encourage enrollment.

Discussion

Retrofits

There were several questions related to why the company is proposing to continue to offer the LED screw in incentive through 2024 when in July 2023 people can only buy LEDs. Chellie responded that it is to encourage early replacement of inefficient lighting. Kathy added that the company is adjusting the cost effectiveness to reflect a one-year measure life based on the remaining useful life of the existing, inefficient bulb.

One member asked how the participation is different between TLEDs vs retrofit kits. Chellie replied that the TLEDs do offer an opportunity for a lower cost option. Shelley Martin added that the incentive is structured towards a 'good, better, best' approach with options for TLEDs, kits, and fixtures.

11:30 A.M. Marketing—Annie Meyer & Alexis Freeman

Annie presented Idaho Power's new energy efficiency add campaign that will be used to promote energy efficiency. The new campaign is called "Good Energy" and will replace the "Joulie & Wattson" theme. Annie showed the new commercials associated with the campaign.

Alexis presented an overview of the residential and commercial, industrial & irrigation program marketing. She went over marketing information that has been sent to customers including bill inserts, My Account popups, event participation and DR specific marketing.

There were no questions or comments.

12:00 P.M. – Lunch

1:02 P.M. NEEA Evaluation—Melissa Kosla, Adam Thomas, & Heather Polonsky ADM

Quentin introduced the third-party evaluation completed for the company's participation in the NW Energy Efficiency Alliance (NEEA) and introduced Melissa Kosla, Adam Thomas, Heather Polonsky from ADM who conducted the evaluation.

Melissa presented the overall evaluation approach, showed evaluation results, overall findings, and ADM recommendations.

Discussion

One member asked if the report will be public and if there will be more information on how ADM performed their quantification. Quentin answered yes, it will be a supplement to the company's Idaho prudence filing and will be publicly available at that time.

One member stated one of ADMs conclusions is that the funder share is not appropriate and asked ADM about those conclusions and how does it work to switch to the utility service territory allocation method. Melissa responded that the service territory share allocation is already being done for some other funders, and it is a more accurate representation of energy savings coming back to Idaho.

One member commented that if some funders use service territory allocation and others use funder share allocation then the overall savings will not add up, especially when most do funder share. Melissa agreed and added that NEEA may need to make some adjustments, but ADM was only looking at Idaho and that it would be good issue to bring up with NEEA and understand how that would be handled.

One member asked how the evaluation looked at code and standard improvements that have spillover benefits in other states and how did ADM calculate the impact of that. The member also stated as the market transforms in larger population centers in the west the transformation would then move east. Melissa answered that main factor for quantifying benefits was to use manufacturer sales data to partition the total benefits by state and service territory. If that level of detail is not present in the data, then ADM recommends using another type of allocation but not nesesarily default to funder share. Melissa added, ADM tried to to determine the benefits being accrued in Idaho, specifically for each year, which is a different perspective than what NEEA uses. They assume a more long term effort and aggregate all the benefits and costs for the entire region, ADM was focused on estimating the actual accrued cost and benefits for each year within the state of Idaho.

Adam Thomas added that the suggestions in the evaluation are ultimately to help realign NEEA's reporting to specifically show benefits to Idaho.

One member asked if the market is expected to see a jump at some point from NEEA influence in an EE measure as a percentage of the total market. Melissa said yes and that NEEA wants efforts on measures to hopefully lead to a standard being integrated. She added that the evaluation saw a large percentage of NEEA savings being derived from standards, and the NEEA goal is that standards are incorporated in each state and when that happens, NEEA claims savings from a percentage of sales in that state. The rate of that change is not known, but it is assumed to happen over time, which again highlights the perspective that NEEA uses versus the perspective that utilities use for cost-effectiveness.

One member asked if NEEA's responses to the report will be part of the filing. Connie said that the plan is to incorporate NEEA's feedback into Idaho Power's response for each of the recommendations. Theresa added the company conducted the evaluation through an outside party, which has been what Melissa shared here as she went through the findings and results, it is the responsibility of the company to respond to the commission based on what they asked of us.

1:49 P.M. Wrap-up/Open Discussion

Member Comments:

I really appreciate the information shared and look forward to your updates and seeing what changes are made to the programs and to see those kinds of impacts over the next months. I appreciate everyone's preparation and information.

Thanks for the meeting and I appreciate you bringing in ADM to speak about the NEEA evaluation. I've been curious about it for a while and look forward to what's coming.

I appreciate the meeting today and ADM's presentation, insightful feedback and appreciate everyone's insight. Thank you.

I very much appreciate these EE and DR efforts. They are much more important than what some of the public sees in them. Maybe it's because of my own involvement in many facets of the programs. I may be a little more aware than most, but if we want to keep electric rates reasonable, we need to continue to do important things with stepping up to the plate with both DR and EE.

I look forward to reading through the materials. I was struck by the range of cost effectiveness that came through with NEEA's programs.

I echo those EE and DR effort comments. We are also seeing a rate increase, which with the size of our facility, is quite a bit. So it does help us prioritize looking at ways to save on our side and reduce costs with DR and EE.

Thanks everybody, good meeting. I will also echo those EE and DR comments. It's important the region faces the questions of resource adequacy and reliablitlity and cost.

I am happy to be here and hear from everyone. I realize how important DR is today and going forward. There are strong results from the company so far. I encourage you to see the potential there. As the region maintains both resources and transmission contraints, there is a lot of optimism that the DR programs can grow.

Thank you again for this meeting. I always look forward to these quarterly meetings. I learned quite a bit of information. I want to make a friendly reminder of the federal funding in relation to the Inflation Reduction Act. OEMR is actively speaking to the DOE regarding program implementation which is expected to be released midsummer. So, if you are receiving phone calls, please refer customers to OEMR.

Connie thanked everybody for their advocacy and advisory support towards keeping the programs running.

Quentin thanked everyone for their participation. Stated that the next meeting is August 17th and 4th quarter meeting is November 8th.

2:00 P.M. Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
August 17, 2023

Present

Alexa Bouvier – Office of Energy and Mineral Resources
Brad Heusinkveld – Idaho Conservation League
Connie Aschenbrenner – Idaho Power
Diego Rivas – Northwest Energy Coalition
Jim Hall – WaFd Bank
Ken Robinette – South Central Community Action Partnership
Quentin Nesbitt – Idaho Power
Sidney Irwin – Idaho Irrigation Pumpers Association
Taylor Thomas - Idaho Public Utilities Commission
Wil Gehl – City of Boise Public Works

Not Present

Don Strickler – Simplot
Tina Jayaweera – NW Power & Conservation Council
Peter Kernan – Public Utilities Commission of Oregon

Guests and Presenters*

Amanda Richards – Honeywell
Annie Meyer – Idaho Power
Becky Arte Howell – Idaho Power
Billie McWinn* – Idaho Power
Chellie Jensen* – Idaho Power
Cheryl Paoli – Idaho Power
Chris Pollow – Idaho Power
Curtis Willis – Idaho Power
Dahl Bietz – Idaho Power
Denise Humphreys – Idaho Power
Jared Hansen* – Idaho Power
Jason Talford – Idaho Public Utilities Comm.
Jonathon Guynes – Idaho Power
Julie Rosandick* – Idaho Power
Kathy Yi* – Idaho Power
Krista West – Idaho Power
Laura Conilogue – Idaho Public Utilities Comm
Landon Barber – Idaho Power
Michelle Toney – Idaho Power
Mindi Shodeen – Idaho Power
Nathan Black – Idaho Power
Ray Short – Idaho Power
Shelley Martin – Idaho Power
Theresa Drake – Idaho Power
Todd Greenwell – Idaho Power
Zack Thompson – Idaho Power

Note Takers

Michelle Toney (Idaho Power) with Kathy Yi (Idaho Power)

Meeting Facilitator: Quentin Nesbitt

9:30 A.M. Welcome & Announcements—Quentin Nesbitt

Quentin started the meeting and went over the agenda and introductions. There were no questions or comments regarding the May meeting notes.

One member stated that they have a program with USDA Rural Development and celebrated the 100th energy efficient home and thanked Idaho Power for their support of the celebration.

9:33 A.M. 2023 YTD Financials & Savings—Quentin Nesbitt

Quentin presented the DSM financial, savings and evaluation plans. He discussed the YTD expenses and savings. Quentin then went over the evaluations including the 2024 plans and proposed to add an impact evaluation for Rebate Advantage. Quentin also mentioned NEEA's future business plan and the approval process timeline.

Discussion

<u>Financials</u>

One member asked if the spending level was below average for this time of year. Quentin answered yes, incentives and savings are down, but there are some large projects in the pipeline.

<u>Evaluations</u>

One member stated there are a lot of impact and process evaluations done together for commercial and industrial programs and asked if there is a reason both evaluations are done separately in residential. Quentin said it is preferred to do it simultaneously for cost savings, but if there is not a process change for the program, there is less need to do the process evaluation. The member asked, when evaluations are done together, does one type inform the other. Quentin answered not necessarily, but it could if there is a better process that is identified and gets more participation, then there would be more savings, but the focus of two evaluation types is different.

One member asked if there were evaluations on the weatherization program. Quentin answered that the last evaluation was a billing analysis. The company has little control over operation of the weatherization program, but the company wants to ensure it is claiming the right savings.

One member stated that there is a new state audit tool called ECOS, then mentioned that the problem with weatherization is that it includes everything: windows, doors, insulation, health, and safety, all of which can impact total savings. Quentin added that a billing analysis gives a broad look. The member commented that they are trying to make the home comfortable for the customer, and sometimes that may not result in actual energy savings. Quentin said the billing analysis does not get the value increase to the customer. The member added the value is captured when the quality of life is improved, or kids don't have to go to the hospital because of air quality.

One member suggested an internal review of the weatherization program process because there have been changes to the tool.

NEEA

One member asked if there is any ability for the company to shape the NEEA business plan. Quentin answered that Theresa Drake is on the NEEA board, and her involvement can have an impact, but one person on the board has a limited amount of influence.

One member stated they appreciate the company's participation in NEEA.

Another member said the value of what NEEA brings to the region is important, and it is great to see the company attempting to work with them and encourages the company to keep doing so.

9:54 A.M. Cost Effectiveness/Avoided Costs—Kathy Yi

Kathy provided a preview of the cost effectiveness for each energy efficiency program. She dove deeper into two programs, Heating & Cooling Efficiency and Rebate Advantage programs, and discussed the cost-effectiveness challenges and next steps for the programs. Kathy then discussed avoided costs and how avoided costs are used in cost-effectiveness. She provided a background on the current methodology of using avoided costs from acknowledged IRPs. Kathy presented Idaho Power's plan to change the methodology to using avoided costs from filed IRPs going forward.

Discussion

Weatherization

One member asked if Oregon weatherization was cost-effective. Kathy answered the company does not perform cost-effectiveness on the program in the same manner due to it being a statutory program the company is required to do.

Heating & Cooling Efficiency

One member asked what the plans for future changes are. Kathy listed off the changes, including incentive levels for ducted and ductless heat pumps and heat pump water heaters. The member then asked if these changes would be difficult to roll back. Billie answered these changes were designed in a way that will not set back the program's ability to adapt to future situations.

One member asked if avoided cost impacts the Heating and Cooling program and if the program will remain cost-effective. Kathy said there will be an impact and expects it to be cost-effective in 2024.

One member asked about the interplay between the BRIO pilot on the Ductless Heat Pumps and Heating & Cooling programs. Quentin answered that BRIOs activities have impacted the market and is currently being evaluated as part of the pilot. The member said assessing both programs in tandem would be a good idea because BRIO might be driving some participation.

Rebate Advantage

One member asked why the program is not cost-effective this year, but it is expected to be cost-effective next year. Kathy answered that this is due to new avoided costs from the 2023 IRP.

Avoided Costs

One member asked about what would happen if the IRP is not acknowledged. Quentin said it would depend on why the IRP was not acknowledged. Sometimes, falling back to the previous IRP's numbers could be necessary.

One member asked if the measures with year-round savings will get a boost under the new avoided cost's winter capacity. Kathy answered yes.

One member asked what the peak hours are and associated dollar values. Quentin answered that the hours come from the IRP and represent highest risk or need for energy and that the dollar values for capacity are derived from the alternate capacity resource and that the capacity value is only added to the high-risk hours.

Another member said they expect the capacity value should be more valued in the winter in the Northwest because the region is winter peaking. Therefore, in the summer market purchases win over building new resources. Quentin said the energy price is an output from the IRP analysis and reflects regional costs impacts before the company adds capacity value to certain hours.

One member asked about the winter peak months. Connie answered they are December through February. Quentin added that it is now being thought of as "high need or risk" hours rather than strictly "peak" hours.

One member asked for clarification on the idea that the capacity was shifting and why it is not simply an additive process of new hours. Connie answered that the highest risk hours have been assessed as both adding and shifting to different hours. In particular, given the nature of other resources, the highest risk hours are not necessarily the peak demand hours but the hours when available resources are most strained.

Another member stated they assume winter DR programs are the next step. Quentin said the planning and energy efficiency teams are looking at various options and that the DR potential study from 2022 is being used to guide some of these decisions. Quentin added that one possibility is the previously discussed Bring Your Own Thermostat program (BYOT), which could operate in both summer and winter. He said that water heater programs are also on the radar. He added that one difficulty in assessing these programs is identifying the comparable alternate resources and ensuring that DR resources are being valued properly.

One member asked about the hours shifting and the turn-around/lifecycle of a DR program. For example, if in the next IRP there is a change where winter hours are no longer high risk, possibly due to load or resource changes. Quentin answered that this change to recognizing winter peak has been expected for a while and is believed to be the new nature of the system.

10:48 A.M. – Break

11:00 A.M. Residential Programs—Billie McWinn

Billie presented on the savings & participation for each residential program and updated the group on recent activities with the Market Transformation pilot, the new Multifamily program, AC Cool Credit, and WAQC Re-Weatherization.

Discussion

Residential Program Savings & Participation

One member stated in relation to WAQC that numbers are up, but some contractors still have labor issues. They know they will have additional federal funding soon. The member asked if re-weatherization numbers will be reported separately. Billie said yes, they will be. In relation to Solutions the member said the pipeline of projects is getting smaller. In reference to the Easy Savings HVAC tune-up coupon program, the member said contractors are happy with the payments from the program but that they supported the discontinuation of the distribution of some of the energy savings items because contractors' involvement required them to make an upfront purchase of inventory, and they were taking on the risk of being unable to dispose of that product or the program shutting down.

Home Energy Audit

One member asked if participants would be eligible for federal tax credits. Kathy answered that there is an evaluation this year, and the company has asked the evaluators to see if participation in program qualifies or if the program would need to be altered.

AC Cool Credit

One member is concerned about how expensive it is to market to new customers and install devices. The member would like the company to look at the cost of new switches and push more toward BYOT because the customer has more control. Billie acknowledged that BOYT does give customers more control to opt out of events and alleviates some of the issues with homes getting too warm.

One member said BYOT also sets the company up for winter DR and suggested pushing BYOT sooner rather than later. Billie said BYOT is being evaluated to see if it can be cost effective.

Another member asked if there has been any consideration between older homes and newer subdivisions with more efficient units. Billie noted the program is for demand reduction, not for energy savings and Quentin added that there is a wide diversity of unit sizes within the program, based on the size of the home, and even though efficiency can affect the size of units, there is already a lot of variation in size.

Another member asked if there is any way to run targeted marketing, given that some customers prefer older thermostats and are not interested in smart thermostats. Billie answered that yes, there are ways to target marketing .

One member said surveys are a great way to reach out and raise awareness and become an excellent learning opportunity for customers. Billie agreed, stating the company has seen non-participant surveys cause a spike in participation.

Another member suggested the company work with younger children in schools to market to parents. Billie said the company has student kits and informs school children about company programs.

One member encourages the company to explore the survey idea for customers, then added that BYOT should be less expensive for the company so encourages movement in that direction. Quentin said the cost of the BYOT program is something the company is evaluating. The company has done an RFP and has determined that a BYOT offering is not necessarily less expensive. Even though there are no equipment costs, there are costs associated with the manufacturer and vendor relationships to utilize smart thermostats. He also added that with BYOT, the load reduction is less per participant.

One member commented that they appreciate the company's efforts in trying to get more participation. As for the incentive, the $25 gift card doesn't seem to be working very well. There isn't enough motivation. The member suggested a marketing approach where a customer has the option to put in for a drawing on a big item to win, rather than the $25 enrollment incentive, may encourage additional participation.

<u>WAQC Re-Weatherization</u>

One member stated that they see a $14-16K heat pump cost upgrade from baseboard/ceiling resistance heat to ducted heat. The member added that a serious backlog of homes is already waiting for weatherization. He said that including already-weatherized homes will add to this list. He said that his agency, and likely many others, have only a handful of certified contractors who can do this work. The member asked if the 14 years was a moving target. Billie said technically it could be a rolling 14 years, but the more recent years will not see the same need because more recently heat pumps have become commonplace, so the potential projects are really a finite number of already weatherized homes. .

One member asked how much was spent. Cheryl answered the company has spent $136k so far, and two more are coming in that will bump it to $150k. The member asked if the company would spend most of the carry forward by 2025. Cheryl answered that it depends on the agencies.

11:57 A.M. Marketing—Julie Rosandick

Julie presented the quarterly Energy@Work newsletter for commercial, industrial, and irrigation then discussed the new residential campaign. She went over the summer savings contest, sports sponsorships, upcoming H&C marketing, and active summer EE education.

Discussion

One member asked about the education component, given that the tips are the same every year, and if the company thinks it is getting returns on that messaging over the years. Annie answered that the tips do revolve around seasons. Julie added that the frequency of exposure to the messaging helps. Denise also commented that it is important to have messages out there for when customers are interested. The marketing reaches the customer when they are ready.

Another member asked for more information about sports sponsorships and the Good Energy campaign. Julie said Good Energy is the branded message for energy efficiency for residential customers. Annie added that it will have signage but not as an Idaho Power brand. It is the Good Energy message that promotes energy efficiency.

Another member asked if ads are all the same exact messaging. Julie said the marketing is different depending on the sporting event. Annie added it depends on what type of package the schools present to the company. BSU has a jumbotron for 15-second commercials, and CSI has a banner (signage).

12:03 P.M. – Lunch

1:03 P.M. Integrated Resource Plan Update – Jared Hansen

Jared presented an IRP update highlighting the IRPAC meeting progression and reasons for the IRP extension. He provided the preliminary review of the preferred portfolio, described different scenarios that were reviewed and advised the report will be publicly available on Idaho Power's website.

Discussion

Energy Efficiency Potential

One member asked if this was a base case. Jared answered that energy efficiency is in every portfolio. The energy efficiency numbers were built in as a decrement to the load forecast.

DR Potential

One member asked about Time of Use (TOU) identified in the DR potential study and if it is different than the current TOU program. Connie answered that they are the same, but the potential study modeled an expanded version of a program. She added the company understands there is an opportunity to modify the current TOU structure.

Another member commented about TOU being an optional program that needs quantifying. Quentin answered that the estimated cost and savings is based on regional averages seen by the evaluator. The DR potential study modeled the program based on market prices and capacity-based benefits. Customers could be more attracted to TOU with a larger rate differential in the time periods identified.

One member asked about the technology for the 100-hour storage. Jared answered the technology is still in development and that, currently, the round-trip efficiency of these units is low at around 70%, whereas current four-hour batteries are around 90%.

Another member asked about how the new winter peak needs will impact resource planning. Jared answered that winter planning is a particular focus of this IRP compared to previous IRPs.

One member asked if there was a specific time frame when the winter peak surpasses summer. Jared answered that the forecasted load includes a significant increase in industrial load in the next decade and that both winter and summer loads will continue to grow over the next five to ten years, he added that winter peaks are by nature more difficult to meet due to constrained availability of resources such as solar.

1:23 P.M. Commercial, Industrial, & Irrigation Programs—Chellie Jensen

Chellie presented DR season updates and planned changes to Flex Peak, overall commercial, industrial, and irrigation program performance and updates for quarter two. She then discussed the company's plans for the 2023 training schedule.

Discussion

Flex Peak Proposed Changes

One member asked about the responses to DR marketing. Chellie answered that commercial customers require continued engagement for effective marketing. The program has seen success with having engineers and Key Account Advisors aid with this outreach.

One member asked if the pattern of over-nominating is typical and why these customers weren't more sophisticated. Chellie answered that some do great and turn off equipment to match nominations and other participants load reductions are more challenging to be accurate with their nominations if they are more behavior based, such as raising temperature set points. Jonathon added that it depends on the participant's involvement in monitoring their nomination amount. The member asked if performance is better on larger customers versus smaller customers. Jonathon said it depends more on the customer and type of loads being controlled and how they change nominations as their business changes. They need to notify the company about the change in nomination by Thursday of the preceding week.

One member asked how the proposed incentive method works on a medium participant versus high performance. Chellie answered that the new structure will help provide more fair incentives and encourage participation for the typical participant. There will be little difference under the new structure for participants who are already high performers. Quentin added that the goal is to get people to nominate properly, and this structure still does that.

One member asked if payments would differ based on the season average rather than the per-event average. Quentin answered that the new structure does look at the season as a whole, whereas the current structure looks at weekly performance.

Another member said it might help their organization decide which building to nominate because HVAC is variable and harder to predict. The member asked if it was a big risk not to get that nomination and if there was a way to opt out. Chellie answered yes, they can opt out the week before, so the company can provide an accurate nomination to the Load Serving Operators.

One member asked if there is evidence that the longer a participant is in the program, the nominations become more accurate. Chellie answered anecdotally that it is the case, but largely the customers are participating manually which requires them to initiate action for an event and they might not be able to perform to their nomination on the day of the event for multiple reasons. There is a possibility that a facility manager or responsible party might change even for a long-term or high performing participant and knowledge transfer doesn't happen.

Another member asked if the Flex Peak payment is capped for over-performance and if removing the cap was a consideration in the proposal. Quentin answered that yes over-performance is capped at 120% and removing this cap would eliminate the incentive for a participant to provide a nomination accurately.

2:08 P.M. – Break

2:23 P.M. Office of Energy and Mineral Resources Programs—Alexa Bouvier

Alexa introduced OEMR's mission and focus and then discussed the responsibilities of their staff. Alexa presented OEMR's collaboration with Idaho Strategic Energy Alliance and current programs: State Energy Loan Program, Idaho Awards for Leadership in Energy Efficiency, Government Leading by Example, National Electric Vehicle Infrastructure Program, and Energy Resiliency Grant Program. She then discussed future programs funded by the federal Infrastructure Law and Inflation Reduction Act; K-12 Public School Energy Efficiency Program, Home Efficiency Rebates, and Home Electrification and Appliance Rebates.

Discussion

State Energy Loan Program

One member asked if the application was online. Alexa answered yes, and it is also available by contacting the OEMR office.

One member asked about the interest loan program and how interest rates are set. Alexa answered that applicants can choose between 3%, 5%, or 7% interest rates depending on the payback term.

Government Leading by Example

One member asked who OEMR works with from the University of Idaho's - Integrated Design Lab. Alexa stated they work with Damon Woods, the director of the lab.

K-12 Public School Energy Efficiency Program

One member asked if there is a plan to do new audits or rely on old ones from prior programs. Alexa answered that the audits are 10-15 years old, and they are looking at a way to do both. OEMR is meeting with the Division of Public Safety to see if the updated reports will help them better understand what needs to be addressed. OEMR's objective is to utilize funding directly on the retrofits versus an audit.

Chellie commented that the company has assessments on many buildings and would like to work together. Alexa said that would be great. Their funding is focused on retrofits and making that money last for schools.

One member asked if there was a specific budget and for how long. Alexa said yes there will be a specific budget, but the timeline is unknown. It is still in development.

Energy Resiliency Grant

One member asked if the grant was for the same type of project as loans. Alexa answered yes but focused on immediate needs.

One member said resiliency is hard to measure and asked how that is done. Alexa said they ask for different reports from utilities to get resiliency levels on their proposed projects.

Home Efficiency Rebates

One member asked if the measure was an audit or a deemed measure. Alexa said she believes an audit would support that but will seek clarification.

Home Electrification & Appliance Rebates

One member asked if the money is distributed throughout the state or on a first come or first serve. Alexa answered that it is still up for debate but anticipates the latter.

One member asked if the area's average median income is for counties or communities. Alexa answered that it is based on counties.

One member asked if OEMR plans to add staff as a result of increased funding. Alexa answered that there are four policy analysts; she is one of them, and they are looking to add another. There is also a legal team, a finance team, and a program manager. Each analyst will be issued a program to ensure staff is not overwhelmed.

One member asked if there is a way for 501CS to get involved. Alexa said their outreach is essential, especially in rural areas.

2:58 P.M. Wrap-up/Open Discussion

Member Comments:

I look forward to these meetings and find them highly informative. I appreciate all of your hard work.

I enjoyed the updates and ability to give feedback, it is interesting to look at what is happening with C&I and Demand Response. It will be interesting to see how they evolve over the next year. It just feels like a lot of balls in the air.

For me, I always enjoy these. I get schooled every time I come, a lot of information was shared. These meetings help me connect the dots.

3:05 P.M. Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
November 8, 2023

Present

Alexa Bouvier – Office of Energy and Mineral Resources
Brad Heusinkveld – Idaho Conservation League
Connie Aschenbrenner – Idaho Power
Diego Rivas – Northwest Energy Coalition
Don Strickler – J.R. Simplot
Ken Robinette – South Central Community Action Partnership
Quentin Nesbitt – Idaho Power
Sidney Irwin – Idaho Irrigation Pumpers Association
Jason Talford – Idaho Public Utilities Commission
Wil Gehl – City of Boise Public Works

Not Present

Taylor Thomas - Idaho Public Utilities Commission
Peter Kernan – Public Utilities Commission of Oregon
Jim Hall – WaFd Bank

Guests and Presenters*

Alexis Freeman – Idaho Power
Annie Meyer* – Idaho Power
Becky Arte Howell – Idaho Power
Billie McWinn* – Idaho Power
Bill Trent – Idaho Power
Chellie Jensen* – Idaho Power
Cheryl Paoli – Idaho Power
Chris Pollow – Idaho Power
Curtis Willis – Idaho Power
Dahl Bietz – Idaho Power
Dave Thornton* – Idaho Power
Denise Humphreys – Idaho Power
Jared Hansen – Idaho Power
Kathy Yi* – Idaho Power
Krista West – Idaho Power
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Todd Greenwell – Idaho Power
Zack Thompson – Idaho Powe

Note Takers

Michelle Toney (Idaho Power) with Kathy Yi (Idaho Power) and Landon Barber (Idaho Power)

Meeting Facilitator: Quentin Nesbitt

9:35 A.M. Welcome & Announcements—Quentin Nesbitt

Quentin opened the meeting. There were no questions or comments about the August notes. He recognized Tina Jayaweera's passing and mentioned her significant participation and contributions to EEAG over the years. He then announced Theresa's retirement in early December. Quentin added that he will be replacing Theresa on the NEEA (Northwest Energy Efficiency Alliance) board.

9:40 A.M. 2023 YTD Financials & Savings—Quentin Nesbitt

Quentin presented the DSM (Demand Side Management) financials, savings showing YTD expenses, and savings through September 2023. He then reviewed the evaluations in 2023 and those planned for 2024 for all sectors.

Discussion

One member had a question about expenses changing from Rider to Non-Rider. Quentin answered that the only change expected is labor, which was proposed to be moved from Rider to Rate Base as part of the company's general rate case filing. He noted the company will still track and report costs for program cost-effectiveness.

Another member asked why the ACCC (AC Cool Credit) program costs are funded by both the Rider and Non-Rider O&M. Quentin said the Idaho DR (Demand Response) incentives are paid out of base rates (non-rider) and trued up through the annual PCA. All other program costs beyond incentives are charged to the Rider, such as labor, materials, etc.

One member asked about the special accounting entries. Kathy answered that, in general, they are the annual accruals and reversals.

Another member noted the $54 charge to C&I overheads categorized as O&M. Quentin commented that the company will review and ensure it is correct.

9:52 A.M. Cost-Effectiveness/Avoided Costs—Kathy Yi

Kathy presented a Cost-Effectiveness training refresher. She explained the Company's plan to implement use of the DSM avoided costs from the 2023 IRP (Integrated Resource Plan) and shared impacts of how that change would impact cost-effectiveness evaluation. She then went over the 2024 preview of cost-effectiveness for each of the programs.

Discussion

One member asked about the cumulative lifetime savings and why those are not used for reporting. Kathy explained that cumulative totals are used for the IRP and are included in the potential study. For reporting, only the first-year savings are used.

Another member mentioned the number of years for the stream of benefits and costs and then asked if the discount rate is used to account for inflation or time value of money. Kathy answered that the company uses a discount rate for the benefit side. She explained that the stream of benefits is discounted using the discount rate determined from the weighted average cost of capital for the company and the same number the company uses for other resources in the IRP. As for the cost side, most of the programs have one-time costs that are not ongoing, so there is no cost stream to discount.

One member asked why the avoided costs are projected to decline according to the Aurora outputs in the future. Jared Hansen explained that many renewables are expected to come onto the grid, and they have production tax credits and do not have a fuel component. Models show there will be oversupply at certain times, bringing the overall average cost down. There are many market changes and resource availability factors involved.

The member then asked if costs relating to avoided transmission are contained within avoided costs. Jared said yes, transmission costs are contained within avoided cost values. He said that one key is the kinds of costs you are avoiding depends on what the market looks like, and that is why there can be differences between IRPs.

The member asked if using less means less needed transmission to move energy and if it is a component of avoided costs. Jared responded that we see transmission as necessary to integrate renewables. Even if demand is brought down, there is still a need for added transmission as we transition our energy supply so that energy can be brought in from different areas.

The member questioned why the IRP model projects a jump in avoided costs around 2027. Jared responded that there are some lumpy resource acquisitions, including converting coal resources to natural gas.

Another member asked about the energy efficiency modeling in the IRP. Jared explained that the company modeled buckets of energy efficiency at their associated estimated costs and that Aurora could select those incrementally, and if selected, the savings would continue through the life span of the measures. Quentin added that most of the energy efficiency included in the IRP was subtracted from the initial load forecast, so a lower load forecast was used in the IRP Aurora model. The model could only select additional energy efficiency opportunities not initially deemed cost-effective.

One member asked if the process is using costs levelized over the range of the years or if the company uses the actual number from that year. Kathy answered that there is a table for avoided costs, and the numbers used are for a specific year. Then, it is all added and brought back to today's dollars using the present value calculation.

One member asked if the drop-off in avoided costs starting around 2035 would impact the cost-effectiveness of the DSM programs. Kathy answered that it depends on the measure. Some measures have a shorter measure life, so they will not see the drop-off. Other measures have a long life and are affected.

Another member asked if the company considers carbon emissions because of the energy savings in "Other" benefits and if those are included in the avoided costs. Kathy responded that a carbon cost is embedded in the avoided costs. Jared added that a carbon price adder was used in the IRP. It was added to the fuel cost and starts a few years in, then carries on through the rest of the plan, so it does pass through to avoided costs.

One member asked if "Risk" as in loss of load factor as it pertains to avoided costs, refers to loss of load probability or some other metric. Jared answered that the loss of load expectation was used to determine the block of hours that are the highest risk to serve.

One member asked about the terminology change and if "Peak" is now "High Risk." Quentin answered that terminology has changed recently due to the necessity of accounting for variable resources within the system. What we now consider high-risk or highest cost-to-serve hours are not necessarily during our peak load.

One member asked if the Aurora Model looks at what really happens versus what is predicted and if it does a better job at predicting. Jared answered that this is something utilities are struggling with. There are unexpected weather events and other things that are different from what is seen in the models based on planned conditions. The company developed a separate tool that does a statistical analysis with six historical years of weather and load data.

Another member asked what is considered a holiday on the hourly chart. Kathy answered that holidays are defined in Idaho Power's tariff. Jared clarified that the definition is based on lower energy use on those holidays.

The member then asked why Sundays are not peak when Saturdays are. Quentin answered that this is because system loads related to irrigation and industrial are lower on Sundays.

One member asked if part of the winter risk is due to electric heating. Jared responded that it was not the specific cause. There is now significant growth in industrial load, which has a high load factor that strains demand. Additionally, accounting for an increased portfolio of renewable resources has impacted resource availability.

One member asked if the avoided costs included capacity. Kathy answered yes; capacity costs are added to the avoided cost of energy in high-risk hours starting in the first year of a capacity deficiency.

The member asked if the company has investigated power factor measures that do not strictly save energy but reduce peak load at a site and if incentives are considered. Quentin said it has come up before, and Idaho Power has not paid incentives. Connie added that there is a power factor adjustment in rates for industrial customers who measure less than a 90 percent power factor.

Another member asked, how in the Aroura model, the risk is divided between winter and summer peaks and if the risk comes from other dual-peaking utilities in the region impacting the market. Jared answered that the model does include a regional look. He also clarified that the risk hours are a snapshot and will change over time.

One member asked how the IRP team arrived at the summer to winter risk allocation percentages. Jared indicated it was based on probability of resources not being able to meet load.

One member asked why the peak seasons do not align with the demand response season windows. Quentin answered that the company did look into that, but the difference in dates at the start of the seasons did not have enough risk to justify changes.

11:10 A.M. – Break

11:20 A.M —Theresa's Tenure

Quentin, Billie, and Chellie did a presentation honoring Theresa's time and contributions to the company's customers through her work supporting energy efficiency and demand response.

11:28 A.M. Residential Programs—Billie McWinn

Billie presented the residential programs' savings and participation. She also went into specific detailed updates on the Marketplace program investigation, Market Transformation Pilot results, and the Multifamily program launch.

Discussion

Shade Tree

One member asked about the shade tree program not being in the participation change table from 2022 to 2023. Billie answered that it was removed because the savings were unavailable, but she will consider including the participation or total tree count in the future. Kathy explained that shade tree savings start when the trees get a little older, so current participation does not relate to current savings.

Marketplace

One member asked if any Marketplace program vendors meet all the criteria that the company is looking for. Billie answered that they are not.

One member asked which criteria were most difficult for current Marketplace vendors to offer. Billie answered that the most challenging requirement was for the vendor to accommodate local retailers.

Market Transformation Pilot

One member asked if it had been decided if some version of the Ductless Heat Pump (DHP) pilot would continue. Billie answered that no decision had been made, and the results were still being examined.

The member then asked if there is still potential for DHP adoption in the area as it is not saturated. Todd Greenwell answered that the current market saturation is extremely low and there is room for expansion.

Multifamily

One member asked what the expected timeline is for the multifamily program. Billie answered that the program is fully launched, but participation will take time. Kathy added that the company is anticipating a significant lag between application time and project completion dates since it's expected that most participation will be in New Construction.

11:51 A.M. DR Response—Quentin Nesbitt, Chellie Jensen, & Billie McWinn

Quentin, Chellie, and Billie presented the DR Response Season Wrap-Up, including the C&I Flex Peak program, residential AC Cool Credit, and Irrigation Peak Rewards season results. The presentation included events, participation, max capacity and performance, and then concluded with a look to the future for DR.

Discussion

One member asked why AC Cool Credit does not run on Saturdays. Quentin answered that the program rules do not include Saturdays, because the system need is typically lower, and with residential AC, the company determined if Saturdays were included it would jeopardize customer enrollment.

One member commented on the consistent savings for Irrigation Peak Rewards and then asked if there were any differences between the dispatch groups. Quentin replied that the program intentionally tries to balance the groups to have similar reduction potential. Chellie added that each group is typically a different region, except group D.

One member asked if the DR programs look at the avoided energy amount instead of just capacity and compare it to the market price. Quentin responded that the company has looked at this in the past; the energy value has been small, and the value is in the avoided capacity.

Another member commented that there is a long-term value. The short-term value of DR is difficult to quantify because it is the last marginal resource that exists for avoiding inherently rare peak events.

One member said that sometimes industrial DR event reductions are difficult to quantify. The incentive structure is complex to follow. Quentin agreed and responded that we have filed for changes to the program that will make it simpler to understand.

12:15 P.M. – Lunch

1:00 P.M. Commercial, Industrial, & Irrigation Programs—Chellie Jensen

Chellie presented the overall commercial, industrial, and irrigation energy efficiency program savings and participation through the third quarter of the year. She also highlighted individual program activities and trainings.

Discussion

Cohorts

One member asked if there are specific industries that struggle to find energy savings. Chellie answered that it depends more on the facility than the industry.

The member then asked if any facilities had left the cohort due to needing help to implement the energy changes. Chellie answered that some facilities have left due to time commitment issues or having achieved all reasonable energy goals.

The member then asked how long customers stay in the cohorts. Chellie answered that some stay five years, others one year. Chellie added that Idaho Power uses a one-year measure life.

One member asked if the program would quantify the energy savings of a non-energy measure, such as wastewater reduction, by ten percent. Chellie responded that a production normalized energy model looks at the cumulative energy savings from any change, or we look at bottoms-up energy calculations or energy intensity. For instance, if a participant gets their water from the city and if they reduce water use, they save wastewater pumping energy. If they provide their water from wells, saving water would save on water production energy. Reducing water may or may not reduce loading on the wastewater plant's aeration system, but we could include it if it does.

One member asked if there is any cap on the size of a cohort. Chellie responded that there is no cap; however, an ideal size is typically six or seven participants, but some cohorts have been as large as 16.

Another member commented about the incentive covering all the costs, and they liked the savings. The member questioned that if there is an electric boiler, there are additional gas savings that would not be included in the kWh savings number.

The member also inquired if the company or consultants do the tune-ups. Chellie responded that the company offers a detailed assessment to determine and quantify the opportunity, and a third party does the tune-up. She added that the company engages with several professional energy-efficiency firms.

The member then commented on the benefit of trainings, after attending the refrigeration training, and said he received emails from other employees asking about ways they can save.

1:36 P.M. Marketing—Annie Meyer

Annie presented the marketing overview for all sectors. She showed how the company celebrated Energy Awareness month in October and the awareness campaign ads that will run through November. Annie then went over the updates for the fall efficiency guide and discussed the success of the Shade Tree event and the Multifamily program marketing tactics. She presented Energy@Work and shared a commercial customer success story.

Discussion

One member asked if customers could still check out or rent the Kill A-Watt Meters at the library. Annie responded that customers can check them out.

1:44 P.M. Energy Advisor Presentation—Dave Thornton

Dave presented the role of the company's Energy Advisors and their approach, who they are, who they work with, and how they help customers.

2:05 P.M. Wrap-up/Open Discussion

Member Comments

Thank you, everyone. It was a great meeting. I appreciate the informative numbers.

I like the format of doing in-person meetings along with an online meeting. The programs are working great and are well managed. I look forward to seeing how those go in the future. I want to address the impact of rate changes by the company and across the state.

Thank you for the meeting. I also appreciate the numbers. It is an interesting time with a lot of added information coming in.

I look forward to these meetings and am interested in more details on the stacked incentive information from Billie's presentation. Hearing the advisors are out there and talking to customers is encouraging. The lack of customer knowledge is vast.

Great meeting! I do prefer the in-person meeting. Congratulations Theresa.

Thank you, everyone, for the time and preparation that went into the meeting. The changes in the IRP results, particularly the emerging dual peak, will present interesting challenges in the future.

I like the format of in-person meetings and the option to join in remotely. Thanks for your hard work and diving into the nitty gritty of numbers. Making energy efficiency work in the new world, we are transitioning to.

Thank you, Theresa, for your efforts over the years. I have also heard many accounts from people whom suppliers have misled. I have also been approached by about half a dozen older people who were told that if they installed rooftop solar, they would get a tax incentive, but they have no income.

Thank you for the participation.

2:15 P.M. Meeting Adjourned

NEEA MARKET EFFECTS EVALUATIONS

Report Title	Sector	Analysis Performed By	Study Manager
2015 Battery Charger Standard Evaluation for NEEA's Non-Adoptive States	Residential	TRC Energy Services	NEEA
2022 Luminaire Level Lighting Controls Incremental Cost Study	Commercial	Energy Solutions	NEEA
2022 Review of Key Assumptions for Luminaire Level Lighting Controls	Commercial	Cadmus Group	NEEA
Assessment of NEEA's Approach to the Evaluation of Market Transformation Programs	Residential and Commercial	Pointed Arrows Consulting	NEEA
Central Heat Pump Water Heaters for Multifamily Supply-Side Assessment Study	Residential	New Buildings Institute	NEEA
Commercial Secondary Windows Field Observations and Decision-Maker Interviews Report	Commercial	Energy 350	NEEA
Commercial Secondary Windows Field Test	Commercial	Energy 350	NEEA
Commercial-Sector Adjustable-Speed Drive Market Research Study	Commercial	Johnson Consulting Group	NEEA
Cost Benefit Model Analysis for Heat Pump Water Heaters	Residential	Larson Energy Consultant	NEEA
CSA EXP07: Ongoing Progress, Lessons Learned, and Future Work in Load-based Testing of Residential Heat Pumps	Residential	Purdue University	NEEA
Draft 2025-2029 NEEA Strategic + Business Plans	Residential and Commercial	NEEA	NEEA
Dual Fuel and Gas Heat Pump Market Research	Residential	Lieberman Research Group	NEEA
Ductless Heat Pumps 2022 Long-Term Monitoring and Tracking Report	Residential	Johnson Consulting Group	NEEA
Extended Motor Products Variable Load Baseline and Constant-Load to Variable Load Savings Key Assumptions Review	Commercial	Apex Analytics	NEEA
Fan Manufacturer Regional Market Share Research	Commercial	DNV Energy Insights	NEEA
Heat Pump Water Heater Market Progress Evaluation Report #7	Residential	NMR Group	NEEA
Heat Pump Water Heater Market Research: Challenging Installations Scenarios	Residential	Optimized Thermal Systems	NEEA
High-Performance Windows Baseline Review	Residential	Cadmus Group	NEEA
Hydrogen-Ready Appliances Assessment Report	Residential	Cadeo Group	NEEA
Luminaire Level Lighting Controls: Market Progress Evaluation Report #2	Commercial	Cadmus Group	NEEA
Manufactured Homes Transition Market Progress Evaluation Report	Residential	Apex Analytics	NEEA
Modulating Gas Valve for Commercial Dryer Study	Residential	GTI Energy	NEEA
NEEA 2024 Operations Plan	Residential and Commercial	NEEA	NEEA

Report Title	Sector	Analysis Performed By	Study Manager
NEEA Dryer Test Procedure Version 2.0 – Summary of Changes and Rationale	Residential	Kannah Consulting	NEEA
NEEA Energy Efficiency Test Procedure for Residential Clothes Dryers	Residential	NEEA	NEEA
NEEA Q1 2023 Quarterly Report	Residential and Commercial	NEEA	NEEA
NEEA Q4 2022 Codes, Standards and New Construction Newsletter	Residential	NEEA	NEEA
NEEA Q4 2022 Market Progress Report	Residential and Commercial	NEEA	NEEA
NEEA Q4 2022 Quarterly Report	Residential and Commercial	NEEA	NEEA
Oregon and Washington High CRI Bulb and Commercial Kitchen Equipment State Standards Evaluations	Residential	Michaels Energy	NEEA
Prosaris Compressed Air Leak Detection Initial Field Tests	Commercial	Energy 350	NEEA
Q1 2023 Codes, Standards and New Construction Newsletter	Residential and Commercial	NEEA	NEEA
Q1 2023 Emerging Technology Newsletter	Residential and Commercial	NEEA	NEEA
Q1 2023 Market Progress Report	Residential and Commercial	NEEA	NEEA
Q1 2023 Market Research and Evaluation Newsletter	Residential and Commercial	NEEA	NEEA
Q2 2023 Codes, Standards and New Construction Newsletter	Residential and Commercial	NEEA	NEEA
Q2 2023 Emerging Technology Newsletter	Residential and Commercial	NEEA	NEEA
Q2 2023 Market Progress Report	Residential and Commercial	NEEA	NEEA
Q2 2023 Market Research and Evaluation Newsletter	Residential and Commercial	NEEA	NEEA
Q2 2023 Quarterly Report	Residential and Commercial	NEEA	NEEA
Q3 2023 Codes, Standards and New Construction Newsletter	Residential	NEEA	NEEA
Q3 2023 Emerging Technology Newsletter	Residential and Commercial	NEEA	NEEA
Q3 2023 Market Progress Report	Residential and Commercial	NEEA	NEEA
Q3 2023 Market Research and Evaluation Quarterly Newsletter	Residential and Commercial	NEEA	NEEA
Q3 2023 Quarterly Report	Residential and Commercial	NEEA	NEEA
Q4 2022 Emerging Technology Newsletter	Residential and Commercial	NEEA	NEEA

Report Title	Sector	Analysis Performed By	Study Manager
Q4 2023 Emerging Technology Newsletter	Residential and Commercial	NEEA	NEEA
Q4 2023 Market Research and Evaluation Newsletter	Residential and Commercial	NEEA	NEEA
Retail Product Portfolio Market Progress Evaluation Report #2	Residential	TRC Engineers	NEEA
Study of High-Performance Windows Incremental Manufacturing Cost	Residential	Stephan Selkowitz Consultants	NEEA
Variable Speed Heat Pump Baseline and Key Assumptions Review	Residential	Cadmus Group	NEEA
Washington Residential Code Evaluation	Residential	TRC	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
2023 Task 1: Foundational Services—Summary of Projects	Commercial	IDL	Idaho Power	Assistance and Education
2023Task 2: Lunch and Learn—Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	Training and Education
2023 Task 3: BSUG—Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	Training and Education
2023 Task 5: Energy Resource Library—Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	Assistance and Education
2023 Task 7: Fan Savings from UV Lamps	Commercial	IDL	Idaho Power	Research
2023 Task 8: Digital Design Tools—Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	Research

2023 Task 1: Foundational Services

Summary of Projects

Idaho Power Company External Year-End Report

January 15, 2024

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 2023_001-01

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Prepared for:
Idaho Power Company

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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 2023 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

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

2. Project Summary

The IDL worked on over 18 Foundational Service projects in 2023. Projects ranged from commercial to municipal and the IDL worked with both architecture and engineering firms within Idaho Power Service territory. Most project intake came through a phone call or email to the IDL. A tab is also available on the IDL website for people to submit requests for technical support through the foundational services program.

Projects consisted of email responses, personal trainings, technical reports, and memos. In total, there were 15 Phase I projects, three Phase II projects, and zero Phase III projects. The full list of projects is shown in Table 1 below.

Table 1: Summary of 2023 Foundational Services Projects

Type	Phase	Notes	Retro/New	Ft2	Location
Office	1	Load diversification	New	32,000	Boise
Warehouse	1	Roof membrane savings	Retro	100,000	Twin Falls
Retail	1	Refrigeration control optimization	Retro	500	Meridian
Education	1	Commissioning luminaire level lighting controls	Retro	54,700	Boise
Office	2	Design charette for daylighting and HVAC efficiency options	New	20,000	Boise
Commercial	1	Energy benchmarking assistance	Retro	NA	Boise
Education	1	Insulation dewpoint investigation	Retro	25,000	Pocatello
Mixed-Use	1	Energy efficiency certification roadmap	New	50,000	Pocatello
Healthcare	1	Quantifying air filter savings from new design	Retro	75,000	Boise
Education	1	Energy audit and walkthrough	Retro	30,000	Midvale
Office	1	Luminaire Level Lighting Control commissioning	New	NA	Nampa
Education	1	Energy audit and walkthrough	Retro	29,313	Cambridge
Commercial	1	Literature review on commercial infiltration assumptions for load sizing	New	NA	NA
Commercial	2	Identify potential energy saving features in hospitality projects	New	45,668	Jerome
Civic	2	Minimizing operational energy and help identifying annual energy baseline	New	12,000	Ketchum
Commercial	1	Technical assistance for energy modeling	New	NA	Boise
Commercial	1	Ground loop design assistance	New	74,000	Star
Civic/education	1	Estimating savings from EE upgrades across a campus of buildings	Retro	NA	Idaho

2023 Task 2: Lunch and Learn

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 22, 2023

Prepared for:
Idaho Power Company

Authors:
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Report Number: 2023_002-01

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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. 2023 SUMMARY AND CUMULATIVE ANALYSIS

Table 1: 2023 Lunch and Learn Summary

	Date	Title	Presenter	Group / Location	Attendees
1	4/20	The Architect's Business Case for Energy Performance Modeling	Dylan	AO1	2
2	5/25	Luminaire Level Lighting Controls	Dylan	OS1	5
3	5/31	Future of Lighting Controls	Dylan	EF1	9
4	6/14	HVAC Load Calculations – Tips & Tricks	Damon	EF1	11
5	6/20	The Architect's Business Case for Energy Performance Modeling	Dylan	AF1	8
6	7/19	Daylighting Multipliers – Increasing Daylighting Harvesting Efficiency	Dylan	AF2	18
7	8/30	Luminaire Level Lighting Controls	Dylan	EF1	13
8	8/31	ASHRAE Standard 209 Energy Modeling	Damon	AF1	8
9	9/13	High Performance Classrooms	Damon	AF2	10
10	9/14	Air Infiltration and Passive Systems	Damon	EF2	7
11	9/27	Daylighting Multipliers – Increasing Daylight Harvesting Efficiency	Dylan	AF3	6
12	10/4	The Architect's Business Case for Energy Performance Modeling	Dylan	AF3	5
13	10/11	High Performance Classrooms	Damon	AF4	6
14	10/12	HVAC load Calculations – Tips & Tricks	Damon	EF2	9
15	11/17	ASHRAE Standard 209 Energy Modeling	Damon	EF3	13
16	11/28	Air Infiltration and Passive Systems	Damon	AF5	8
17	11/29	High Performance Classrooms	Damon	SO1	12
18	12/06	The Architect's Business Case for Energy Performance Modeling	Dylan	SO1	10
19	12/12	Air Infiltration and Passive Systems	Damon	AF6	7
20	12/14	The Architect's Business Case for Energy Performance Modeling	Dylan	AF4	5
				Total Attendees	172

Table 1 on the previous page summarizes all Lunch and Learn presentations given in 2023. The statistics in this section are cumulative for the 20 presentations. At each presentation participants were asked to sign in and fill out an evaluation form. Presentations were judged on a scale of 1 to 5, (see table 2). All lunch and learn presentations given in 2023 were in-person presentations.

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:	79	Electrician:	0
Engineer:	33	Contractor:	0
Mech. Engineer:	9	Other:	32
Elec. Engineer:	0	None Specified:	18
Total (In-Person):	165		
Total (Online):	7		

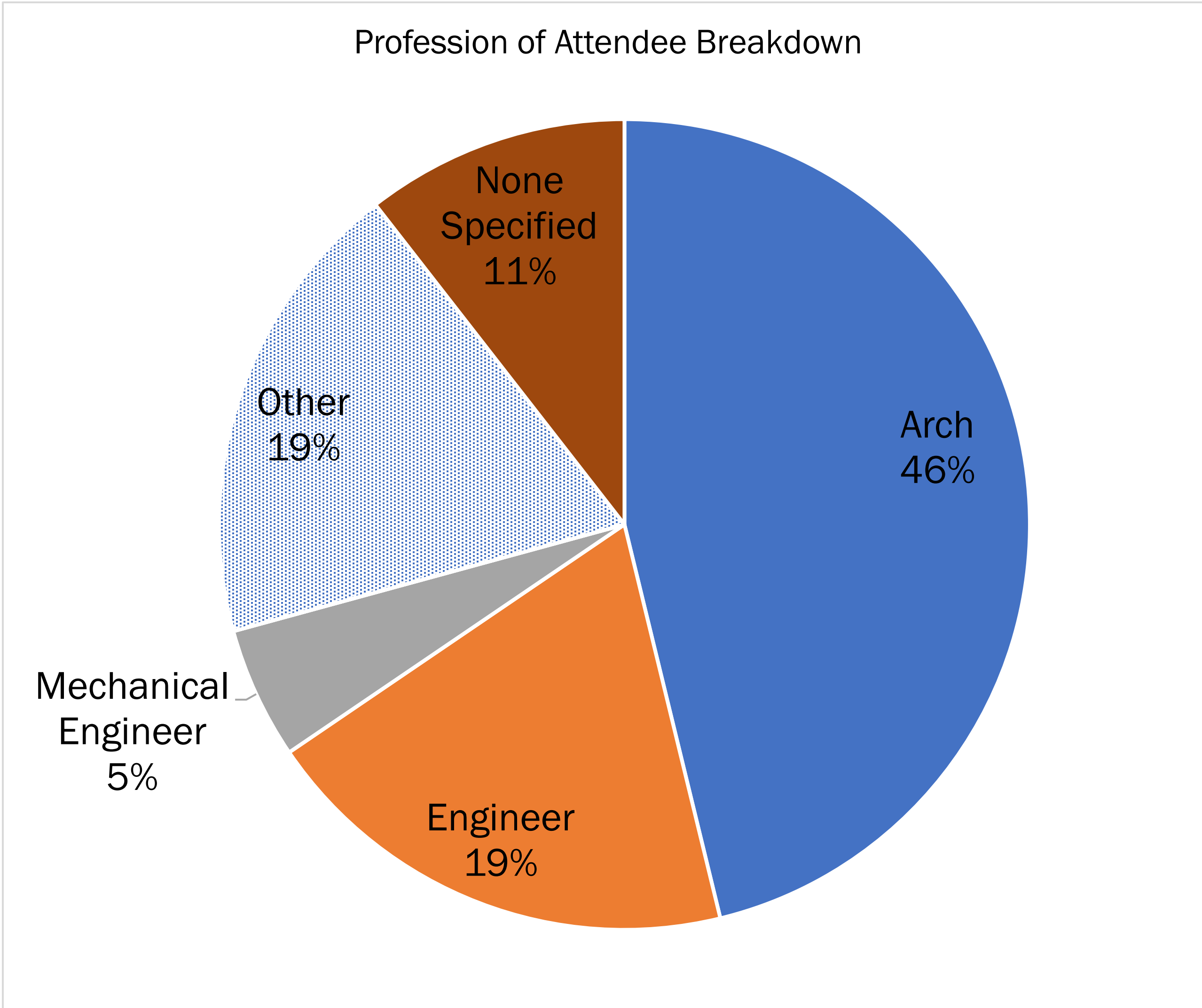

Figure 1: Attendee Profession

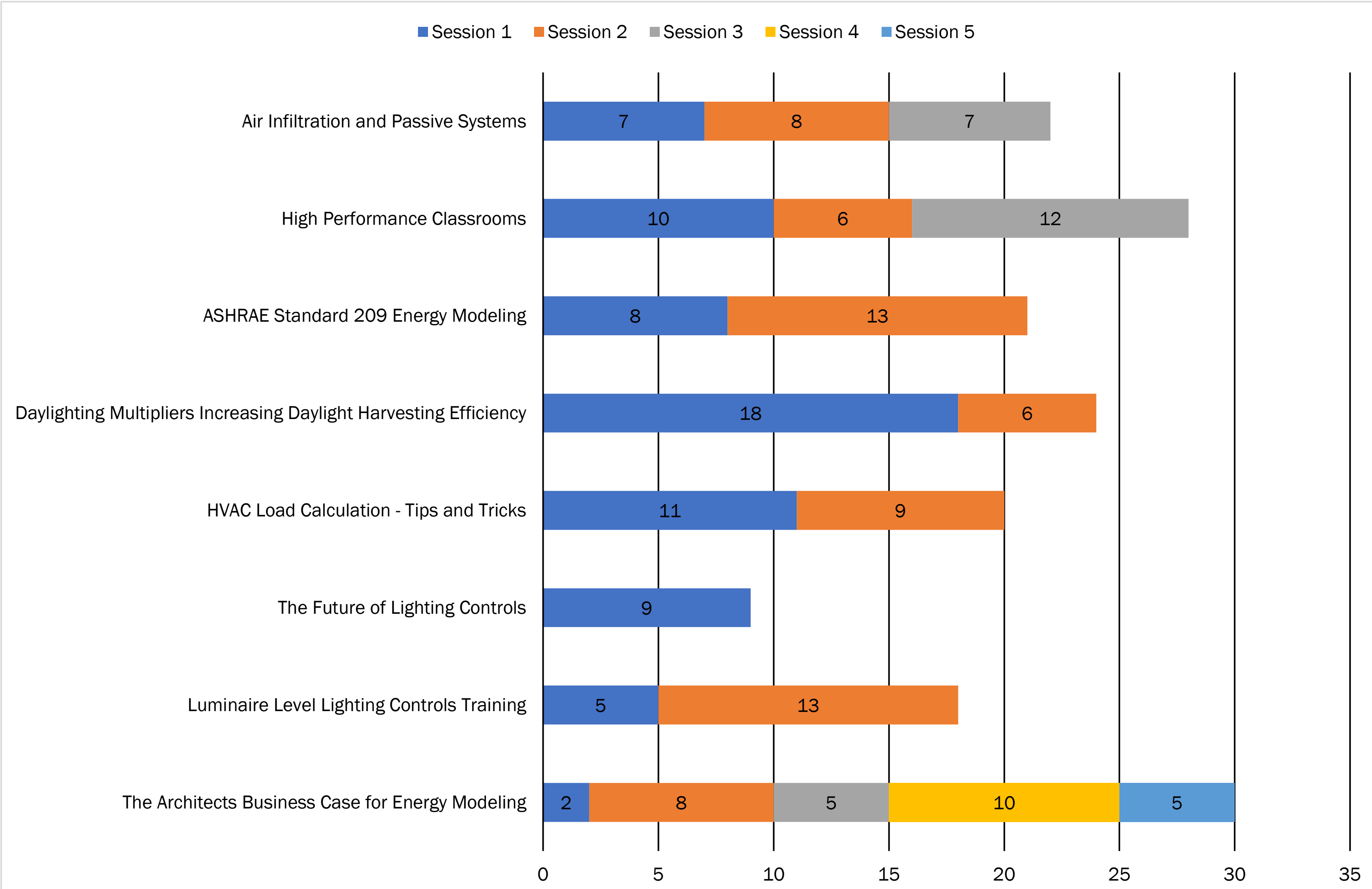

Figure 2: Attendee Count by Title and Number per Session

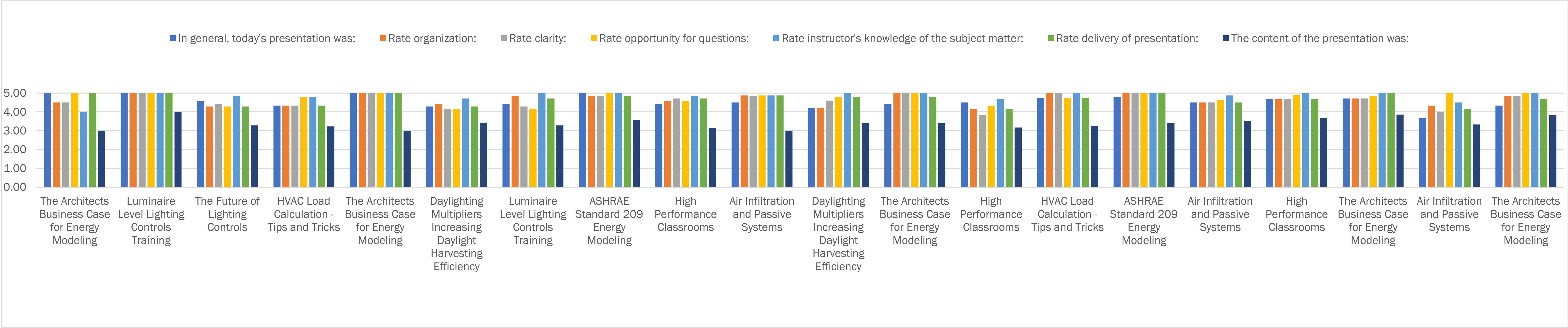

Figure 3: Average Evaluations by Session Title

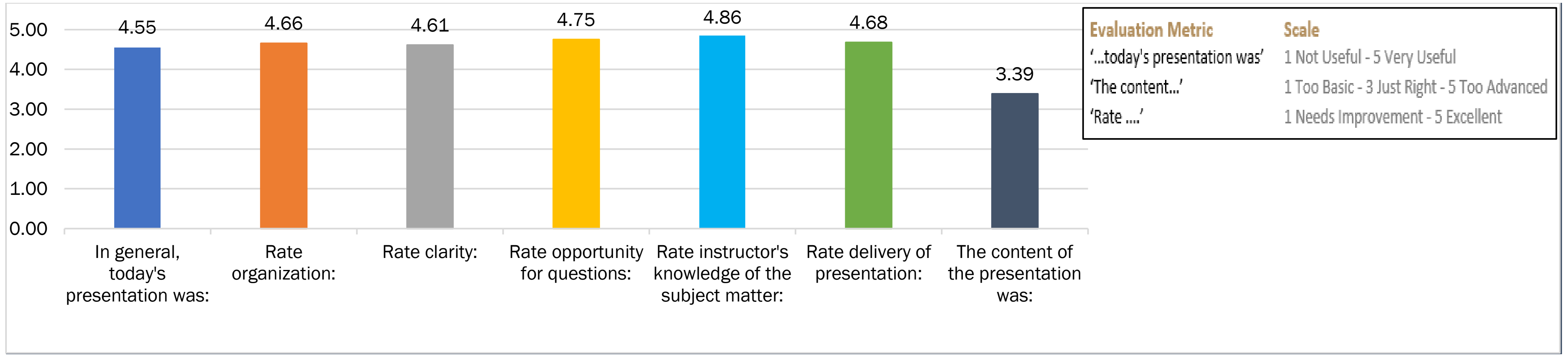

Figure 4: Overall Averages of Evaluations for all Sessions

2. SESSION SUMMARIES

After each lunch and learn session, an evaluation form was handed out to participants. 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: THE ARCHITECTS BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (04/20/2023)

Title: The Architects 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 with 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 avocation for energy performance modeling.

Presentation Info:

Date:	04/20/23
Location:	A01 – Pocatello, ID
Presenter:	Dylan Agnes

Attendance:

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

2.2 SESSION 2: LUMINAIRE LEVEL LIGHTING CONTROLS (05/25/2023)

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 the 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:	05/25/23
Location:	OS1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		*Other:	4
Elec. Engineer:		None Specified:	1
Total (In-person):	5		
*Other included:	Property director, Property manager, Manager, Boise electric		

2.3 SESSION 3: THE FUTURE OF LIGHTING CONTROLS (05/31/2023)

Title: The Future of Lighting Controls

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

Presentation Info:

Date:	05/31/23
Location:	EF1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:		Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		*Other:	8
Elec. Engineer:		None Specified:	
Total (In-Person):	9		
*Other included:	Electrical designer (x8).		

2.4 SESSION 4: HVAC LOAD CALCULATIONS – TIPS & TRICKS (06/14/2023)

Title: HVAC Load Calculations – Tips & Tricks

Description: Load calculations are one of the key logistics to designing a high performing building. But, how does one capture the nuance of today's post-covid hybrid office environments? What about conference rooms that are full in the mornings, but empty in the afternoons? For those in the Treasure Valley, ASHRAE's design temperatures have changed – we have hotter summers and milder winters than 20 years ago. The IDL will share updated weather data sources and several load calculation tools freely available to engineers. Participants will learn the distinction between ASHRAE's different load calculation methods – (90.1 vs 183). The lecture will cover how to use energy modeling tools to predict loads in different scenarios and apply ASHRAE 55's thermal comfort standard during the design process. Practitioners will be able to use these tools to add dynamic loads to their designs and conduct robust post-occupancy evaluations to ensure energy efficient operation and client satisfaction.

Presentation Info:

Date:	06/14/23
Location:	EF1 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	7	Contractor:	
Mech. Engineer:		*Other:	3
Elec. Engineer:		None Specified:	1
Total (In-Person):	11		
*Other included:	Drafter (x3)		

2.5 SESSION 5: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (06/20/2023)

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 with 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 avocation for energy performance modeling.

Presentation Info:

Date:	06/20/23
Location:	AF1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

2.6 SESSION 6: DAYLIGHTING MULTIPLIERS (07/19/2023)

Title: Daylighting Multipliers

Description: This session will explore the role that daylighting multipliers are used when trying to increase the efficiency of daylighting or daylight harvesting in a building, such as, light shelves, manufactured glazing, and material specification. Furthermore, we will explore the rate of return, the ranges of efficiency, and appropriate uses between daylighting strategies and multipliers.

Presentation Info:

Date:	07/19/23
Location:	AF2 - Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	12	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		*Other:	6
Elec. Engineer:		None Specified:	
Total (In-Person):	**18**		
*Other included:	Interior Designer (x4), Office manager, Market manager.		

2.7 SESSION 7: LUMINAIRE LEVEL LIGHTING CONTROLS (08/30/2023)

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:	08/30/23
Location:	EF1 - Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:		Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		*Other:	7
Elec. Engineer:		None Specified:	
Total (In-Person):	**8**		
*Other included:	Electrical Designer (x7)		

2.8 SESSION 8: ASHRAE STANDARD 209 ENERGY MODELING (08/31/2023)

Title: ASHRAE Standard 209 Energy Modeling

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:	08/31/23
Location:	AF1 – Boise, ID

Presenter:	Damon Woods		

Attendance:

Architect:	12	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**13**		

2.9 SESSION 9: HIGH PERFORMANCE CLASSROOMS (09/13/2023)

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:	09/13/23
Location:	AF2 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	8	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	2
Total (In-Person):	**10**		

2.10 SESSION 10: AIR INFILTRATION AND PASSIVE SYSTEMS (09/14/2023)

Title: Air Infiltration and Passive Systems

Description: Each year, $11 billion in energy costs are wasted through infiltration in commercial buildings according to a 2021 study from the Department of Energy. Learn how envelope design affects both comfort and energy costs in Idaho's buildings. Participants will learn about pressure management and using it to design for passive strategies including stack and cross-ventilation and some of the inherent challenges of doing so. The lecture will cover why infiltration is especially important to manage in Idaho due to the health impacts of wildfire smoke, which can infiltrate a leaky building. The main takeaway is to design buildings that deliver clean filtered air to the occupants in a way that minimizes utility costs and maximizes comfort.

Presentation Info:

Date:	09/14/23
Location:	EF2 – Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	2
Total (In-Person):	7		

2.11 SESSION 11: DAYLIGHTING MULTIPLIERS (09/27/2023)

Title: Daylighting Multipliers

Description: This session will explore the role that daylighting multipliers are used when trying to increase the efficiency of daylighting or daylight harvesting in a building, such as, light shelves, manufactured glazing, and material specification. Furthermore, we will explore the rate of return, the ranges of efficiency, and appropriate uses between daylighting strategies and multipliers.

Presentation Info:

Date:	09/27/23
Location:	AF3 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

2.12 SESSION 12: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (10/04/2023)

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 with 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 avocation for energy performance modeling.

Presentation Info:

Date:	10/04/23
Location:	AF3 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

2.13 SESSION 13: HIGH PERFORMANCE CLASSROOMS (10/11/2023)

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:	10/11/23
Location:	AF4 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	4	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		*Other:	1

Elec. Engineer:		None Specified:	
Total (In-Person):	6		
*Other included:	Project manager.		

2.14 SESSION 14: HVAC LOAD CALCULATIONS – TIPS & TRICKS (10/12/2023)

Title: HVAC Load Calculations – Tips & Tricks

Description: Load calculations are one of the key logistics to designing a high performing building. But, how does one capture the nuance of today's post-covid hybrid office environments? What about conference rooms that are full in the mornings, but empty in the afternoons? For those in the Treasure Valley, ASHRAE's design temperatures have changed – we have hotter summers and milder winters than 20 years ago. The IDL will share updated weather data sources and several load calculation tools freely available to engineers. Participants will learn the distinction between ASHRAE's different load calculation methods – (90.1 vs 183). The lecture will cover how to use energy modeling tools to predict loads in different scenarios and apply ASHRAE 55's thermal comfort standard during the design process. Practitioners will be able to use these tools to add dynamic loads to their designs and conduct robust post-occupancy evaluations to ensure energy efficient operation and client satisfaction.

Presentation Info:

Date:	10/12/23
Location:	EF2 – Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	
Total (In-Person):	9		
*Other included:	Designer.		

2.15 SESSION 15: ASHRAE STANDARD 209 ENERGY MODELING (11/17/2023)

Title: ASHRAE Standard 209 Energy Modeling

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:	11/17/23
Location:	EF3 – Nampa, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		*Other:	5
Elec. Engineer:		None Specified:	7
Total (In-Person):	6		
Total (Online):	7		

*Other included: Estimator, Division Manager (x3), Designer.

2.16 SESSION 16: AIR INFILTRATION AND PASSIVE SYSTEMS (11/28/2023)

Title: Air Infiltration and Passive Systems

Description: Each year, $11 billion in energy costs are wasted through infiltration in commercial buildings according to a 2021 study from the Department of Energy. Learn how envelope design affects both comfort and energy costs in Idaho's buildings. Participants will learn about pressure management and using it to design for passive strategies including stack and cross-ventilation and some of the inherent challenges of doing so. The lecture will cover why infiltration is especially important to manage in Idaho due to the health impacts of wildfire smoke, which can infiltrate a leaky building. The main takeaway is to design buildings that deliver clean filtered air to the occupants in a way that minimizes utility costs and maximizes comfort.

Presentation Info:

Date:	11/28/23
Location:	AF5 – Boise, ID
Presenter:	Damon Woods

Attendance:

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

2.17 SESSION 17: HIGH PERFORMANCE CLASSROOMS (11/29/2023)

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:	11/29/23
Location:	S01 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		*Other:	3
Elec. Engineer:		None Specified:	
Total (In-Person):	**12**		
*Other included:	Project manager (x3).		

2.18 SESSION 18: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (12/06/2023)

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 avocation for energy performance modeling.

Presentation Info:

Date:	12/06/23
Location:	S01 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	5	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	2
Total (In-Person):	**10**		
*Other included:	Interior designer.		

2.19 SESSION 19: AIR INFILTRATION AND PASSIVE SYSTEMS (12/12/2023)

Title: Air Infiltration and Passive Systems

Description: Each year, $11 billion in energy costs are wasted through infiltration in commercial buildings according to a 2021 study from the Department of Energy. Learn how envelope design affects both comfort and energy costs in Idaho's buildings. Participants will learn about pressure management and using it to design for passive strategies including stack and cross-ventilation and some of the inherent challenges of doing so. The lecture will cover why infiltration is especially important to manage in Idaho due to the health impacts of wildfire smoke, which can infiltrate a leaky building. The main takeaway is to design buildings that deliver clean filtered air to the occupants in a way that minimizes utility costs and maximizes comfort.

Presentation Info:

Date:	12/12/23
Location:	AF6 – Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		*Other:	2
Elec. Engineer:		None Specified:	
Total (In-Person):	**7**		
*Other included:	Project manager (x2).		

2.20 SESSION 20: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (12/14/2023)

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 avocation for energy performance modeling.

Presentation Info:

Date:	12/14/23
Location:	AF4 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

3. FUTURE WORK

Feedback was gathered from the 119 Lunch and Learn evaluations received throughout 2023. The comments from these were valuable in defining possible future Lunch and Learn topics. The IDL will propose new topics for lectures based on this feedback for 2024.

4. APPENDICES

APPENDIX A: SESSION SUMMARIES

At the conclusion of each lunch and learn session, an evaluation form was requested from each participant. The feedback will be 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 have not been edited in most cases, many appear exactly how the participant entered them online or how they were interpreted for translation from hand-written forms.

4.1.1 SESSION 1: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (04/20/2023)

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 with 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 avocation for energy performance modeling.

Presentation Info:

Date:	04/20/23
Location:	AO1 – Pocatello, ID
Presenter:	Dylan Agnes

Attendance:

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

Evaluations:

		Scale
In general, today's presentation was:	**5.0**	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:	**5.0**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.0**	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:

Attendee suggested improvements for the instructor:

- N/A
- Dylan did an excellent job, no changes.

What attendees found most valuable:

- Good share of knowledge to what we can be doing.
- Opportunity for discussion on energy modeling.

Professional associations of which attendees are members:

- AIA (x2)

Other types of training attendees would find useful

- Any by IDL.

4.1.2 SESSION 2: LUMINAIRE LEVEL LIGHTING CONTROLS (05/25/2023)

Title: The Future of 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 the 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: 05/25/23

Location:	OS1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		*Other:	4
Elec. Engineer:		None Specified:	1

Total (In-Person):	5
*Other included:	Property director, property manager, manager, Boise electric.

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:	4.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Excellent Job.
- None.
- Everything was good.

What attendees found most valuable:

- New technology.
- Most advance info.
- Everything.

Professional associations of which attendees are members:

- Orchard Commons LLC (x2)

Other types of training attendees would find useful

- No comments were made.

4.1.3 SESSION 3: FUTURE OF LIGHTING CONTROLS (05/31/2023)

Title: Future of Lighting Controls

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

Presentation Info:

Date:	05/31/23
Location:	EF1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:		Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		*Other:	8
Elec. Engineer:		None Specified:	
Total (In-Person):	**9**		
*Other included:	Electrical designer (x8).		

Evaluations: No evaluations were collected for this webinar.

		Scale
In general, today's presentation was:	**4.6**	1 Not Useful - 5 Very Useful
Rate organization:	**4.3**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.4**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.3**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.9**	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:

Attendee suggested improvements for the instructor:

- Interactive lecture style.
- Perhaps work on the flow of speech.
- Read off slides less/less text on slides.

What attendees found most valuable:

- Human algorithms – dynamic data harvesting.
- Knowing where the future of lighting is headed, I had no idea.
- It was very interesting to learn about this new technology.
- POE/IOL.

Professional associations of which attendees are members:

- No comments were made.

Other types of training attendees would find useful

- User interface options.
- Residential applications of PoE/IoL.

4.1.4 SESSION 4: HVAC LOAD CALCULATIONS – TIPS & TRICKS (06/14/2023)

Title: HVAC Load Calculations – Tips & Tricks

Description: Load calculations are one of the key logistics to designing a high performing building. But, how does one capture the nuance of today's post-covid hybrid office environments? What about conference rooms that are full in the mornings, but empty in the afternoons? For those in the Treasure Valley, ASHRAE's design temperatures have changed – we have hotter summers and milder winters than 20 years ago. The IDL will share updated weather data sources and several load calculation tools freely available to engineers. Participants will learn the distinction between ASHRAE's different load calculation methods – (90.1 vs 183). The lecture will cover how to use energy modeling tools to predict loads in different scenarios and apply ASHRAE 55's thermal comfort standard during the design process. Practitioners will be able to use these tools to add dynamic loads to their designs and conduct robust post-occupancy evaluations to ensure energy efficient operation and client satisfaction.

Presentation Info:

Date:	06/14/23
Location:	EF1 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	7	Contractor:	
Mech. Engineer:		*Other:	3
Elec. Engineer:		None Specified:	1
Total (In-Person):	**11**		
*Other included:	Drafter (x3)		

Evaluations:

		Scale
In general, today's presentation was:	**4.3**	1 Not Useful - 5 Very Useful
Rate organization:	**4.3**	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:	**4.8**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.3**	1 Needs Improvement - 5 Excellent

The content of the presentation was:	3.2	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Short example of a service.
- Provide live demonstration of other calculation tools.
- More project examples.
- Speak a bit louder, eh!

What attendees found most valuable:

- The ability to use the IDL's resources.
- The IDL tool repository.
- The tools the IDL has available.
- The resources and tools that are available for load calculations.
- Lot of valuable references.
- Notification of design tools.

Professional associations of which attendees are members:

- ASHRAE (x3), ASME, NSPE, ASPE.

Other types of training attendees would find useful

- Heatpump water heaters.
- Load calcs variation for very cold climates.
- More detailed information concerning building modeling.

4.1.5 SESSION 5: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (06/20/2023)

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 with 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 avocation for energy performance modeling.

Presentation Info:

Date:	06/20/23
Location:	AF1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	6	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		Other:	

Elec. Engineer:		None Specified:	
Total (In-Person):	8		

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:

Attendee suggested improvements for the instructor:

- No comments were made.

What attendees found most valuable:

- No comments were made.

Professional associations of which attendees are members:

- No comments were made.

Other types of training attendees would find useful

- What different energy modeling software is available with pros and cons of each levels 1,2,3.

4.1.6 SESSION 6: DAYLIGHTING MULTIPLIERS (07/19/2023)

Title: Daylighting Multipliers

Description: This session will explore the role that daylighting multipliers are used when trying to increase the efficiency of daylighting or daylight harvesting in a building, such as, light shelves, manufactured glazing, and material specification. Furthermore, we will explore the rate of return, the ranges of efficiency, and appropriate uses between daylighting strategies and multipliers.

Presentation Info:

Date:	07/19/23
Location:	AF2 - Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	12	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	6

Elec. Engineer:	None Specified:
Total (In-Person): 18	

Evaluations:		**Scale**
In general, today's presentation was:	4.3	1 Not Useful - 5 Very Useful
Rate organization:	4.4	1 Needs Improvement - 5 Excellent
Rate clarity:	4.1	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.1	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.7	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:

Attendee suggested improvements for the instructor:

- Great Job!
- Touch-in on some basic definitions occasionally as reference.

What attendees found most valuable:

- Great refresher on things I learned in school.
- Explanation of which aspects of daylight are most useful and what to focus on + when.
- Demonstration of principles and strategies in-use.
- Calculation daylight, daylight strategies.

Professional associations of which attendees are members:

- AIA, NCARB.

Other types of training attendees would find useful

- Passive vs mechanical design strategies.

4.1.7 SESSION 7: LUMINAIRE LEVEL LIGHTING CONTROLS (08/30/2023)

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:	08/30/23		
Location:	EF1 - Boise, ID		
Presenter:	Dylan Agnes		

Attendance:

Architect:		Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		*Other:	7
Elec. Engineer:		None Specified:	
Total (In-Person):	8		
*Other included:	Electrical designer (x7).		

Evaluations:		Scale
In general, today's presentation was:	4.4	1 Not Useful - 5 Very Useful
Rate organization:	4.9	1 Needs Improvement - 5 Excellent
Rate clarity:	4.3	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.1	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.7	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.3	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Volume was quiet low at times.
- Speak louder.
- Soft suggestion to offer a recording of presentation or just do a TED talk, would be interesting.

What attendees found most valuable:

- Economic benefits and graphs.
- What makes a smart building, market application plus savings % of LLLC vs w/o LLLC.
- Data and statistics of the actual functionality.
- Visual aids.
- Less regarding LLLC capabilities.

Professional associations of which attendees are members:

- No comments were made.

Other types of training attendees would find useful

- No comments were made.

4.1.8 SESSION 8: ASHRAE STANDARD 209 ENERGY MODELING (08/31/2023)

Title: ASHRAE Standard 209 Energy Modeling

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:	08/31/23
Location:	AF1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	12	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**13**		

Evaluations:		**Scale**
In general, today's presentation was:	5.0	1 Not Useful - 5 Very Useful
Rate organization:	4.9	1 Needs Improvement - 5 Excellent
Rate clarity:	4.9	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:	4.9	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.6	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- More real world project examples.
- Passing around the 5 page resource tool would be nice for people to see while presenting.
- Great pace, seemed very comfortable in the content.

What attendees found most valuable:

- Up to date information.
- Presentation was well organized and enjoyed video.
- Attending to be more aware.

Professional associations of which attendees are members:

- AIA (x2), LEED, NCARB.

Other types of training attendees would find useful

- No comments were made.

4.1.9 SESSION 9: HIGH PERFORMANCE CLASSROOMS (09/13/2023)

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:	09/13/23
Location:	AF2 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	8	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	2
Total (In-Person):	**10**		

Evaluations:

		Scale
In general, today's presentation was:	4.4	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:	4.6	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:	3.1	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Broaden to other project types.
- Love the ay case studies keep them current as new schools continue to be built with new technology.

What attendees found most valuable:

- Metrics to communicate benefits of better design to clients.
- Discussion on thermal comfort.
- Studies defining the need for ventilation, daylight, etc…
- "the why?" I think that made the presentation a lot better.

- The data from local classrooms.
- Fact sheets that we can use w/ our clients.

Professional associations of which attendees are members:

- AIA (x4), NCARB.

Other types of training attendees would find useful

- Measuring acoustic levels.
- Specific daylighting strategy dealing w/glare.
- Alternative building methods, workshops, photovoltaics.
- Any, love what you offer to our community.

4.1.10 SESSION 10: AIR INFILTRATION AND PASSIVE SYSTEMS (09/14/2023)

Title: Air Infiltration and Passive Systems

Description: Each year, $11 billion in energy costs are wasted through infiltration in commercial buildings according to a 2021 study from the Department of Energy. Learn how envelope design affects both comfort and energy costs in Idaho's buildings. Participants will learn about pressure management and using it to design for passive strategies including stack and cross-ventilation and some of the inherent challenges of doing so. The lecture will cover why infiltration is especially important to manage in Idaho due to the health impacts of wildfire smoke, which can infiltrate a leaky building. The main takeaway is to design buildings that deliver clean filtered air to the occupants in a way that minimizes utility costs and maximizes comfort.

Presentation Info:

Date:	09/14/23
Location:	EF2 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	2
Total (In-Person):	7		

Evaluations:		**Scale**
In general, today's presentation was:	4.5	1 Not Useful - 5 Very Useful
Rate organization:	4.9	1 Needs Improvement - 5 Excellent
Rate clarity:	4.9	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.9	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.9	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.9	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Mostly was about the fact. Would like more on what an engineer could do.

What attendees found most valuable:

- Conuersian and software.
- It was nice to see a scientific data collection approach on how to design.
- Graphics and visuals.
- Good info, very relevant, well presented.

Professional associations of which attendees are members:

- ASHRAE

Other types of training attendees would find useful

- No comments were made.

4.1.11 SESSION 11: DAYLIGHTING MULTIPLIERS (09/27/2023)

Title: Daylighting Multipliers

Description: This session will explore the role that daylighting multipliers are used when trying to increase the efficiency of daylighting or daylight harvesting in a building, such as, light shelves, manufactured glazing, and material specification. Furthermore, we will explore the rate of return, the ranges of efficiency, and appropriate uses between daylighting strategies and multipliers.

Presentation Info:

Date:	09/27/23
Location:	AF3 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

Evaluations:		**Scale**
In general, today's presentation was:	4.2	1 Not Useful - 5 Very Useful
Rate organization:	4.2	1 Needs Improvement - 5 Excellent
Rate clarity:	4.6	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.8	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.8	1 Needs Improvement - 5 Excellent

The content of the presentation was:	3.4	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- No comments were made.

What attendees found most valuable:

- Graphs.
- Optimizing design with daylighting.
- Too much.
- Data heavy but a good thing.

Professional associations of which attendees are members:

- AIA (x2), USGBC, NCARB

Other types of training attendees would find useful

- Using software that is seamless with Archicad.
- HVAC, VRF Energy Efficiency.

4.1.12 SESSION 12: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (10/04/2023)

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 with 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 avocation for energy performance modeling.

Presentation Info:

Date:	10/04/23
Location:	AF3 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

Evaluations: No evaluation were handed out

		Scale
In general, today's presentation was:	4.4	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:	4.8	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.4	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Good content, could 'dumb' down some of the tech terms.

What attendees found most valuable:

- Good graphs/graphics and examples.
- How exactly I involve energy modeling into my workflow.
- The fact that you remembered that we use ArchiCad and related part of the presentation towards the software.
- Energy analysis simulator software and knowledge.

Professional associations of which attendees are members:

- AIA, NCARB (x2)

Other types of training attendees would find useful

- HVAC and Daylighting.
- Mechanical equipment selection.

4.1.13 SESSION 13: HIGH PERFORMANCE CLASSROOMS (10/11/2023)

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:	10/11/23
Location:	AF4 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	4	Electrician:	
Engineer:	1	Contractor:	

Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	
Total (In-Person):	6		
*Other included:	Project manager.		

Evaluations: No evaluations were handed out

		Scale
In general, today's presentation was:	4.5	1 Not Useful - 5 Very Useful
Rate organization:	4.2	1 Needs Improvement - 5 Excellent
Rate clarity:	3.8	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:	4.2	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.2	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- None. It was great!
- Opportunities for interactive questions, more case students.
- Example slides of solvtrons/recommendations.
- Nope – good to go.

What attendees found most valuable:

- The local school examples and researched/study results.
- Metrics for measuring data within classrooms.
- Breakdown.
- Classroom ventilation discussion and glazing option.

Professional associations of which attendees are members:

- AIA (x4)

Other types of training attendees would find useful

- Daylighting.
- More mechanical and HVAC building solutions for new renovation projects.
- Ventilation solutions.

4.1.14 SESSION 14: HVAC LOAD CALCULATIONS – TIPS & TRICKS (10/12/2023)

Title: HVAC Load Calculations – Tips & Tricks

Description: Load calculations are one of the key logistics to designing a high performing building. But, how does one capture the nuance of today's post-covid hybrid office environments? What about conference rooms that are full in the mornings, but empty in the afternoons? For those in the Treasure Valley, ASHRAE's design temperatures have changed – we have hotter summers and milder winters than 20 years ago. The IDL will share updated weather data sources and several load calculation tools freely available to engineers. Participants will learn the distinction between ASHRAE's different load calculation methods – (90.1 vs 183). The lecture will cover how to use energy modeling tools to predict loads in different scenarios and apply ASHRAE 55's thermal comfort standard during the design process. Practitioners will be able to use these tools to add dynamic loads to their designs and conduct robust post-occupancy evaluations to ensure energy efficient operation and client satisfaction.

Presentation Info:

Date:	10/12/23
Location:	EF2 – Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	
Total (In-Person):	9		
*Other included:	Designer		

Evaluations:

		Scale
In general, today's presentation was:	4.8	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:	4.8	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.8	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.3	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- No comments were made.

What attendees found most valuable:

- How to better assume loads for buildings.

Professional associations of which attendees are members:

- No comments were made.

Other types of training attendees would find useful

- No comments were made.

4.1.15 SESSION 15: ASHRAE STANDARD 209 ENERGY MODELING (11/17/2023)

Title: ASHRAE Standard 209 Energy Modeling

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:	11/17/23
Location:	EF3 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		*Other:	5
Elec. Engineer:		None Specified:	7
Total (In-Person):	6		
Total (Online):	7		
*Other included:	Estimator, Division Manager (x3), Designer.		

Evaluations:		**Scale**
In general, today's presentation was:	4.8	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:	3.4	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- N/A

What attendees found most valuable:

- Additional resources were provided.
- Potential resources for energy modeling.
- How to define and display the data.
- Energy modeling resource information.

Professional associations of which attendees are members:

- NCARB.

Other types of training attendees would find useful

- No comments were made.

4.1.16 SESSION 16: AIR INFILTRATION AND PASSIVE SYSTEMS (11/28/2023)

Title: Air Infiltration and Passive Systems

Description: Each year, $11 billion in energy costs are wasted through infiltration in commercial buildings according to a 2021 study from the Department of Energy. Learn how envelope design affects both comfort and energy costs in Idaho's buildings. Participants will learn about pressure management and using it to design for passive strategies including stack and cross-ventilation and some of the inherent challenges of doing so. The lecture will cover why infiltration is especially important to manage in Idaho due to the health impacts of wildfire smoke, which can infiltrate a leaky building. The main takeaway is to design buildings that deliver clean filtered air to the occupants in a way that minimizes utility costs and maximizes comfort.

Presentation Info:

Date:	11/28/23
Location:	AF5 – Boise, ID
Presenter:	Damon Woods

Attendance:

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

Evaluations:

		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:	4.6	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.9	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.5	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.5	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- More picture, more demonstration of programs.
- Display a model or example implementation.
- Great job!

What attendees found most valuable:

- Explanation of tools.
- Implementation of local laws and regulations.
- Intro to online tools.
- Available tools, clarify of material.
- Use of online tools.

Professional associations of which attendees are members:

- AIA (x3), USGBC.

Other types of training attendees would find useful

- Passive systems, low cost energy options.

4.1.17 SESSION 17: HIGH PERFORMANCE CLASSROOMS (11/29/2023)

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:	11/29/23
Location:	SO1 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		*Other:	3
Elec. Engineer:		None Specified:	
Total (In-Person):	12		
*Other included:	Project manager (x3).		

Evaluations:		**Scale**
In general, today's presentation was:	4.7	1 Not Useful - 5 Very Useful
Rate organization:	4.7	1 Needs Improvement - 5 Excellent
Rate clarity:	4.7	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.9	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent

Rate delivery of presentation:	4.7	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.7	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- N/A
- Good presentation.
- Did a great job!
- When addressing light in classrooms, talk to best color temps for optimal learning.
- Very professional and informative.

What attendees found most valuable:

- Data and solutions.
- Interesting in what k-12 does but state higher education is different.
- Seeing the statistics – very general and easy to comprehend, retain.
- Everything.

Professional associations of which attendees are members:

- N/A

Other types of training attendees would find useful

- Any for higher education or commercial building design.
- See this education study with higher ed. facilities or universities.
- Commissioning, review of different systems, priorities for tight budgets.

4.1.18 SESSION 18: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (12/06/2023)

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 avocation for energy performance modeling.

Presentation Info:

Date:	12/06/23
Location:	S01 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	5	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	2
Total (In-Person):	10		
*Other included:	Interior designer.		

Evaluations:

		Scale
In general, today's presentation was:	4.7	1 Not Useful - 5 Very Useful
Rate organization:	4.7	1 Needs Improvement - 5 Excellent
Rate clarity:	4.7	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.9	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:	3.9	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Excellent job fitting within time constraints.
- N/A

What attendees found most valuable:

- Design tools available.
- Process.
- Understanding moves and responsibilities between design professionals.

Professional associations of which attendees are members:

- No comments were made.

Other types of training attendees would find useful

- Other design aspects.

4.1.19 SESSION 19: AIR INFILTRATION AND PASSIVE SYSTEMS (12/12/2023)

Title: Air Infiltration and Passive Systems

Description: Each year, $11 billion in energy costs are wasted through infiltration in commercial buildings according to a 2021 study from the Department of Energy. Learn how envelope design affects both comfort and energy costs in Idaho’s buildings. Participants will learn about pressure management and using it to design for passive strategies including stack and cross-ventilation and some of the inherent challenges of doing so. The lecture will cover why infiltration is especially important to manage in Idaho due to the health impacts of wildfire smoke, which can infiltrate a leaky building. The main takeaway is to design buildings that deliver clean filtered air to the occupants in a way that minimizes utility costs and maximizes comfort.

Presentation Info:

Date:	12/12/23
Location:	AF6 – Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		*Other:	2
Elec. Engineer:		None Specified:	
Total (In-Person):	7		
*Other included:	Project manager (x2)		

Evaluations:		**Scale**
In general, today's presentation was:	3.7	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:	5.0	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.5	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.2	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.3	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- More explanation of acronyms.
- None.
- None, thank you.
- The calculations were a bit difficult to understand. I appreciate that there is a calculator on your website.

What attendees found most valuable:

- Tools available for loan.
- Examples and discussion about projects we are currently working on.
- Sharing of available resources.
- Making suggestions for available resources.
- Solutions, diagrams.

Professional associations of which attendees are members:

- IIDA, ICA, NCARB, AIA (x2)

Other types of training attendees would find useful

- Materials used for solutions and how to better on details for construction.

4.1.20 SESSION 20: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (12/14/2023)

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 with 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 avocation for energy performance modeling.

Presentation Info:

Date:	12/14/23
Location:	AF4 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

Evaluations:		**Scale**
In general, today's presentation was:	4.3	1 Not Useful - 5 Very Useful
Rate organization:	4.8	1 Needs Improvement - 5 Excellent
Rate clarity:	4.8	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:	4.7	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.8	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Intro/explanation of Autodesk insight.
- Insisut knowledge.
- N/A.

What attendees found most valuable:

- Great presenter, useful info.
- Who models and how and why (LEED compliance, etc.).
- LEED Applicability.
- Overall.

Professional associations of which attendees are members:

- AIA (x2)

Other types of training attendees would find useful

- No comments were made.

APPENDIX B: LUNCH AND LEARN 2023 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.

Ultraviolet Germicidal Air Irradiation (Topic 2203)

With the arrival of COVID, there has been a surge of interest in Ultra Violet Germicidal Irradiation. During our research, the IDL found that UV systems can actually save on operational costs by reducing fan energy. Attendees will learn about the different UV technologies available, the strength needed to kill pathogens in air streams, and how to minimize the energy used to run these systems. This lecture will draw from leading researchers such as William Bahnfleth, who chaired ASHRAE's Epidemic Task Force. By installing UVGI systems in front of cooling coils, these can help prevent microbial growth and ensure better airflow throughout the building. With building occupants increasingly mindful of airborne contaminates, it's important for architects and engineers to be aware of these systems and how they can be integrated into a building.

Thermal Energy Storage Systems (Topic 2202)

Thermal Energy Storage Systems (TES) are gaining popularity as a way to mitigate peak energy use. This lecture will explore the use of things like ice-storage and ponds to minimize chiller and boiler use. This technology can be paired with ground-source heat pumps, radiant systems, and natural ventilation. Idaho typically has large temperature swings between the high and low temperatures (sometimes up to 30 F), which makes our state especially suited to shifting when heating and cooling equipment should operate. By understanding more about TES, engineers and architects alike can design unique configurations that can increase efficiency and enhance resiliency in their buildings.

LED Technology's Impact on Savings and Efficiency (Topic 2201)

We will examine the effect LED technology has had on energy savings, control strategies, and future implications with continued efficient lighting technology. As lighting technology becomes more efficient it will adjust codes, incentives from utilities, and energy efficiency standards. More importantly, it will change the cost benefit analysis regarding lighting, control strategies, and occupant comfort. The LED revolution for lighting is not done and, in this lecture, we will discuss the current state of LEDs as well as the direction we are going and what we might find when we arrive.

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.

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.

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.

HVAC Load Calculations – Tips & Tricks (Topic 2302)

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.

Air Infiltration and Passive Systems (Topic 2301)

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.

2023 Task 3: BSUG
Summary of Effort and Outcomes
Idaho Power Company External Year-End Report

December 26, 2023

Prepared for:
Idaho Power Company

Author:
Dylan Agnes

Report Number: 2023_003-01

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IPC KIT #8112

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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 2023 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. 2023 Summary and Cumulative Analysis

In 2023, 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
03/29	Semhub Energy Management Tool & Resources	Josh Pellham	NEEA	8	30	9	10
04/26	Eliminating the two week turn around by using Pollination	Mostapha Roudsai	Ladybug	4	103	3	35
05/24	High Performance Warehouse	Davind & Simran	SSOE	11	20	11	5
08/23	Using the Erl to Benchmark Buildings	Dylan Agnes	IDL	5	17	5	10
09/20	Controls Panel Discussion	Panel	ASHRAE	-	-	42	12
10/25	CBECS 2018 – Idaho Power Climate Region	Dylan Agnes	IDL	10	19	8	5
				38	**189**	**78**	**77**
				227		**155**	

2023 Attendance

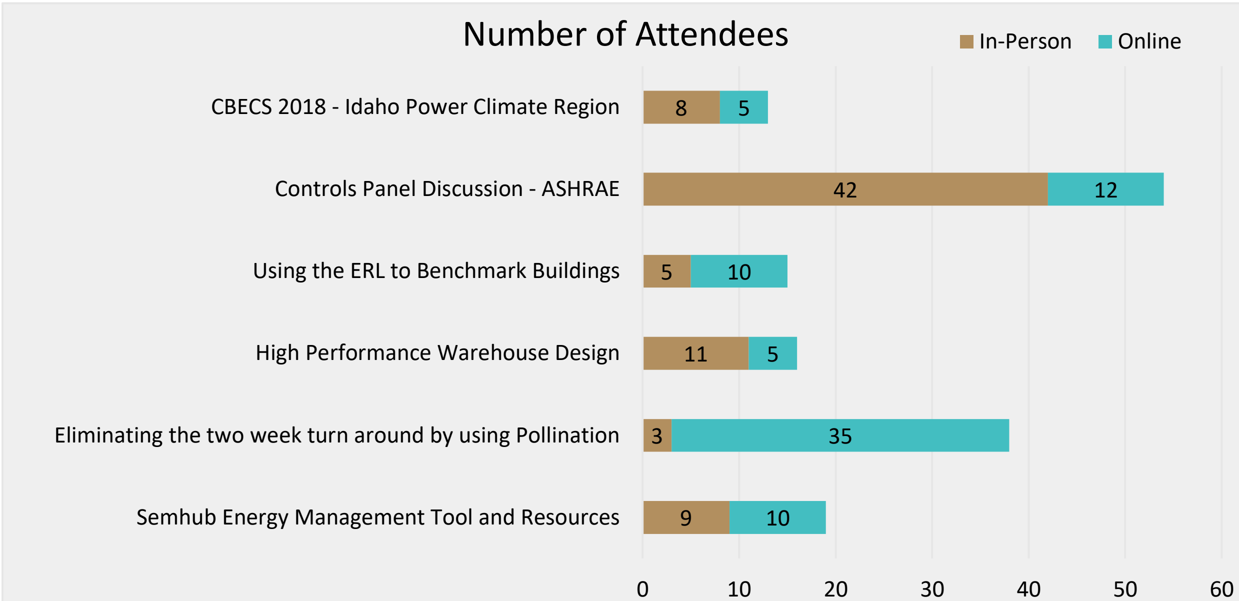

Figure 1: Attendee Count by Session and Type

Table 2: Overall Attendance Breakdown

Architect:	13	Electrician:	0
Engineer:	71	Contractor:	1
Mech. Engineer:	8	Other:	2
Elec. Engineer:	0	None Specified:	60
Total (In-Person):	**78**		
Total (Online):	**77**		
Total (Combined):	**155**		

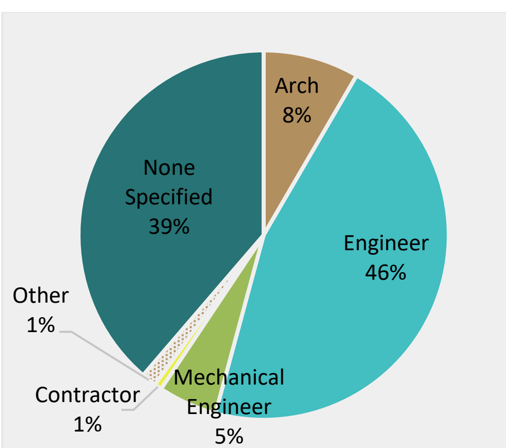

Figure 2: Attendee Profession Breakdown

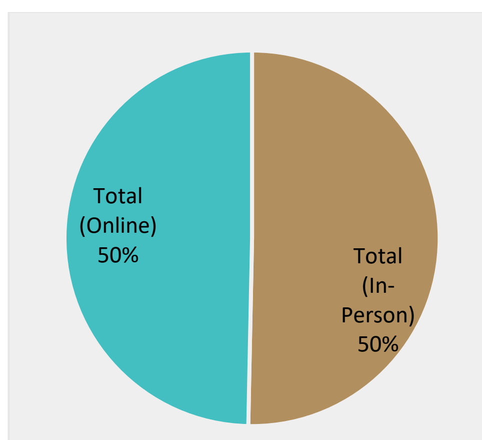

Figure 3: Attendee Type Breakdown

2023 Evaluations

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

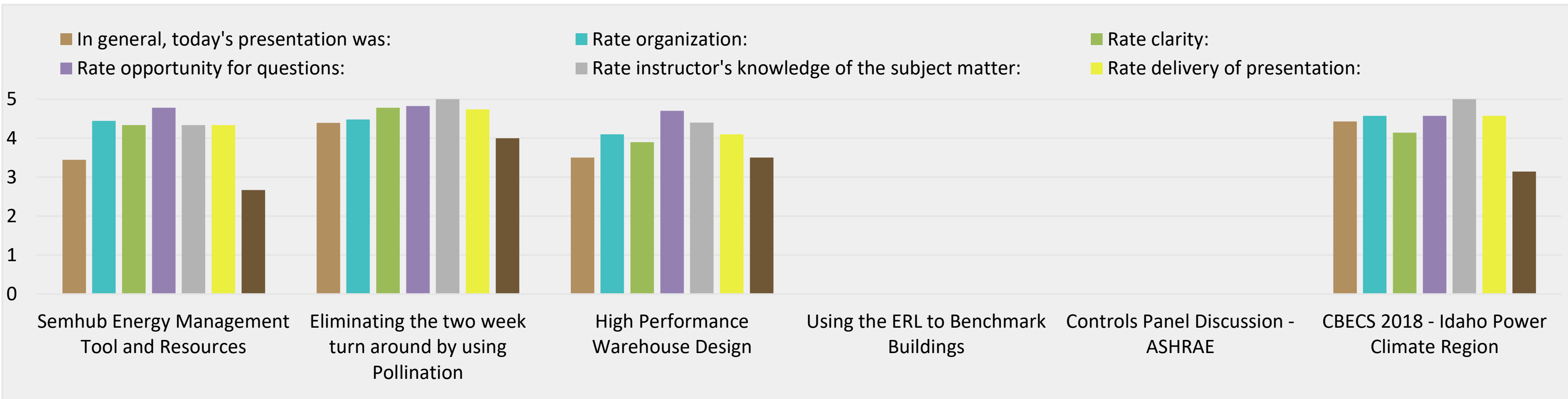

Figure 4: Average Evaluations by Session

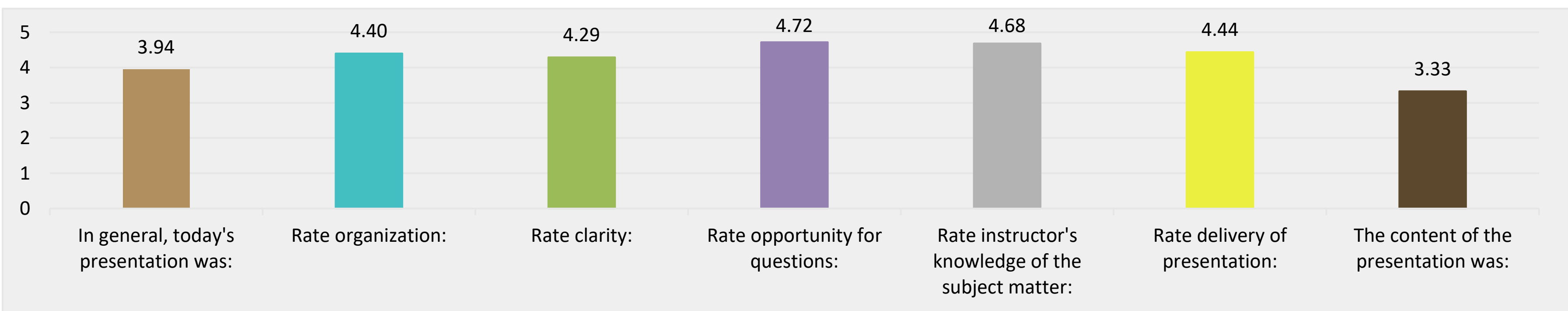

Figure 5: Average Evaluation Scores for All Sessions

4. Session Summaries

Session 1: Semhub Energy Management Tool and Resources (3/29/23)

Title: Semhub Energy Management Tool and Resources

Date: 03/29/23

Description: During this session, program managers for NEEA's BetterBricks and Strategic Energy Management (SEM) programs will provide insight into the commercial building case studies, white papers, and other resources available on betterbricks.com. The session will also include an overview and live demonstration of the alliance's Energy Management Assessment tool and insight into upcoming plans for its use in the market.

Presenter: Josh Pellham

Attendance:

Architect:		Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	10
Total (In-Person):	**9**		
Total (Online):	**10**		
*If 'Other' was noted:	Energy Modeler		

Session 2: Eliminating the two week turn around by using Pollination (04/26/23)

Title: Decarbonized Building and District Energy Systems

Date: 04/26/23

Description: Has the quality of your project ever suffered because you didn't have the right information at the time you had to make a decision? Have you ever had an energy modeling consultant send you a report two weeks after you gave them design documents and all you can say is "great but the design is completely different now?". Have you been that consultant? If so, you are not alone and you're just experiencing an issue that persistently plagues today's building industry.

In this presentation, Mostapha will examine the root causes of the “two-week turnaround” problem starting from the biggest reasons why environmental building performance modeling takes so long and moving down the list of challenges that make collaboration over building simulation difficult. He will show how workflows with the Pollination CAD plugins and cloud platform can mitigate these challenges and ultimately eliminate the two-week turnaround altogether.

Presenter: Mostapha Sadeghipour Roudsari

Attendance:

Architect:	4	Contractor:	
Mech. Engineer:	8	*Other:	8
Elec. Engineer:		None Specified:	18
Total (In-Person):	**3**		
Total (Online):	**35**		
*If 'Other' was noted:	Energy modeler, PhD student, Principal, VP, Building performance, Designer, Professor (x2)		

Session 3: High Performance Warehouse Design (05/24/23)

Title: High Performance Warehouse Design

Date: 05/24/23

Description: This 1-hour presentation provides a brief overview of a LEED Platinum Net-Zero Energy Warehouse designed for the National Institute of Health in North Carolina and certified (v2009) in October 2018. Using current analysis and simulation tools, David will look to validate the project’s design decisions to reduce energy use, and Simran will demonstrate how performing a Lifecyle Assessment (LCA) can be used to balance embodied carbon, cost, and performance targets on projects. As a retrospective on a project designed over 5 years ago, David and Simran will summarize whether the analysis suggests design improvements that would be beneficial to implement if designed today.

Presenter: Simran Bajaj & David Johnson

Attendance:

Architect:	7	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		*Other:	
Elec. Engineer:		None Specified:	5
Total (In-Person):	**11**		
Total (Online):	**5**		
*If 'Other' was noted:			

Session 4: Using the ERL to Benchmark Buildings (08/23/23)

Title: Using the ERL to Benchmark Buildings

Date: 08/23/23

Description: Benchmarking is a method for measuring a building's energy efficiency by comparing its energy use to other buildings with similar functions (commercial office, school, warehouse, etc…). Benchmarking allows owners to take a snapshot of how their building is currently performing regarding energy consumption and then compare the performance to other buildings to infer if improvements can be made. However, not everyone knows where to start or the tools they will need to gather the necessary data to calculate a building's performance. The Integrated Design Lab has an Energy Resource Library where hundreds of diagnostic tools are available for check-out to support your next energy efficiency project. In this lecture we will be reviewing how to conduct a walk-through/audit using the ERL and additional resources from ASHRAE.

Presenter: Dylan Agnes

Attendance:

Architect:	1	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		*Other:	
Elec. Engineer:		None Specified:	10
Total (In-Person):	**5**		
Total (Online):	**10**		
*If 'Other' was noted:			

Session 5: Controls Panel Discussion – ASHRAE Panel (09/20/23)

Title: Controls Panel Discussion - ASHRAE Panel

Date: 09/20/23

Description: Local HVAC controls engineers will share their insights on what makes for a successful and streamlined project testing and turnover. They will discuss the opportunities and challenges with project team communication, HVAC specifications and best practices, and other challenges. The discussion will also include what trends in the controls industry are gaining traction and what other members on the project team need to know as the technology evolves.

Presenters: Wes Stanfield, Casey Crown, Edward Rebman

Attendance:

Architect:		Electrician:	
Engineer:	42	Contractor:	
Mech. Engineer:		*Other:	
Elec. Engineer:		None Specified:	12
Total (In-Person):	**42**		
Total (Online):	**12**		
*If 'Other' was noted:			

Session 6: CBECS 2018 – Idaho Power Climate Region (10/25/23)

Title: CBECS 2018 – Idaho Power Climate Region

Date: 10/25/23

Description: Sponsored by the Idaho Power Company, the University of Idaho Integrated Design Lab (UI-IDL) developed this series of infographics to communicate how four different building types consume energy on both a regional and national level. The data used to create them has been gathered from The Commercial Buildings Energy Consumption Survey (CBECS), which is a national-level sample survey of commercial buildings and their energy suppliers conducted quadrennially by the Energy Information Administration (EIA).

The survey collects key benchmark information on U.S. commercial buildings, their characteristics, and how they consume energy. It is used by private and public stakeholders to track industry progress and gain a high-level understanding of how similar buildings compare and inform policy decisions.

Architects and engineers can also use this information for goal setting and prioritizing energy efficiency measures within the integrated design process for high performance projects. These infographics make detailed consumption data per building type easily accessible to design teams without having to filter the CBECS database themselves. Information from CBECS is reported on the EIA's website in the form of summary tables, which provide tabular breakdowns of high-level energy consumption statistics based upon general building characteristics.

The information is also available as public use microdata spreadsheets that can be downloaded, filtered, and organized with much more flexibility than the summary tables. These spreadsheets contain much more detailed information from the building characteristics survey in its entirety and served as the origin of information for this series of infographics.

This lecture will focus on the emerging trends from the 2018 survey as well as comparing and contrasting trends identified in the 2012 survey. Specifically, the data examined from the 2012 and 2018 survey focuses on climate region 1 & 2, more commonly known as 6B & 5B ASHRAE climate zones.

Presenter: Dylan Agnes

Attendance:

Architect:	1	Electrician:	
Engineer:	5	Contractor:	1
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	5
Total (In-Person):	**8**		
Total (Online):	**5**		
*If 'Other' was noted:	Estimator		

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. 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. The IDL developed a blog section within the BSUG content where we post on past topics, emerging technologies, and simulation software workflows.

6. Other Activities and Suggestions for Future Improvements

A round table meeting was held on December 7th, 2023, to provide feedback on topics presented this year as well as suggestions for 2024 lecture topics. The feedback is summarized below.

- Passive vs Mechanical Design Strategies: Identify what is passive and mechanical, but also, why. How to use climate analysis to inform passive design.
- Heatpumps for cold climates: Types and conditions.
- HVAC, VRF Energy Efficiency: How to maximize technology and use parameters in OpenStudio, Reheat, and the current stock curves are not reliable anymore. (ASHRAE Joint Session)
- High Performance Building Envelope Design: Using software, TBD.
- Introduction to Parametric Modeling and Analysis using Grasshopper & Ladybug.

- Performance modeling for early design process: Present fundamentals (pulling from analysis to define variables) with a list of applicable software programs.
- Electrification in Cold Climates
- Embodied Carbon: Looking at different wall assemblies to understand performance, but also, what the lower carbon swaps (products, etc.) are that perform the same or better.
- OpenStudio Scripting: New version of OpenStudio will have python compatibility.

7. Appendices

Appendix A: BSUG 2023 Evaluations

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

Session 1 (03/29/23): Semhub Energy Management Tool and Resources

Presentation Info:

Date:	03/29/2023
Location:	Boise, ID
Presenter:	Josh Pellham – NEEA

Attendance:

Architect:		Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	10
Total (In-Person):	**9**		
Total (Online):	**10**		
*If 'Other' was noted:	Energy modeler.		

Evaluations:

		Scale
In general, today's presentation was:	**3.4**	1 Not Useful - 5 Very Useful
Rate organization:	**4.4**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.3**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.8**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.3**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.3**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**2.7**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- More detail on application would be helpful.
- More interaction with audience rather than just lecture.
- Show some before/after results plus case studies.

What attendees found most valuable:

- The available resources.

Professional associations of what attendees are members:

- ASHRAE (x2), ASME

Other types of training attendees would find useful:

- Energy efficiency auditing tools.

Session 2 (04/26/23): Decarbonized Building and District Energy Systems

Presentation Info:

Date:	04/26/2023
Location:	Boise, ID
Presenter:	Mostapha Roundsair – Ladybug

Attendance:

Architect:	4	Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		*Other:	8
Elec. Engineer:		None Specified:	18
Total (In-Person):	**3**		
Total (Online):	**35**		
*If 'Other' was noted:	Energy modeler, PhD student, Principal, VP, Building performance, Designer, Professor (x2)		

Evaluations:

		Scale
In general, today's presentation was:	**4.4**	1 Not Useful - 5 Very Useful
Rate organization:	**4.5**	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:	**5.0**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.7**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**4.0**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- No comments were made.

What attendees found most valuable:

- No comments were made.

Professional associations of what attendees are members:

- ASHRAE (x2), USGBC

Other types of training attendees would find useful:

- No comments were made.

Session 3 (05/24/23): High Performance Warehouse Design

Presentation Info:

Date:	05/24/2023
Location:	Boise, ID
Presenter:	David and Simran – SSOE

Attendance:

Architect:	7	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:	2	*Other:	
Elec. Engineer:		None Specified:	5
Total (In-Person):	**11**		
Total (Online):	**5**		
*If 'Other' was noted:			

Evaluations:

		Scale
In general, today's presentation was:	**3.5**	1 Not Useful - 5 Very Useful
Rate organization:	**4.1**	1 Needs Improvement - 5 Excellent
Rate clarity:	**3.9**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.7**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.4**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.1**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.5**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- More pictures, less analysis – more best practices.
- Include some economic comparison information.
- Was expecting a little more on design strategy and whys of the design.

What attendees found most valuable:

- IMPs are better than precast.
- Interesting to see the technical tools available for calculations and comparison for efficiency.
- Materials for warehouse design that were useful for energy efficiency design.
- Software available to analyze design.

Professional associations of what attendees are members:

- AIA (x2)

Other types of training attendees would find useful:

- More indepth presentation on specific aspects of sustainable and energy efficiency design.

Session 4 (08/23/23): Using the ERL to Benchmark Buildings

Presentation Info:

Date:	08/23/2023
Location:	Boise, ID
Presenter:	Dylan Agnes – IDL

Attendance:

Architect:	1	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		*Other:	
Elec. Engineer:		None Specified:	10
Total (In-Person):	**5**		
Total (Online):	**10**		
*If 'Other' was noted:			

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 evaluations were filled out.

Attendee suggested improvements for the instructor:

- No comments were made.

What attendees found most valuable:

- No comments were made.

Professional associations of what attendees are members:

- No comments were made.

Other types of training attendees would find useful:

- No comments were made.

Session 5 (09/20/23): Controls Panel Discussion – ASHRAE Panel

Presentation Info:

Date:	09/20/2023
Location:	The Creative Space
Presenters:	Wes Stanfield, Casey Crown, Edward Rebman – ASHRAE Panel

Attendance:

Architect:		Electrician:	
Engineer:	42	Contractor:	
Mech. Engineer:		*Other:	
Elec. Engineer:		None Specified:	12
Total (In-Person):	**42**		
Total (Online):	**12**		
*If 'Other' was noted:			

Evaluations: No evaluations were collected

		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 evaluations were collected.

Attendee suggested improvements for the instructor:

- No comments were made.

What attendees found most valuable:

- No comments were made.

Professional associations of what attendees are members:

- No comments were made.

Other types of training attendees would find useful:

- No comments were made.

Session 6 (10/25/23): CBECS 2018 – Idaho Power Climate Region

Presentation Info:

Date:	10/25/2023
Location:	Boise, ID
Presenter:	Dylan Agnes – IDL

Attendance:

Architect:	1	Electrician:	
Engineer:	5	Contractor:	1
Mech. Engineer:		*Other:	1
Elec. Engineer:		None Specified:	5
Total (In-Person):	**8**		
Total (Online):	**5**		
*If 'Other' was noted:	Estimator		

Evaluations:

		Scale
In general, today's presentation was:	**4.4**	1 Not Useful - 5 Very Useful
Rate organization:	**4.6**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.1**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.6**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**5.0**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.6**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.1**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

Attendee suggested improvements for the instructor:

- Some of the numbers were not clear what they were representing.
- Good info, we understand your analysis isn't quite done, but good info!

What attendees found most valuable:

- Resources available.
- Love splitting up CBECS into regional analysis.
- Tons of useful data!
- Info graphics.

Professional associations of what attendees are members:

- ASHRAE (x2), AEE

Other types of training attendees would find useful:

- Energy modeling.

2023 Task 5: Energy Resource Library

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 16, 2023

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes

Report Number: 2023_005-05

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Table of Contents

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).

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.

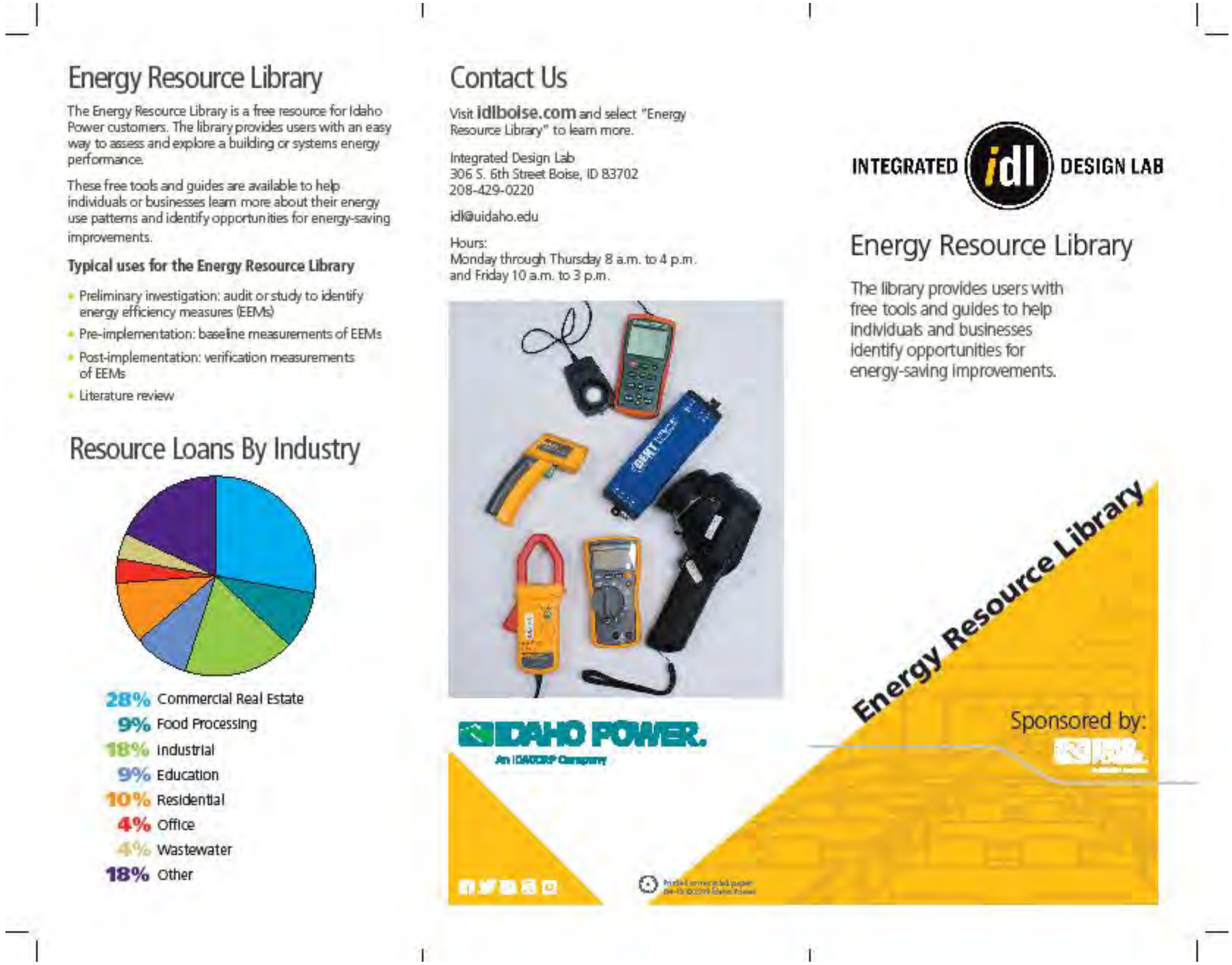
The loan process is started when a customer creates a user account. Then the user has access to submit a resource questionnaire and fill out a form describing their intent and project information. Customers can also add tools to their “cart” and complete a checkout process if they don’t require the IDL 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.

2. Marketing

Marketing for the ERL was done at various UI-IDL and IPC activities throughout 2023, as well as on the 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 for 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 has been distributed at various lectures so firms would have an on-hand reference for the ERL, but also, has been made available as a pdf for download and viewing on the idlboise.com website. You can find the catalog here: http://www.idlboise.com/content/erl-catalog-2020

The ERL was promoted in presentations given by the UI-IDL staff, including the Lunch and Learn series and lectures to professional organizations such as the American Institute of Architects (AIA), ASHRAE, and the City of Boise.

The ERL flyer and program slides direct potential users to the ERL website for more information about the library. The main UI-IDL website hosts the ERL portal where customers can submit a resource questionnaire for assistance or a request for specific tools, all online. In 2023, the ERL home page had 5,220 visitors. Changes and progress on the ERL homepage can be found in Appendix C. (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 2023, sixteen new tools were added to the ERL to replace old data logging models, current transformers, and air quality sensors to fill gaps in tool kits, and add accessories for kits.

Equipment in the tool loan program typically has a guaranteed calibration period between 1 and 3 years from the manufacturer. 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 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 exceed 30% or more of the item's original 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 been 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 is cross-checked against new equipment of the same type for accuracy in a test situation where data is logged. The IDL cross-checks older items against multiple newer items at the end of each calibration period (i.e. every two years) to ensure readings are within specified tolerances.
2. Those items found to be out of tolerance will be assessed for factory re-calibration or replacement.

Calibration tracking has 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 is maintained in the inventory spreadsheet and has been expanded to include tool use, quotes, and budget estimates.

4. 2023 Summary of Loans

In 2023, loan requests totaled 30 with 29 loans completed, 1 loan is on-going. The second and third quarters had the highest volume of loans at 9 total. Loans were made to 9 different locations and 14 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 principal investigations or audits, although loans were also made for determining baselines before EEMs were implemented. Tools were borrowed to verify these EEMs as well.

Due to Covid-19 and the associated restrictions there was a decrease in loans over the past two and a half years. Continuing into 2023, IDL devoted resources to marketing the ERL to potential users in order to return to normal frequency of use. More details about the ERL marketing strategy can be found in the 2023 scope of work. The cutoff date for the report is December 15th, 2023. All loans made between December 15th to December 31st, 2023, will be reported at the kickoff meeting for 2024.

Table 1 and the following figures outline the usage analysis for ERL in 2023. The cutoff date for the report is December 15th, 2023. All loans made between December 15th to December 31st, 2023, will be reported at the kickoff meeting for 2024.

TABLE 1: PROJECT AND LOAN SUMMARY

	Request Date	Location		Project	Type of Loan	# of Tools Loaned
1	1/18/2023	Eagle	ID	Company 65	Post-Implementation	1
2	2/8/2023	Eagle	ID	Company 65	Post-Implementation	1
3	2/24/2023	Grangeville	ID	University 1	Identify EEMs	21
4	2/21/2023	Idaho City	ID	University 1	Identify EEMs	15
5	3/7/2023	Meridian	ID	Company 2	Identify EEMs	1
6	4/3/2023	Garden City	ID	Company 10	Post-Implementation	1
7	4/13/2023	Boise	ID	Company 134	Pre-Implementation	1
8	4/5/2023	Star	ID	Company 20	Identify EEMs	2
9	5/15/2023	McCall	ID	Company 2	Pre-Implementation	1

10	5/18/2023	Boise	ID	University 1	Identify EEMs	1
11	5/22/2023	Boise	ID	Company 266	Identify EEMs	22
12	6/12/2023	Boise	ID	Company 101	Pre-Implementation	1
13	6/22/2023	Boise	ID	University 3	Identify EEMs	1
14	6/30/2023	Boise	ID	University 3	Identify EEMs	1
15	7/6/2023	Boise	ID	University 3	Identify EEMs	1
16	9/7/2023	Boise	ID	University 1	Identify EEMs	1
17	9/11/2023	Boise	ID	Company 14	Pre-Implementation	1
18	9/19/2023	Boise	ID	Company 134	Post-Implementation	1
19	10/5/2023	Boise	ID	Company 99	Pre-Implementation	1
20	9/18/2023	Boise	ID	Company 12	Identify EEMs	3
21	9/8/2023	Boise	ID	University 1	Identify EEMs	1
22	9/15/2023	Boise	ID	University 1	Identify EEMs	3
23	9/29/2023	Boise	ID	University 1	Identify EEMs	1
24	10/14/2023	Boise	ID	University 1	Identify EEMs	1
25	8/22/2023	Boise	ID	Company 99	Identify EEMs	1
26	11/17/2023	Boise	ID	Company 199	Pre-Implementation	1
27	11/20/2023	Boise	ID	Company 2	Post-Implementation	1
28	11/29/2023	Boise	ID	Company 2	Post-Implementation	1
29	12/1/2023	Boise	ID	University 1	Identify EEMs	1
30	12/6/2023	Payette	ID	Company 99	Identify EEMs	1

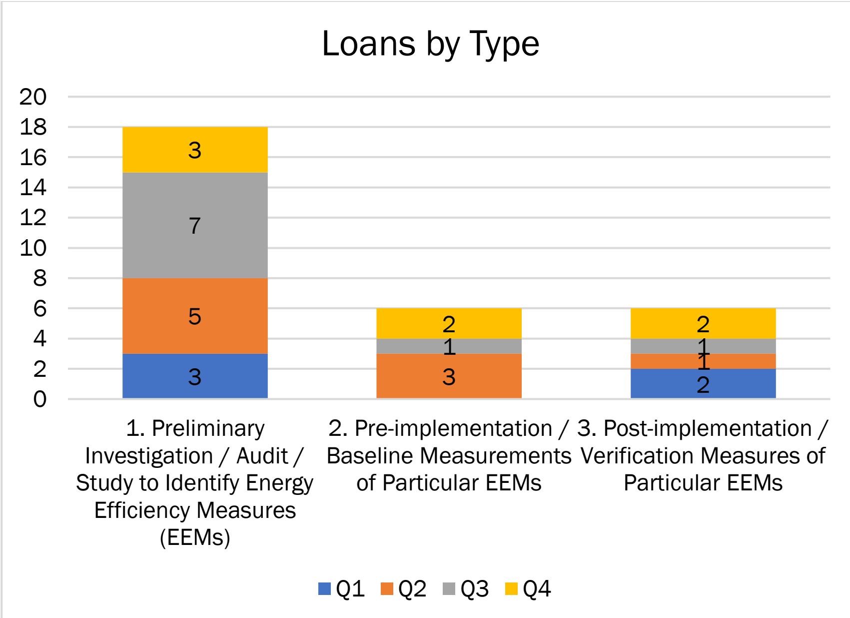


FIGURE 3: LOANS BY TYPE

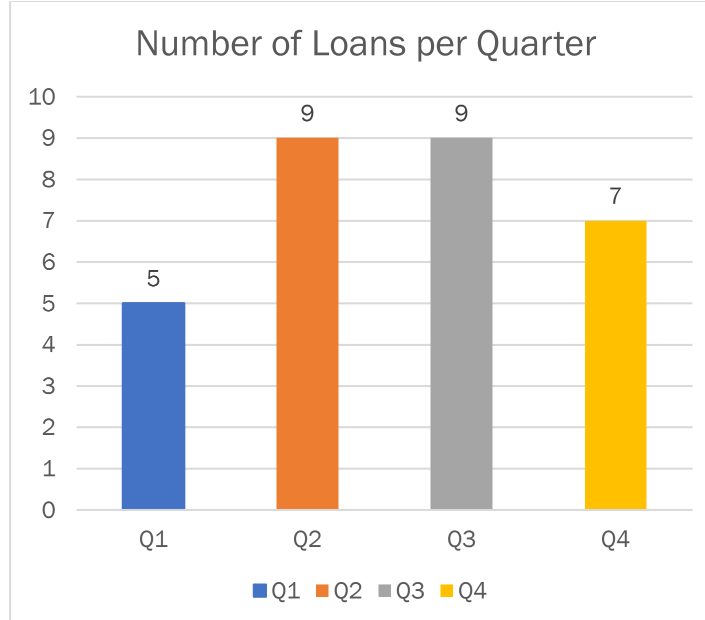


FIGURE 4: NUMBER OF LOANS PER QUARTER

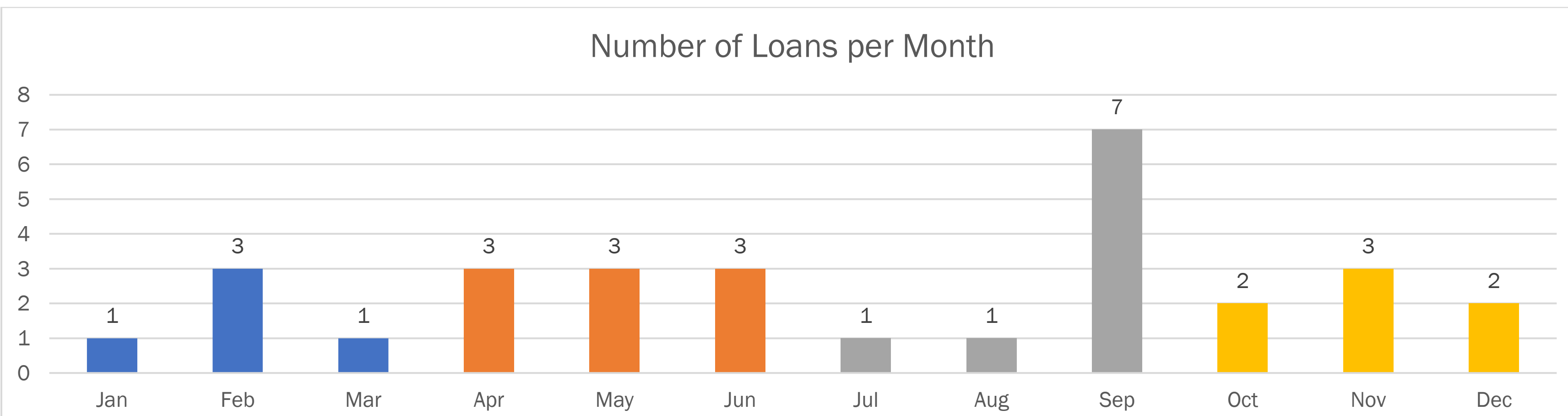


FIGURE 5: NUMBER OF LOANS PER MONTH

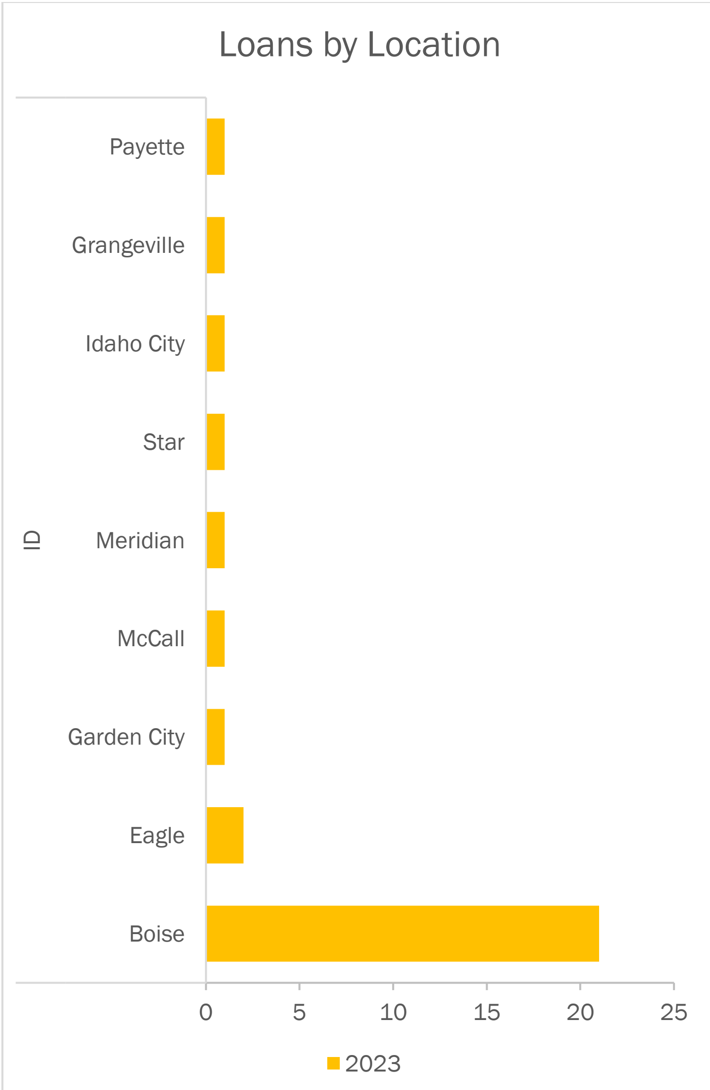


FIGURE 6: NUMBER OF LOANS BY LOCATION

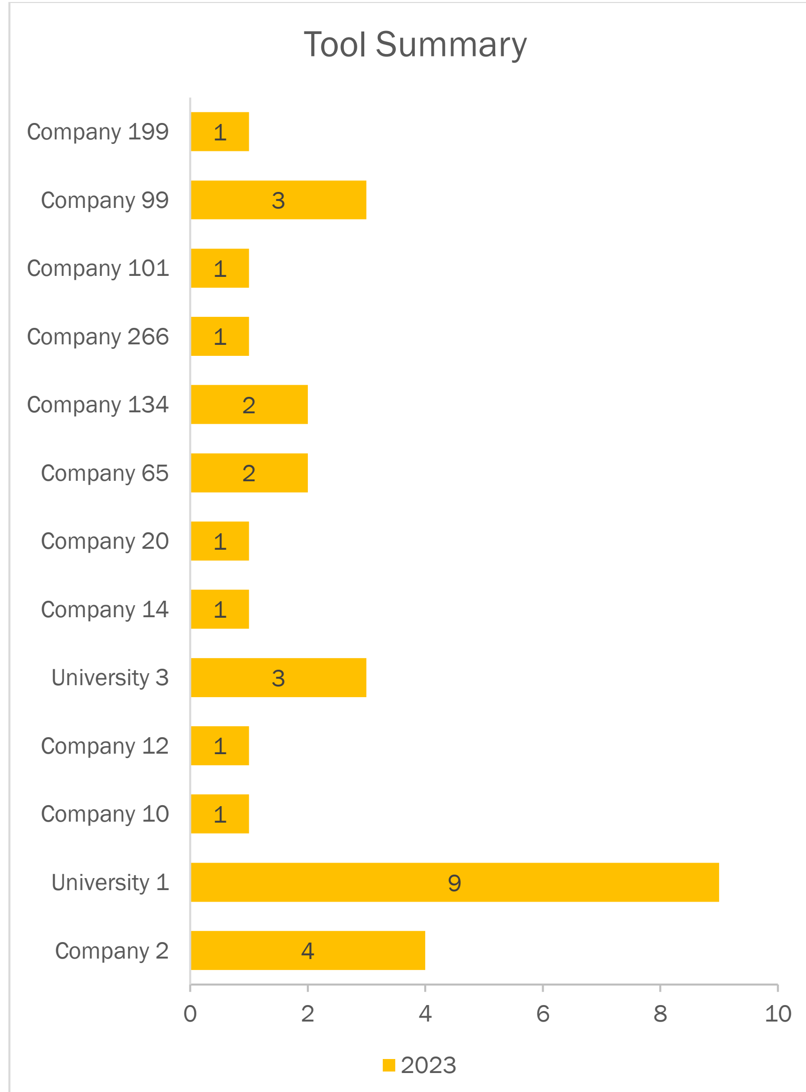


FIGURE 7: NUMBER OF LOANS BY USER

TOTAL TOOLS LOANED: 90	Q1=39	Q2=31	Q3=13	Q4=7

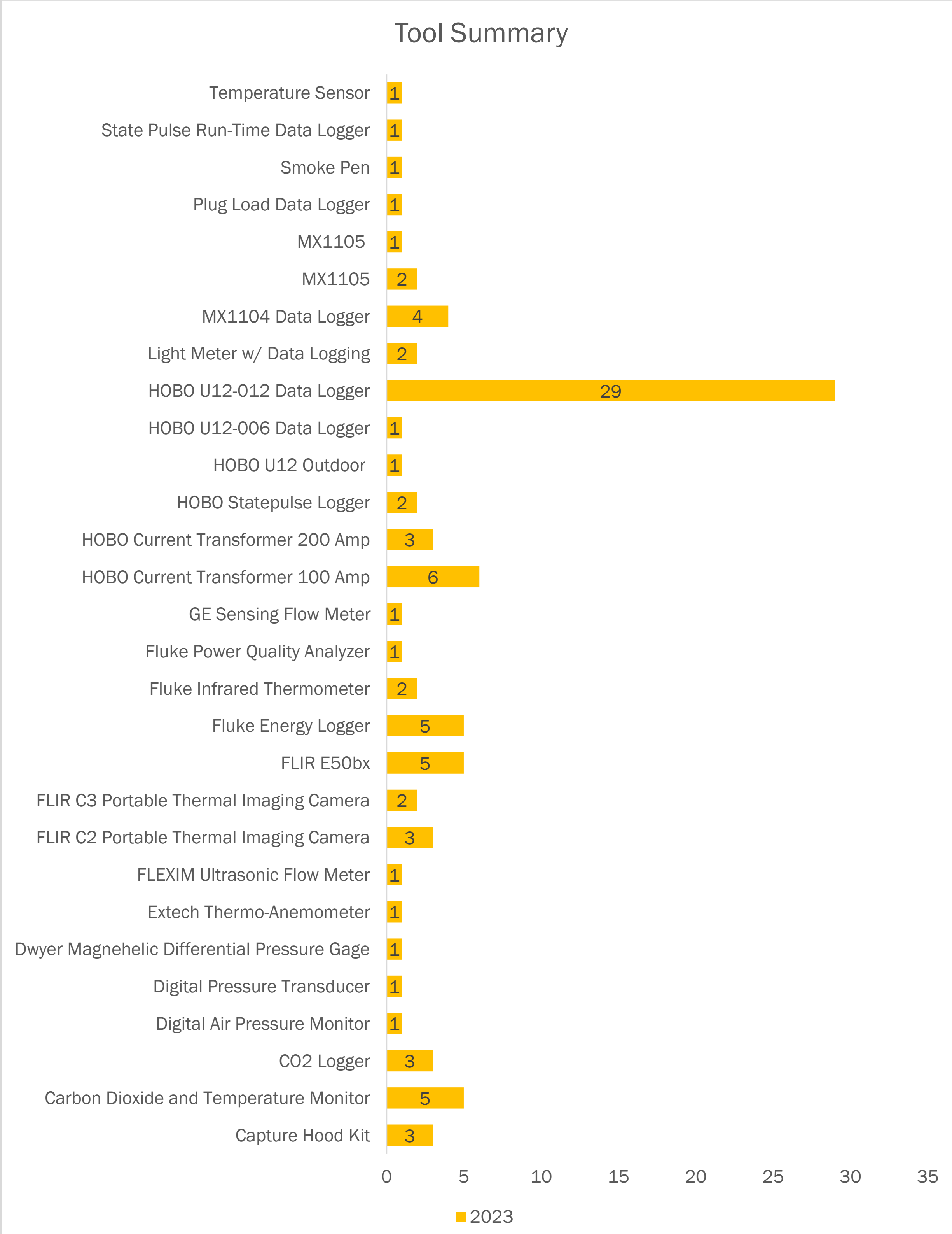


FIGURE 8: SUMMARY OF TOOLS LOANED

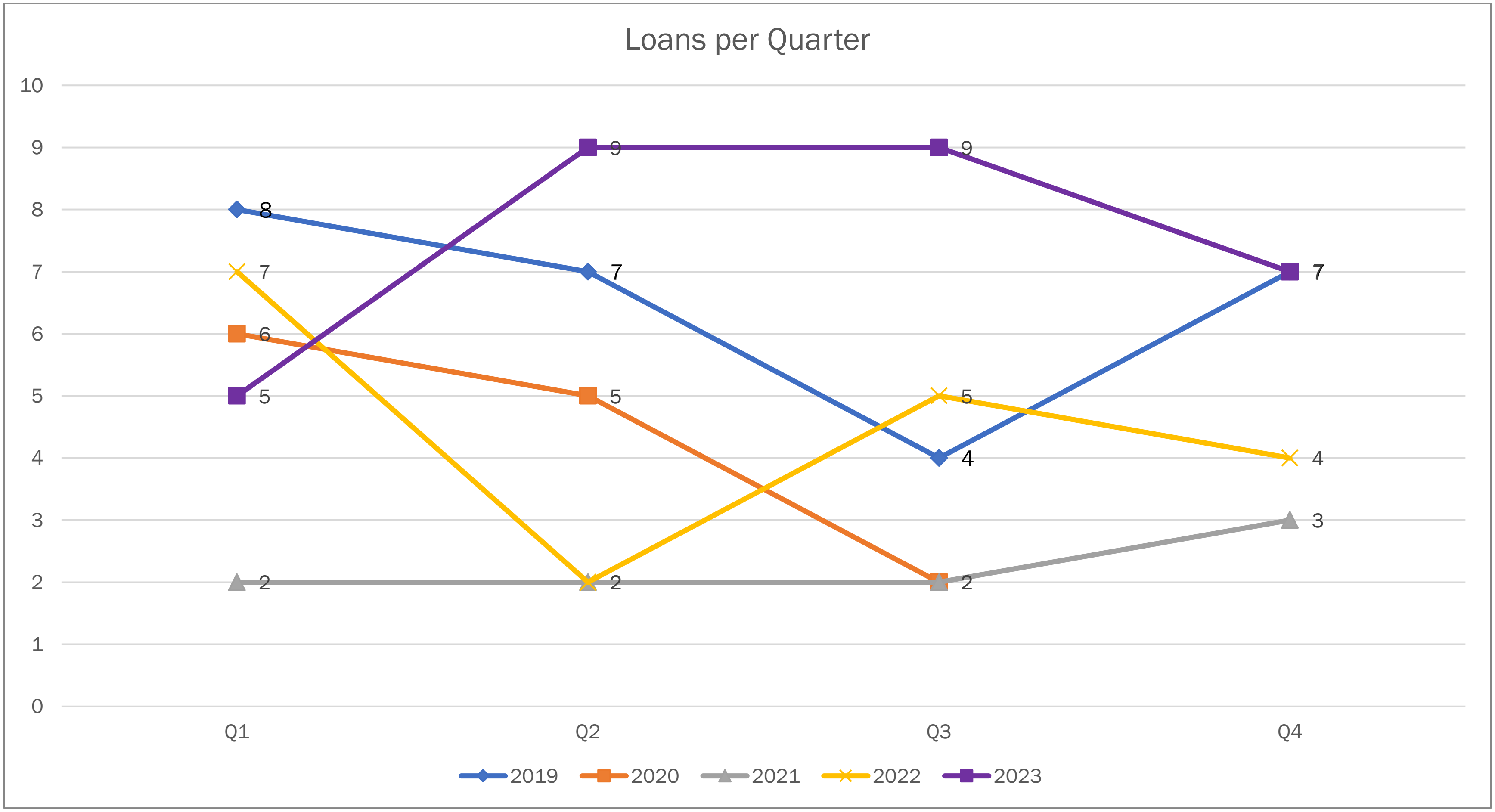


FIGURE 9: LOANS PER QUARTER SINCE 2019

5. Appendices

APPENDIX A: Equipment List

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

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

APPENDIX C: Website Progress

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

2023 Task 07: Fan Savings from UV Lamps

Idaho Power Company External Year-End Report

January 15, 2024

Prepared for:
Idaho Power Company

Authors:
Damon Woods
Farnaz Nazari

Report Number: 2023_001-07

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Contract Number:
IPC KIT # 5277

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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

In the wake of the Covid-19 pandemic, the University of Idaho Integrated Design Lab (UI-IDL) examined the energy impacts of various 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. Reviewing the simulation results, the IDL found that there could be energy savings through adding in-duct Ultraviolet Irradiation. This was the only technology that reduced energy consumption, while increasing the equivalent air change rates. Ultraviolet Lamps have been shown to reduce fan energy by keeping the evaporative coil clear of mold and mildew. William Bahnfleth et al. have conducted studies showing up to a 20% reduction in pressure drop across the coil. The goal of this task is to investigate the effectiveness of adding UV lamps to new or existing HVAC units in IPC territory and monitor the energy consumption over the course of a year using tools from the Energy Resource Library. The goal is to find several sites where two identical HVAC units (such as RTUs with similar zones) that could be used as case studies. The IDL team will record the fan energy over time while taking velocity and airflow measurements. By measuring performance, the IDL will learn the extent of savings in climate 5B for UV installation.

2. Work Summary

2.1 Comparing the mitigation strategies

The IDL work began with conducting a literature review of existing UV technology and studies. The team also examined the impact of ASHRAE Standard 241, which was released this summer. ASHRAE 241 specifies how buildings are to adjust their operations during a pandemic and increase “Equivalent Outdoor Air Exchange Rates”. UltraViolet Germicidal Irradiation (UVGI) qualifies as a method of increasing the equivalent air exchange rate without introducing more outdoor air.

2.1.1 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. In-duct UVGI is estimated to add a plug load of 1 Watt/50 CFM and reduce pressure drop across the cooling coil by 20%. The capital and operating costs from last year’s study are available in Table 1.

Table 1: Capital and Operating Costs of In-Duct UVGI

Technology	**Capital Costs (Equipment + Installation)**	**Operating Costs**	**Maintenance Cost (including filter replacement)**
	[$/1000cfm]	[$/1000cfm]	[$/1000cfm]
UVGI (in duct)	$83.82	$74.25	$100.00

2.1.2 Reviewing current literature on Ultraviolet Germicidal Irradiation

Building on our literature review from last year, we continued to explore the benefits of UVGI technology, aiming for a balance between air purification and energy conservation. This area is a focal point of active research at IDL, with a primary emphasis on leveraging UV-C lamps for both coil cleansing benefits in addition to frequently sought-after germicidal purposes. UVGI, in contrast to traditional filters like MERV, excels at eradicating pressure drops and reducing the burden on fans while delivering germicidal effectiveness. Notably, it prevents bacteria growth, especially on cold coils, a common breeding ground due to moisture. By ensuring a clean coil, UVGI maintains optimal airflow, free from hindrance caused by fungal growths.

Given the intricate challenges in modeling biological growth, quantifying the impacts of UVGI on energy conservation becomes a complex endeavor. As a result, our emphasis lies in extracting valuable insights from diverse studies, regardless of their primary focus. Here is a summary of the key findings gleaned from existing research:

- Bahnfleth's field study affirms the advantages of UVGI in reducing air pressure drop and enhancing heat transfer coefficient by inhibiting fungal growth on coils. The reported improvements are substantial, with a 22% boost in air pressure drop and a 15% increase in the heat transfer coefficient. Nevertheless, the study highlights that the impact varies significantly by location. The most pronounced effects are observed in hot and humid climates, such as Tampa, FL, and Singapore, while cold, temperate, and dry climates show comparatively negligible impacts. (Bahnfleth 2017)
- Ryan et al.'s experiment further validates the substantial sanitizing impact of enhanced UVGI installed in hospital HVAC units. This installation led to a notable reduction in the requirement for antibiotics among patients undergoing antibiotic treatment, observed after a two-week timeframe. (Ryan et al. 2011)
- Nicas and Miller report that UVGI provides 10- 25 equivalent air changes per hour (ACH). (Nicas and Miller 1999)

- In Truffo et al.'s study, a comparative analysis of various air purification techniques reveals both positive and negative aspects of UV radiation treatment. While highlighting several benefits, the study draws attention to a potential drawback: a high degree of photo-oxidative degradation in polymers and plastic components. This aspect warrants careful consideration in the design of UVGI systems. (Truffo et al. 2022)
- Pirouz et al provide a literature review and essential data on the required UV dosage to halt bacterial activity, UVGI effectiveness depends primarily on the UV intensity and exposure time. They mention the dosage values to achieve 99.9% disinfection for SARS family viruses under controlled lab conditions are 10 to 20 mJ/cm2 with direct UVC in a wavelength of 254 nm. (Pirouz et al. 2021)
- Similarly, IUVA(International Ultraviolet Association) mentions required dosage of 1000 and 3000 mJ/cm^2 for the same disinfection impact in office or classroom settings. The latter dosage is higher since all contaminated particles might not be in direct UVC light. (“IUVA UV Disinfection for COVID-19” 2020)
- It's noteworthy that repeated exposure to UV intensifies results Lower doses with longer exposure times may achieve similar effects to higher doses with shorter exposure times. . However, quantifying this impact requires further study.

$$\mathrm{N}_t / \mathrm{N}_{t0} = \exp(-\mathrm{NE}_{\mathrm{ff}}\, \Delta t) = \exp(-\mathrm{k} \times \mathrm{Dose}) \qquad (1)$$

Equation (1) illustrates the exponential decay in the number of living organisms as a constant level of UV-C exposure continues. (“ASHRAE 185.1-2020: Method of Testing UV-C Lights for Use in Air-Handling Units or Air Ducts to Inactivate Airborne Microorganisms” 2020)

While UV light theoretically disrupts bacterial replication by interacting with their DNA, the practical application of UV-C lamps necessitates addressing several key parameters:

- **Organism Susceptibility:** Variations in susceptibility to UV inactivation exist among organisms, with vegetative bacteria being highly susceptible and fungal spores showing lower susceptibility. This disparity influences the required exposure dose (j/m2) and time (s). Appendix A includes a table featuring some members from each category. (“ASHRAE Handbook for HVAC Systems and Equipment Chapter 17: Ultraviolet Lamp Systems” 2020)
- **UV-C Lamps:** The effectiveness of UV systems is influenced by the source of UV light, with UV-C wavelengths ranging from 200-280nm proving most effective for germicidal control, reaching optimal efficiency at 265nm. There is a rapid decline in efficacy if the wavelength deviates from this optimal range.

Commercially, UV-C lamps are mainly low-pressure mercury lamps emitting UV energy at 253.7 nm.

- **Design Considerations:** ASHRAE's design guidance recommends incorporating UV in the supply air section. The handbook also includes Upper-Air UVC and In-Duct UVC Systems. It is important to note that the latter two options lack a coil-cleansing impact, limiting their benefits primarily to air sanitization effects. Figure 1 in Appendix A illustrates the potential application of UV-C lamps. ("ASHRAE Handbook for HVAC Applications Chapter 62. Ultraviolet Air and Surface Treatment" 2023)
- **Maintenance:** UV lamps should be replaced at the end of their useful life, typically 9000 hours of continuous operation for a typical low pressure mercury lamp, therefore it is advisable to replace lamps annually (equivalent to 8760 hours of continuous operation). Although lamps may continue operating beyond this point, their performance significantly diminishes.

  It's noted that the impact of dirt or cleaning on lamp efficiency remains understudied.

Addressing these considerations is crucial for optimizing the effectiveness of UVGI technology for air purification and energy conservation.

2.1.3 Next Steps for 2024 – Implementation at a site

The research team tested data logging of a rooftop unit in spring, but the Dent Power logger data came back with only a few sporadic readings. The team found they required more technical support for a robust installation of power loggers on high voltage systems, without ready access to a 120V outlet (e.g. on a roof). Therefore in 2024, IDL will engage an external firm for technical support at the sites. An equipment representative is standing by and ready to install the lights once the technical expertise and sites are secured. The IDL worked with several schools in 2023, which were all interested in applying the technology to their existing rooftop units including two rural school districts. Since no physical installations were made, part of the 2023 budget remains unspent. This task will continue in 2024 to conclude the physical measurements that were planned under the funding that was given in 2023.

3. Appendix – Works Cited and Additional Figures

Appendix A: Bibliography:

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Appendix B: Simulation Results

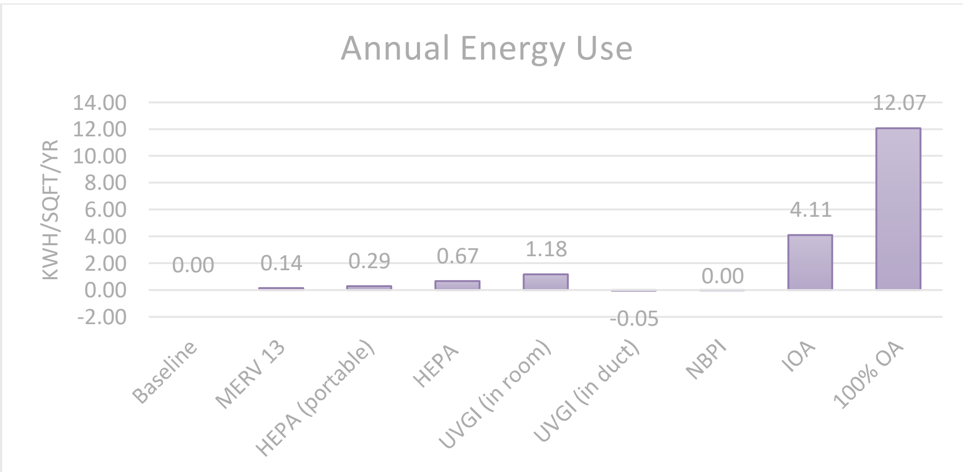


Figure 1: Energy use increase for each of the technologies averaged for the eight building types studied

Table 2: Representative Members of Organism Groups from ASHRAE Handbook for HVAC Systems and Equipment chapter 17: Ultraviolet Lamp Systems

Organism Group	Member of Group
Vegetative bacteria	*Staphylococcus aureus* *Streptococcus pyogenes* *Escherichia coli* *Pseudomonas aeruginosa* *Serratia marcescens*
Mycobacteria	*Mycobacterium tuberculosis* *Mycobacterium bovis* *Mycobacterium leprae*
Bacterial spores	*Bacillus anthracis* *Bacillus cereus* *Bacillus subtilis*
Fungal spores	*Aspergillus versicolor* *Penicillium chrysogenum* *Stachybotrys chartarum*

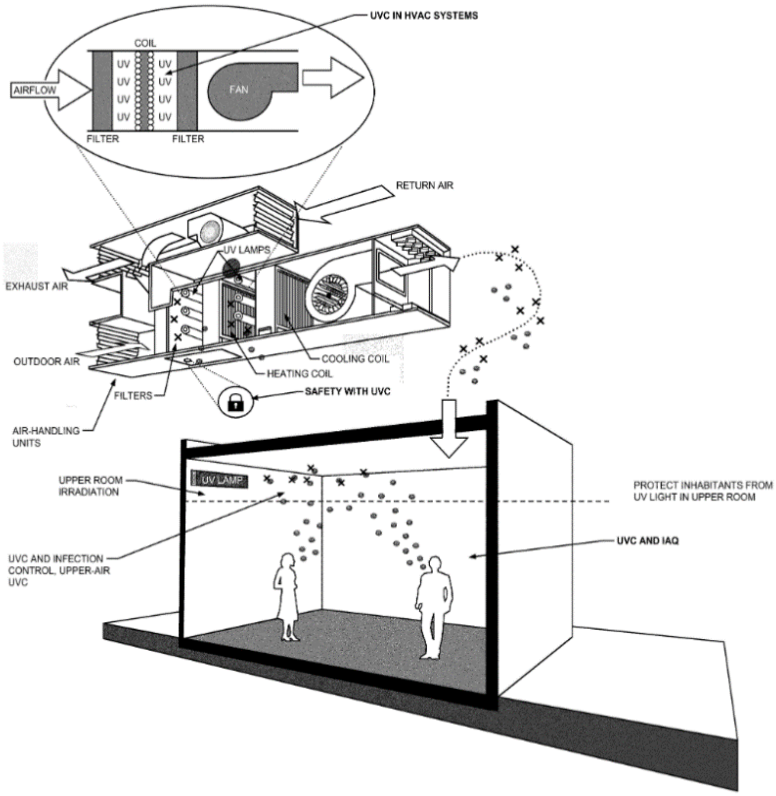
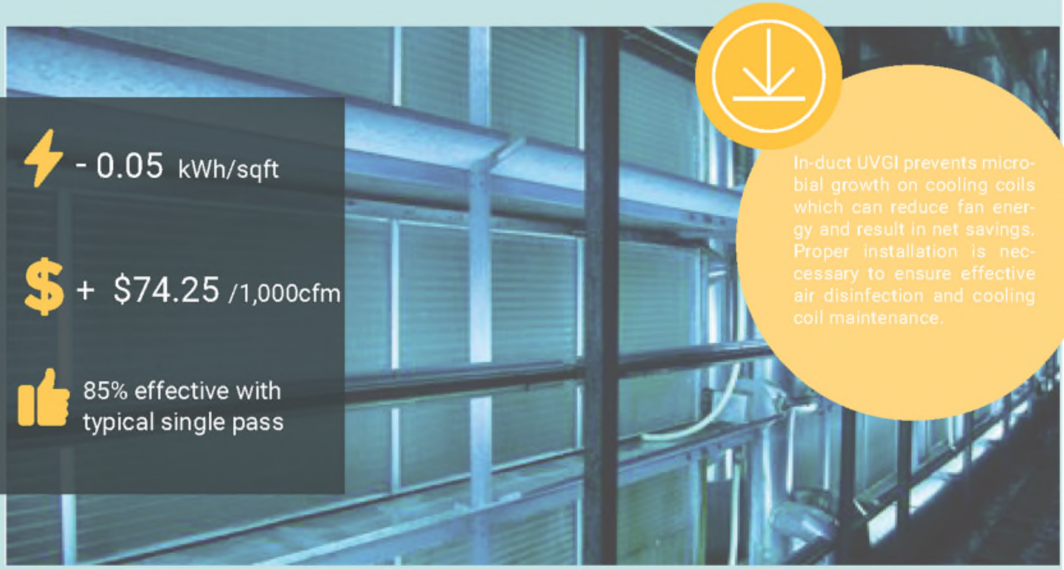


Figure 2:Potential Applications of UVC to Control Microorganisms in Air and on Surfaces from ASHRAE Handbook for HVAC Applications chapter 62. Ultraviolet Air and Surface Treatment

INTEGRATED idl DESIGN LAB

IDAHO POWER.

UVGI IN-DUCT DISINFECTION



- 0.05 kWh/sqft

$ + $74.25 /1,000cfm

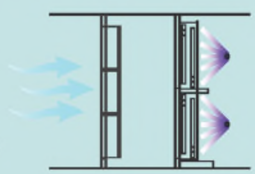
85% effective with typical single pass

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

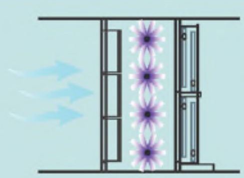
- Irradiance: 1,000 - 10,000 μW/cm²
- Exposure: > 0.25 sec (air speed <500 fpm)
- Upstream or downstream of cooling coils

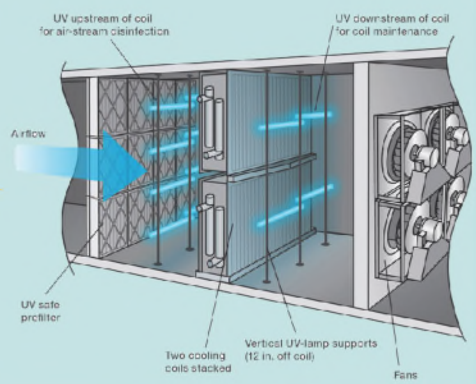


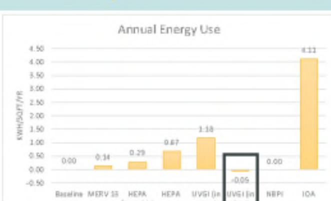
VS

SURFACE

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





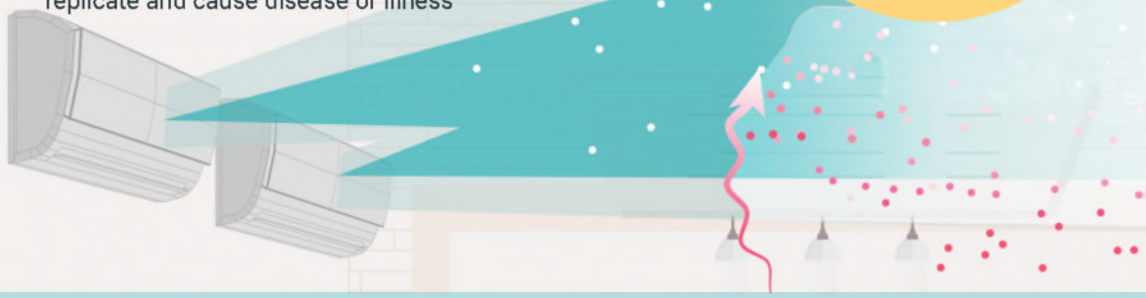


1 ASHRAE. "ASHRAE Epidemic Task Force". Core Recommendations for Reducing Airborne Infectious Aerosol Exposure , 2021, Accessed 2021.
2 ASHRAE. "Filtration and Air Cleaning Summary." ASHRAE, 25 May 2021, COVID-19@ashrae.org. Accessed 10 Sept. 2021.
3 Conlan, Wade H., et al. "Virus Mitigation in K-12 Schools." ASHRAE, 2021.
4 "Fundamentals of UVGI." ASHRAE, 12 May 2021, Online Webinar. Accessed 2021.
5 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, 2017, pp. 135–148.
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 J. Immune Building Systems Technology. The McGraw-Hill Companies, Inc., 2003.

UPPER ROOM DISINFECTION UVGI

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

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.



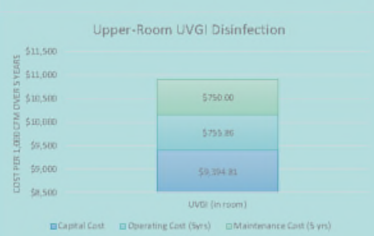
+ 1.18 kWh/sqft

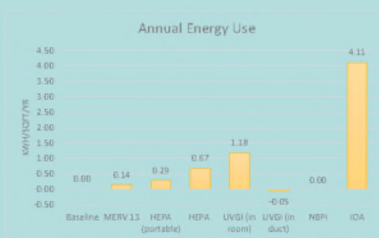
+ $151.17 /1,000cfm

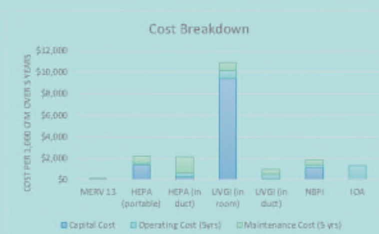
Properly Installed and operated lamps are 99% effective.

DESIGN GUIDELINES

- Approximately one 17W lamp per every 200 ft[2]
- Ideal UV-C intensity for disinfection is >10 uW/cm[2]
- 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.







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2023 Task 8: Digital Design Tools
Summary of Effort and Outcomes
Idaho Power Company Internal Year-End Report

January 15, 2023

Prepared for:
Idaho Power Company

Author:
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Report Number: 2023_003-01

An IDACORP Company

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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

Over the years, the Integrated Design Lab has developed several digital design tools to assist local firms. These include ventilation calculators, daylighting methodologies, thermal envelope calculators, and climate visualization assistants. These tools have been collected and hosted on the IDL website in 2021 but some require updating. IDL is working to update these tools to the latest design temperatures (which have increased over time) and link to other tools available to designers so that the IDL website can serve as a one-stop resource for local engineers and architects for early design considerations.

3. Design Tools

In 2023, seventeen design tools were available for use and download. The Design Tools are summarized below and are current as of December 15th, 2023.

Table 1: Design Tools

#	Status	Priority	Name
1	Proposed	Medium	CBECS Data Visualization Infographics 2012
2	Proposed	Medium	CBECS Micro Master v2 2012
3	Review/Feedback	Low	Weather Normalization
4	Review/Feedback	Low	EnergyPlus Fan Energy Calculator
5	N/A	None	LM-83 Three-phase Daylight Simulation Script
6	N/A	None	Infiltration Equations & Conversions
7	N/A	None	The Climate Responsive Design Web Tool
8	N/A	None	Climate Design Resources - 1st & 2nd Generation Tool Sets
9	N/A	None	Thermal Energy Savings Tabulator (TEST)
10	N/A	None	Construction Insulation Value Calculator
11	N/A	None	Sustainable Design & Practice Benefits
12	N/A	None	Daylight Pattern Guide
13	N/A	None	COVID Impact Modeling (New)
14	N/A	None	IPC Meter Analysis Template (New)
15	High	High	Indoor Air Quality Tool
16	High	High	CBECS Data Visualization Infographics 2018
17	High	High	CBECS Micro Master 2018

2023 Summary of Work

Design tools were assigned a priority during the initial proposal of the task. A design tool's priority determines the probability of receiving an update for the current year. In the future, a design tool's priority level will be assessed in the kick-off meeting for the project task. For 2023, high priority was assigned to two design tools: CBECS Data Visualization Infographics and CBECS Micro Master v2. Commercial Building Energy Consumption Survey (CBECS) 2018 data was expected to be released in 2020, however, the COVID-19 pandemic has continually delayed the release of data from the study. An update in August 2022 indicated that the complete study, including micro data, would be released to the public in the fourth quarter of 2022. All available public data for the CBECS 2018 study was downloaded in December 2022 and January 2023. The IDL converted the Excel sheet format and added column headers to identify areas of study more readily. Then we combined three separate Excel sheets with the following information, general building information and energy end uses, heating and cooling equipment, and lighting, equipment, and conservation features into one master Excel spreadsheet. This master Excel sheet was treated as the master file that all data was extracted from to develop graphics based on specific building type and size. The four building types were given preference in 2023, Office, Retail, Education, and Lodging. These were given preference based on the 2012 CBECS visualization project. The IDL thought it was crucial to connect the 2018 study to the 2012 study. However, it was discovered that the 2012 study/project was intended to have a total of eight categories but only four categories were completed due to budget. Therefore, preparations were made so that the data could be used to develop an additional four categories with the 2018 project/study.

2023 New Design Tools

2018 – CBECS Data Visualization

Priority: High

Link: http://idlboise.com/content/cbecs-data-visualization-infographics

Description: Sponsored by the Idaho Power Company, the University of Idaho Integrated Design Lab (UI-IDL) developed this series of infographics to communicate how four different building types consume energy on both a regional and national level. The data used to create them has been gathered from The Commercial Buildings Energy Consumption Survey (CBECS), which is a national-level sample survey of commercial buildings and their energy suppliers conducted quadrennially by the Energy Information Administration (EIA). The survey collects key benchmark information on U.S. commercial buildings, their characteristics, and how they consume energy. It is used by private and public stakeholders to track industry progress and gain a high-level understanding of how similar buildings compare and inform policy decisions. Architects and engineers can also use this information for goal setting and prioritizing energy efficiency measures within the integrated design process for high performance projects. These infographics make detailed consumption data per building type easily accessible to design teams without having to filter the CBECS database themselves. Information from CBECS is reported on the EIA's website in the form of summary tables, which provide tabular breakdowns of high-level energy consumption statistics based upon general building characteristics. The information is also available as public use microdata spreadsheets that can be downloaded, filtered, and organized with much more flexibility than the summary tables. These spreadsheets contain much more detailed information from the building characteristics survey in its entirety and served as the origin of information for this series of infographics.

Currently, there are five double-sided 11x17" infographics. The first is an introduction to the project and the CBECS database. The next four delve specifically into the office, retail, education and lodging building type.

Last updated: New

2018 – CBECS Micro Master

Priority: High

Link: N/A

Description: This file contains a good portion of the CBECS microdata, which can be filtered for benchmarking and goal setting functions.

Last updated: New

2012 CBECS Data Visualization Infographics

Priority: Medium

Link: http://idlboise.com/content/cbecs-data-visualization-infographics

Description: Sponsored by the Idaho Power Company, the University of Idaho Integrated Design Lab (UI-IDL) developed this series of infographics to communicate how four different building types consume energy on both a regional and national level. The data used to create them has been gathered from The Commercial Buildings Energy Consumption Survey (CBECS), which is a national-level sample survey of commercial buildings and their energy suppliers conducted quadrennially by the Energy Information Administration (EIA). The survey collects key benchmark information on U.S. commercial buildings, their characteristics, and how they consume energy. It is used by private and public stakeholders to track industry progress and gain a high-level understanding of how similar buildings compare and inform policy decisions. Architects and engineers can also use this information for goal setting and prioritizing energy efficiency measures within the integrated design process for high performance projects. These infographics make detailed consumption data per building type easily accessible to design teams without having to filter the CBECS database themselves. Information from CBECS is reported on the EIA's website in the form of summary tables, which provide tabular breakdowns of high-level energy consumption statistics based upon general building characteristics. The information is also available as public use microdata spreadsheets that can be downloaded, filtered, and organized with much more flexibility than the summary tables. These spreadsheets contain much more detailed information from the building characteristics survey in its entirety and served as the origin of information for this series of infographics.

Currently, there are five double-sided 11x17" infographics. The first is an introduction to the project and the CBECS database. The next four delve specifically into the office, retail, education and lodging building type.

Last updated: 2021

2012 CBECS Micro Master v2

Priority: Medium

Link: N/A

Description: This file contains a good portion of the CBECS microdata, which can be filtered for benchmarking and goal setting functions.

Last updated: 2021

Weather Normalization

Priority: Low

Link: http://www.idlboise.com/content/weather-normalization

Description: This spread sheet was created in order to aid with the processing and analysis of building energy usage. In order to operate this spread sheet you will need the following bills for each month in the period you wish to analyze:

- Natural Gas
- Electricity
- Geothermal (if applicable)

In addition, weather data for the location of project is needed. This information can be obtained from the provided link with the instructions below.

- NOAA National Weather Service
- Select the nearest data center.
- Go to the NOWData Tab and refine the location if needed.
- Under the "Product" select "Monthly Summarized Data".
- Input the desired range of years.
- Set the "variable" drop down to either CDD or HDD.
- Click go and copy data to the Data Entry tab of this file.

The sheet will automatically calculate actual and expected energy usage and create graphs that can be found in the "Output Figures" tab. More detailed analysis can be found in the "Calculated Values" and "Regression Visualization" tabs.

Last updated: 2021

EnergyPlus Fan Energy Calculator

Priority: Low

Link: http://idlboise.com/content/energyplus-fan-energy-calculator

Description: This spreadsheet was created in order to aid with determining the fan inputs into EnergyPlus via equations from ASHRARE 90.1 Appendix G (for baseline systems) and fan specifications (for proposed systems). Three key inputs are needed in EnergyPlus:

- Supply Fan Total Efficiency
- Supply Fan Delta Pressure {Pa}
- Supply Fan Motor Efficiency

In order to calculate these inputs, this spreadsheet will lead you through a series of steps, depending on the system type required for your building type. The tabs of this spreadsheet are as follows:

- Introduction
- Systems 1 & 2
- Systems 3 & 4
- Systems 5 - 8
- Proposed System
- Resources

Colored cells signify inputs, outputs, links, and instructive text.

Last updated: 2021

LM-83 Three-Phase Daylight Simulation Script

Priority: None

Link: http://idlboise.com/content/lm-83-12-three-phase-daylight-simulation-script

Description: Annual simulation of dynamic/complex fenestration systems under LM-83 guidelines. This script will generate its own folder structure beyond the starting directories required, which are outlined below.

Version 1.2.0 (August 25, 2017)

Author: Alen Mahic, Ery Djunaedy (Energy Studies in Buildings Laboratory University of Oregon; Integrated Design Lab University of Idaho) This work is licensed under the Creative Commons Attribution 3.0 Unported License. To view a copy of this license, visit GPL v.3

In plain English: you are free to use this script, distribute it, make changes to it, as long as (1) you acknowledge Alen Mahic, Ery Djunaedy and the Integrated Design Lab as the original authors, and (2) you acknowledge that the script is provided as-is with absolutely no warranty, and that the authors and the University of Idaho are not liable to anything that happens or does not happen in relation to the use of this script.

Radiance 5.0+ is required.

Last updated: 2022

Infiltration Equations & Conversions

Priority: Low

Link: http://idlboise.com/content/infiltration-equations-conversions-0

Description: A key factor in building heat gain and loss may be the infiltration rate, or the rate at which outdoor air is exchanged with conditioned interior air through the envelope. This spreadsheet tool outlines a set of simplified equations aimed at converting typical, real world infiltration measurements into metrics that can be input into EnergyPlus. In using methods outlined in the document Infiltration Modeling Guidelines for Commercial Building Energy Analysis by the Pacific Northwest National Laboratory, we were able to convert common metrics of I75 and ACH50, into ones that could be conveniently input into an Energy Plus Model (Idesign and ACHnat).

NOTE: At this time, this calculation tool does not take into account infiltration from stack pressure, only horizontal wind pressure.

Key Definitions

- ACH50-The number of complete air changes that occur within an hour when the building is pressurized at 50 Pascals. This metric is usually used in residential infiltration measurement.
- ACHnat-The number of natural air changes that occur with an hour when the building is naturally pressurized.
- I75- The infiltration flow rate of air in cubic feet per minute per square foot of exterior exposed surface area when the building is pressurized at 75 Pascals. This metric is more commonly used in commercial infiltration measurement.
- Idesign- The infiltration flow rate of air in cubic feet per minute per square foot of exterior exposed surface area when the building is naturally pressurized.

Spreadsheets

- Spreadsheets 1 and 2 can be used to convert I75 into Idesign. Spreadsheet "1. I75 to Idesign Text," explains the method and equations for the conversion. "2. I75 to Idesign Calculations," is an interactive spreadsheet that takes your project's input and provides an output that can be used in EnergyPlus.
- Spreadsheets 3 and 4 can be used to convert ACH50 into ACHnat. As in spreadsheets 1-2, "3. ACH50 to ACHnat Text," explains the method and equations for the conversion. "4. ACH50 to ACHnat Calculations," is an interactive spreadsheet that takes your project's input and provides an output that can be used in EnergyPlus.
- Spreadsheets 5 and 6 are for comparing ACH50 into Idesign metrics. As in spreadsheets 1-4, "5. Compare ACH and I Text," explains the method and equations for the conversion. "6. Compare ACH to I Calculation," is an interactive spreadsheet that takes your project's input and provides an output of comparisons between the different metrics.
- Spreadsheet 7 is a provides a reverse calculation. "7. Reverse Calcs" allows you to convert from an EnergyPlus input into I75.
- Spreadsheet 8 is a reference tab. "8. Appendix" contains useful reference charts for spreadsheets 1-7.

Last updated: 2021

The Climate Responsive Design Web Tool Sets

Priority: None

Link: http://idlboise.com/content/climate-responsive-design-web-tool

Description: The Climate Responsive Design web tool is designed to graphically illustrate the feasibility and potential energy benefits of several climate responsive design strategies. The tool is intended to help designers and owners make correct early decisions that will result in buildings that are more energy efficient. The output of the tool are graphic data plots designed to illustrate not only conventional climate data, such as temperature and relative humidity, but also more complex interactions of these raw weather data with building specific user input data and a rule set for various energy efficient design strategies.

The Climate Responsive Design web tool requires viewing in Firefox internet browser.

Last updated: 2021

Climate Design Resources – 1st & 2nd Generation Tool Sets

Priority: None

Link: http://idlboise.com/content/ui-idl-climate-design-resources-1st-2nd-generation-tool-sets

Description: The Idaho Power Company funded the University of Idaho Integrated Design Lab (UI-IDL) to produce a series of climate design resources to help assist in the conceptual and early design of passive strategies. Through their support, the UI-IDL has developed two generations of spreadsheet calculators that are capable of analyzing building loads and energy consumption impacts of a range of different design strategies over three reference cities. You can download the tools and both the 1st and 2nd generation research reports at the bottom of this webpage. The reports provide insight into the methodology of the research used to develop the tools as well as information on how to use them most effectively. Currently, there are seven different calculation spreadsheets that span across two different generations of tool development:

FIRST GENERATION TOOLS

- Heat Gain Calculations
- Cross Ventilation
- Stack Ventilation
- Night Ventilation Thermal Mass

SECOND GENERATION TOOLS

- Balance Point Calculation
- Passive Solar
- Earth Tube

Each spreadsheet contains multiple tabs and a step-by-step process that directs the user to define the critical baseline and performance parameters of the building. These factors are linked to pre-defined equations within the spreadsheet that automatically provide the peak cooling loads, cooling capacities, and describe other critical design criteria. Charts, line graphs, and other forms of graphic information also automatically populate the workspace to provide rich visual feedback to the user. The spreadsheets also contain a reference tab that consolidates a myriad of textbook, code, and other sources needed to complete the step-by-step instructions. Additionally, a variety of weather data, including hourly information from TMY weather files, are embedded into the calculations based upon three different reference cities within the Idaho Power Company service territory. Once each tab is filled out, the results pages of the spreadsheets contains all of the important outputs needed to evaluate how much the passive design measure can contribute to the peak loads or energy savings of the building. Changes to the building parameters are instantaneous, making the Climate Tools Package an ideal instrument used to explore different design iterations and how they might facilitate passive design strategies.

Goals

The ultimate goal of the Climate Tools Package is to reduce the loads and energy consumption of a building through passive design measures. This happens mainly by embedding, early in the design process, the analysis of the performance capabilities of different passive cooling and heating strategies. Once a performance capacity is calculated and compared against peak loads of a building, a qualitative decision can be made whether or not to pursue more detailed analysis. If certain passive strategies are proven to meet some or all of the peak load, this may warrant further development. Potential next steps could involve more advanced analysis such as building simulation to quantify annual energy savings based on actual weather data.

Last updated: 2021

Thermal Energy Savings Tabulator (TEST)

Priority: None

Link: http://www.idlboise.com/content/thermal-energy-savings-tabulator-test

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

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

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

Last updated: 2021

Construction Insulation Value Calculator

Priority: None

Link: http://idlboise.com/content/construction-insulation-value-calculator

Description: This spreadsheet is designed to calculate insulation values of individual material layers and whole constructions of EnergyPlus objects.

Last updated: 2021

Sustainable Design & Practice Benefits

Priority: None

Link: http://idlboise.com/content/sustainable-design-practice-benefits

Description: Sponsored by the Idaho Power Company, the University of Idaho Integrated Design Lab (UI-IDL) developed this series of infographics to communicate sustainable design & practice Benefits of five different building types for their bottom line impact on efficiency for each building type. Architects and engineers can also use this information to make early design decisions with compelling numbers for additional non-energy benefits of energy efficient design. Currently, there are five printable, single-sided 8.5X11" infographics describing specific benefits and strategies for Grocery, Hotel, Multi-family Housing, Office, and Retail building types.

EXPECTED BENEFITS

- Broadening the scope of sustainable design effectiveness beyond simple utility cost payback gives a more accurate picture of the financial benefits available through sustainable design
- Strategies for specific occupancy types highlight the solutions that are most effective and easiest to achieve for each unique set of needs. Efficiency tips for additional building types can be found at Idahopower.com/business

- Better information during the design phase means a more accurate prediction of a building's performance, avoiding costly changes down the road
- Readily available and easily understandable information means increased participation in efficiency programs by designers, employees, and users of a space
- Energy strategies that go beyond building design and highlight savings opportunities in day to day operation mean greater energy savings with minimal cost
- Sustainable design and responsible energy consumption can increase a user's comfort and appreciation, leading to more positive user experiences and an increase in community support and interaction
- Power companies offer financial incentives to help offset the costs of implementing sustainable design strategies. Available for new construction, retrofits, custom projects, and flex peak programs, Idaho Power helps to make it more affordable than ever to incorporate sustainable and energy-efficient design decisions into your project. Additional information on Idaho Power incentive programs can be found at Idahopower.com/business

Energy and cost savings attributed to efficiency measures are well documented. However, with additional opportunities to increase comfort, efficiency, community involvement, and customer satisfaction, sustainable design and practice could have an impact on your bottom line far beyond reduced utility bills.

Last updated: 2021

Daylight Pattern Guide

Priority: None

Link: http://idlboise.com/content/cbecs-data-visualization-infographics

Description: The Daylighting Pattern Guide is the newest offering in the Advanced Buildings suite of tools and resources to help design teams create high performance commercial buildings. This no-cost, interactive design tool uses a combination of real-world built examples and advanced simulation to set the stage for substantial reductions in lighting power consumption and overall building energy use. It was developed through a partnership between New Buildings Institute (NBI), University of Idaho and University of Washington.

High quality daylighting design has the potential to increase user satisfaction and productivity and save substantial energy. However, successfully designing daylighting into buildings in a manner that supports high ratings of visual comfort while also saving energy can be a complex and challenging process.

The Daylighting Pattern Guide presents 19 prime examples of well-designed daylit spaces around the United States. Each project was photographed, physically measured and simulated using the Radiance simulation tool. Sensitivity analysis of key design variables was conducted on each project to demonstrate whether the outcome was optimized and to illustrate the impact of multiple 'alternate design decisions' on the daylighting performance.

Key daylight patterns, or variables including orientation, glazing layout, area, shading strategies, furniture layout, ceiling height, that contribute to the success or failure of a daylighting design were also identified. This information allows users to differentiate between good built examples of daylit space, the information generated by design analysis tools, and the 'rule of thumb' guidelines that designers commonly apply.

Project types included in analysis are offices, schools, libraries, laboratories, museums, industrial facilities, and recreational facilities across a diverse set of regional climates.

Last updated: 2021

COVID Impact Modeling

Priority: None

Link: http://idlboise.com/content/covid-impact-modeling

Description: Sponsored by the Idaho Power Company, the University of Idaho Integrated Design Lab (UI-IDL) developed this series of infographics to communicate how COVID-19 has brought the issue of indoor air quality to the forefront of building science. Virus mitigation strategies range in effectiveness, efficiency, and costs depending on the building type, use types, and local climate. Using Open Studio and Energy+, the IDL examined the energy and cost impacts of six different mitigation strategies for commercial buildings in the Treasure Valley.

Last updated: 2022

IPC Meter Analysis Template

Priority: None

Link: http://www.idlboise.com/content/idaho-power-company-meter-analysis-template

Description: This spreadsheet is designed to handle meter data provided in the Idaho Power format. IPC provides hourly kW data in a table where each row is a day and each column is an hour. This spreadsheet will format that information so it can be more easily graphed or summed. This should help to analyze seasonal behavior and the building's hourly profile. In order to use this spread sheet, copy and past the information you need over the IPC data sheet. Be careful that your data set is formatted the same way it appears in the current IPC data sheet in this workbook. Also be sure to delete the information currently in this workbook's IPC data sheet, so you don't mix the two sets of data. Once you are sure that information in the spreadsheet you receive from the Idaho Power representative is the same as what appears in the IPC data sheet.

Last updated: 2023

4. Design Tools Maintenance

IPC Meter Analysis Template

Added in November 2023 there is no maintenance currently planned.

2018 CBECS Data Visualization Infographics

Added in December 2023 this tool will be expanded to include additional building types in 2024.

2018 CBECS Micro Master

Added in December 2023 this tool will be expanded to include additional building types in 2024.

2012 CBECS Data Visualization Infographics

Cataloged in 2023, ready for updates. Data will be reorganized and presented in a manner that allows it to better correlate to the 2018 data.

2012 CBECS Micro Master v2

Cataloged in 2022, ready for updates. Data will be reorganized and presented in a manner that allows it to better correlate to the 2018 data.

Weather Normalization

Cataloged in 2022, ready for updates.

EnergyPlus Fan Energy Calculator

Cataloged in 2022, ready for updates.

LM-83 Three-phase Daylight Simulation Script

Cataloged in 2022, no updates needed.

Infiltration Equations & Conversions

None to date and there is no maintenance currently planned.

The Climate Responsive Design Web Tool

None to date and there is no maintenance currently planned.

Climate Design Resources - 1st & 2nd Generation Tool Sets

None to date and there is no maintenance currently planned.

Thermal Energy Savings Tabulator (TEST)

None to date and there is no maintenance currently planned.

Construction Insulation Value Calculator

None to date and there is no maintenance currently planned.

Sustainable Design & Practice Benefits

None to date and there is no maintenance currently planned.

Daylight Pattern Guide

None to date and there is no maintenance currently planned.

5. Design Tools Statistics

We saw a total of 2,396 visits to the home/landing page for the digital design tools (http://www.idlboise.com/content/design-tools). The table below shows the number of visits to a design tools page as of December 15th, 2023.

#	Name	Page Visits
1	CBECS Data Visualization Infographics 2012	334
2	CBECS Micro Master v2 2012	0
3	Weather Normalization	167
4	EnergyPlus Fan Energy Calculator	379
5	LM-83 Three-phase Daylight Simulation Script	132
6	Infiltration Equations & Conversions	166
7	The Climate Responsive Design Web Tool	224
8	Climate Design Resources - 1st & 2nd Generation Tool Sets	157
9	Thermal Energy Savings Tabulator (TEST)	162
10	Construction Insulation Value Calculator	152
11	Sustainable Design & Practice Benefits	245
12	Daylight Pattern Guide	311
13	COVID Impact Modeling (New)	133
14	IPC Meter Analysis Template (New)	11
15	Indoor Air Quality Tool	0
16	CBECS Data Visualization Infographics 2018	0
17	CBECS Micro Master 2018	0
		Total 2,573

6. Future Work & Design Tools

Developing Guides/How-to for Design Tools

While most design tools include an introduction or instructions to assist users with using the tool, we don't have any examples or tutorials they can reference. An example or tutorials would include using the tool, when to use the tool, and when not to use the tool.

Indoor Air Quality

Energy efficient indoor air quality tool that utilizes data and research accumulated through the 2021 IAQ task. This tool will have drop- down menus for baseline and proposed methods along with manual entry fields as needed to reasonably estimate kWh/yr usage and costs for the most popular configurations. The tool will utilize current IPC rate schedules to provide potential bill savings and payback years.

CBECS 2018 Data Visualization

The IDL will continue to work with CBECS data to develop an additional four building types, food service, public assembly, public safety, and warehouse (non-refrigerated).

CBECS 2018 Microdata

The IDL will continue to work with CBECS data to develop an additional four building types, food service, public assembly, public safety, and warehouse (non-refrigerated).

CBECS 2012 Data Visualization

The IDL will reorganize the data and add additional categories that were not tracked in 2012 but were available and are currently being used in the 2018 data visualization. This will allow users to better understand the changes that occurred between the 2012 and 2018 CBECS study.

CBECS 2012 Microdata

The IDL will reorganize the data and add additional categories that were not tracked in 2012 but were available and are currently being used in the 2018 microdata. This will allow users to better understand the changes that occurred between the 2012 and 2018 CBECS study.

RESEARCH/SURVEYS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2023 A/C Cool Credit Non-Participant Survey	Residential	Idaho Power	Idaho Power	Survey
2023 Commercial Energy Savings Kits Survey	Commercial/Industrial	Idaho Power	Idaho Power	Survey
2023 Idaho Power Weatherization Assistance for Qualified Customers Program Survey	Residential	Idaho Power	Idaho Power	Survey
2023 Idaho Power Weatherization Solutions for Eligible Customers Program Survey	Residential	Idaho Power	Idaho Power	Survey
2023 Retrofits Program Survey Results	Commercial/Industrial	Idaho Power	Idaho Power	Survey
2023 SBDI Program Customer Satisfaction Survey Reponses	Commercial/Industrial	DNV	DNV	Survey
2023 Shade Tree Program Survey Results	Residential	Idaho Power	Idaho Power	Survey

2023 A/C Cool Credit Non Participant Survey Results

Do you own or rent your home?

Answer	Response	Percent
Own	523	92.08%
Rent	45	7.92%
Total	**568**	

Do you have a central air conditioner?

Answer	Response	Percent
Yes	481	84.53%
No	88	15.47%
Total	**569**	

Our records indicate that you do not currently participate in the A/C Cool Credit Program. Which of the following would best describe why you do not participate in the program?
(Check all that apply)

Answer	Response	Percent
Wasn't aware of the program	222	46.44%
Don't want my air conditioner interrupted	188	39.33%
Didn't fully understand the program	70	14.64%
Incentive for participating is too low/not enough	164	34.31%
Don't have an air conditioning system that qualifies	10	2.09%
Other (please specify)	52	10.88%
Total	**706**	**n=478**

How interested are you in participating in the A/C Cool Credit Program?

Answer	Response	Percent
Very interested	54	11.25%
Somewhat interested	194	40.42%
Not very interested	122	25.42%
Not interested at all	110	22.92%
Total	**480**	

On a scale of 1 to 5 (where 1 means "not very motivating" and 5 means "very motivating"), please rate how much the following items would motivate you to participate in the A/C Cool Credit program.

Answer	Response	Percent
The monthly $5 bill credit		
1 - Not very motivating	241	50.95%
2	64	13.53%
3	72	15.22%
4	42	8.88%
5 - Very motivating	54	11.42%
Total	**473**	
Helping the environment		
1 - Not very motivating	95	20.39%
2	56	12.02%
3	133	28.54%
4	87	18.67%
5 - Very motivating	95	20.39%
Total	**466**	
No cost to participate		
1 - Not very motivating	134	29.07%
2	28	6.07%
3	103	22.34%
4	61	13.23%
5 - Very motivating	135	29.28%
Total	**461**	

Select the top three reasons why you would NOT be interested in participating in the A/C Cool Credit program in the future. (Check up to three)

Answer	Response	Percent
Number of events per week	59	12.27%
Number of events per season	41	8.52%
Length of season (June 15 - September 15)	44	9.15%
Event times (sometime between 3 pm and 11 pm)	144	29.94%
Length of events (up to 4 hours)	184	38.25%
Incentive amount ($5/month)	179	37.21%
Concerned about possible change to indoor home temperature during events	248	51.56%
Concern the device may affect A/C unit	112	23.28%
Don't want a device installed on property	144	29.94%
Other (please specify)	53	11.02%
Total	**1,208**	**n=481**

Do you recall seeing or hearing any advertisements for the A/C Cool Credit program?(Check all that apply)

Answer	Response	Percent
No, I do not recall seeing any advertisements.	376	66.31%
Yes, in a television commercial	19	3.35%
Yes, in an insert in my power bill	107	18.87%
Yes, in an email	64	11.29%
Yes, in a letter	43	7.58%
Yes, online	30	5.29%
Yes, on a radio commercial	5	0.88%
Yes (please specify)	11	1.94%
Total	**655**	**n=567**

How would you prefer Idaho Power communicate with you about energy efficiency programs?(Check all that apply)

Answer	Response	Percent
Promotional material in Idaho Power bill	160	28.67%
Newsletter	56	10.04%
Letter or postcard in the mail	148	26.52%
Website	57	10.22%
Social media (i.e., Facebook and Instagram)	31	5.56%
Email	369	66.13%
Text	53	9.50%
Other (please specify)	7	1.25%
Total	**881**	**n=558**

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

Answer	Response	Percent
Before 1950	61	10.76%
1950-1959	34	6.00%
1960-1969	23	4.06%
1970-1979	67	11.82%
1980-1989	38	6.70%
1990-1999	83	14.64%
2000-2009	103	18.17%
2010-2019	82	14.46%
2020-present	58	10.23%
Don't know	18	3.17%
Total	**567**	

What one fuel is most often used to heat this residence?

Answer	Response	Percent
Electricity	146	25.80%
Natural gas	390	68.90%
Propane	8	1.41%
Fuel oil	1	0.18%
Wood	16	2.83%
Other (please specify)	5	0.88%
Total	**566**	

Which of the following best describes your age?

Answer	Response	Percent
Under 18	0	0.00%
18-24	1	0.18%
25-34	50	8.82%
35-44	100	17.64%
45-60	144	25.40%
Over 60	272	47.97%
Total	**567**	

2023 Commercial Savings Kit Survey Results

How did you learn about the Energy-Saving Kit program?(Check all that apply)

Answer	Response	Percent
Idaho Power email	42	66.67%
Idaho Power employee	2	3.17%
Idaho Power newsletter	18	28.57%
Idaho Power My Account	7	11.11%
LinkedIn	0	0.00%
Other business owner	0	0.00%
Other (please specify)	1	1.59%
Total	**70**	**n=63**

Of the items included in the Energy-Saving Kit you received, which of the following have you installed at your business:

8 Watt LED lamp #1

Answer	Response	Percent
Yes	45	71.43%
No	18	28.57%
Total	**63**	

8 Watt LED lamp #2

Answer	Response	Percent
Yes	45	71.43%
No	18	28.57%
Total	**63**	

8 Watt BR30 reflector LED lightbulb #1

Answer	Response	Percent
Yes	33	52.38%
No	30	47.62%
Total	**63**	

8 Watt BR30 reflector LED lightbulb #2

Answer	Response	Percent
Yes	25	39.68%
No	38	60.32%
Total	**63**	

LED retrofit kit for exit signs

Answer	Response	Percent
Yes	10	15.87%
No	53	84.13%
Total	**63**	

Kitchen Aerator

Answer	Response	Percent
Yes	27	42.86%
No	36	57.14%
Total	**63**	

Bathroom Aerator

Answer	Response	Percent
Yes	28	44.44%
No	35	55.56%
Total	**63**	

How satisfied are you with the item(s) that you installed?

8 Watt LED lamp #1

Answer	Response	Percent
Very satisfied	39	86.67%
Somewhat satisfied	3	6.67%
Neither satisfied nor dissatisfied	1	2.22%
Somewhat dissatisfied	1	2.22%
Very dissatisfied	1	2.22%
Total	**45**	

8 Watt LED lamp #2

Answer	Response	Percent
Very satisfied	39	86.67%
Somewhat satisfied	3	6.67%
Neither satisfied nor dissatisfied	1	2.22%
Somewhat dissatisfied	1	2.22%
Very dissatisfied	1	2.22%
Total	**45**	

8 Watt BR30 reflector LED lightbulb #1

Answer	Response	Percent
Very satisfied	27	81.82%
Somewhat satisfied	4	12.12%
Neither satisfied nor dissatisfied	1	3.03%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	1	3.03%
Total	**33**	

8 Watt BR30 reflector LED lightbulb #2

Answer	Response	Percent
Very satisfied	20	80.00%
Somewhat satisfied	3	12.00%
Neither satisfied nor dissatisfied	1	4.00%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	1	4.00%
Total	**25**	

LED retrofit kit for exit signs

Answer	Response	Percent
Very satisfied	5	50.00%
Somewhat satisfied	3	30.00%
Neither satisfied nor dissatisfied	1	10.00%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	1	10.00%
Total	**10**	

Kitchen Aerator

Answer	Response	Percent
Very satisfied	17	62.96%
Somewhat satisfied	5	18.52%
Neither satisfied nor dissatisfied	3	11.11%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	2	7.41%
Total	**27**	

Bathroom Aerator

Answer	Response	Percent
Very satisfied	23	82.14%
Somewhat satisfied	2	7.14%
Neither satisfied nor dissatisfied	3	10.71%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	0	0.00%
Total	**28**	

Overall, how satisfied are you with the Energy-Saving Kit program?

Answer	Response	Percent
Very satisfied	46	73.02%
Somewhat satisfied	10	15.87%
Neither satisfied nor dissatisfied	6	9.52%
Somewhat dissatisfied	1	1.59%
Very dissatisfied	0	0.00%
Total	**63**	

Since receiving the Energy-Saving Kit, have you gone to Idaho Power's website to look for information about energy efficiency programs or to find other ways to save?

Answer	Response	Percent
Yes	19	30.16%
No	44	69.84%
Total	**63**	

2023 Weatherization Assistance for Qualified Customers Program Survey		
Metro Community Services	17	14.91%
Eastern Idaho Community Action Partnership		0.00%
El Ada Community Action Partnership	77	67.54%
South Central Community Action Partnership	16	14.04%
Southeastern Idaho Community Action Agency		0.00%
Community Connection of Northeast Oregon		0.00%
Community in Action	4	3.51%
Total	**114**	

How did you learn about the weatherization program?		
Agency/Contractor flyer	13	10.32%
Idaho Power employee	9	7.14%
Idaho Power web site	4	3.17%
Friend or relative	59	46.83%
Letter in mail	4	3.17%
Other (Please specify)	32	25.40%
none listed	5	3.97%
Total	**126**	

Other Option [Other (Please specify)]
by phone
HVAC Contractor
My wife friend or info through ID Power
Heard about program
Bill Stuffer
bill stuff
bill stuffer
bill stuffer
bill stuffer
bill stuffer
bill stuffer
bill stuffer
bill stuffer
bill stuffer
El-Ada
social worker
El-Ada
Idaho Power bill
got a call
done in Oregon
KNOWLEDGE
Neighbors
friend
left blank
neighbors
used El Ada in the past
El Ada
have used utility assistance before

internet
phone call from El Ada
left blank
left blank
Landlord
Dad
I've had this before, weatherization called me
El Ada
left blank
neighbor
El Ada called me
El Ada
left blank
online search
left blank
left blank

What was your primary reason for participating in the weatherization program?		
Reduce utility bills	92	42.79%
Improve comfort of home	43	20.00%
Furnace concerns	40	18.60%
Water heater concerns	14	6.51%
Improve insulation	17	7.91%
Other (please specify)	9	4.19%
Total	**215**	

Other Option [Other (please specify)]
AC
ceiling heat quit-had no heating system, using space heaters and windows and no AC
el calenton, no forcincbo, 4 vent estance rotes
Five
fix window
heat pump
home safety
landlord refused to pay for new heating unit
window replacement

If you received any energy efficiency equipment upgrade as part of the weatherization, how well was the equipment's operation explained to you?		
Completely	105	85.37%
Somewhat	17	13.82%
Not at all	1	0.81%
Total	**123**	

Which of the following did you learn about from the auditor or crew during the weatherization process? (Check all that apply)		
How air leaks affect energy usage	74	20.39%
How insulation affects energy usage	62	17.08%
How to program the new thermostat	56	15.43%
How to reduce the amount of hot water used	40	11.02%
How to use energy wisely	70	19.28%
How to understand what uses the most energy in my home	61	16.80%
Other (Please specify)	0	0.00%
Total	**363**	

Other Option [Other (Please specify)]
they were all amazing!
the importance of properly insulating our home
about bathroom fan
none

Based on the information you received from the agency/contractor about energy use, how likely are you to change your habits to save energy?		
Very likely	83	70.94%
Somewhat likely	31	26.50%
Not very likely	1	0.85%
Not likely at all	2	1.71%
Total	**117**	

How much of the information about energy use have you shared with other members of your household?		
All of it	71	59.17%
Some of it	25	20.83%
None of it	1	0.83%
N/A	23	19.17%
Total	**120**	

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?		
Very likely	46	41.44%
Somewhat likely	33	29.73%
Somewhat unlikely	2	1.80%
Very unlikely	2	1.80%
N/A	28	25.23%
Total	**111**	

What habits are you and other members of your household most likely to change to save energy? (check all that apply)		
Washing full loads of clothes	72	17.14%
Washing full loads of dishes	47	11.19%
Turning off lights when not in use	84	20.00%
Unplugging electrical equipment when not in use	55	13.10%
Turning the thermostat up in the summer	76	18.10%
Turning the thermostat down in the winter	80	19.05%
Other (please specify)	6	1.43%
Total	**420**	

Other Option [Other (please specify)]
already do it
it varies depending on how cold it is in winter
N/A
shower length
staying aware of potential air flow issues and water conservation
we did all the things listed but teaching them about insulation and getting a better bathroom vent is

How much do you think the weatherization you received will affect the comfort of your home?		
Significantly	105	88.98%
Somewhat	9	7.63%
Very little	2	1.69%
Not at all	2	1.69%
Total	**118**	

Rate the Agency/Contractor based on your interactions with them.		
Courteousness		
Excellent	113	94.96%
Good	6	5.04%
Fair	0	0.00%
Poor	0	0.00%
Total	**119**	
Professionalism		
Excellent	109	90.83%
Good	9	7.50%
Fair	2	1.67%
Poor	0	0.00%
Total	**120**	
Explanation of work to be performed on your home		
Excellent	109	90.83%
Good	9	7.50%
Fair	2	1.67%
Poor	0	0.00%
Total	**120**	

Overall experience with Agency/Contractor		
Excellent	109	91.60%
Good	7	5.88%
Fair	1	0.84%
Poor	2	1.68%
Total	**119**	

Were you aware of Idaho Power's role in the weatherization of your home?		
Yes	73	62.39%
No	44	37.61%
Total	**117**	

Overall how satisfied are you with the weatherization program you participated in?		
Very satisfied	111	91.74%
Somewhat satisfied	10	8.26%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	0	0.00%
Total	**121**	

How has your opinion of Idaho Power changed as a result of its role in the weatherization program?		
Improved	103	84.43%
Stayed the same	19	15.57%
Decreased	0	0.00%
Total	**122**	

How many people, beside yourself, live in your home year-round?		
0	36	29.51%
1	30	24.59%
2	21	17.21%
3	12	9.84%
4	8	6.56%
5	5	4.10%
6 or more	10	8.20%
Total	**122**	

How long have you been an Idaho Power customer?		
Less than 1 year	0	0.00%
1-10 years	18	14.75%
11-25 years	48	39.34%
26 years or more	56	45.90%
Total	**122**	

Please select the category below that best describes your age:		
Under 25	2	1.61%
25-34	11	8.87%
35-44	21	16.94%
45-54	16	12.90%
55-64	22	17.74%
65-74	30	24.19%
75 or older	22	17.74%
Total	**124**	

Select the response below that best describes the highest level of education you have attained:		
Less than High School	18	8.57%
High School graduate or GED	53	25.24%
Some College or Technical School	29	13.81%
Associate Degree	40	19.05%
College Degree (including any graduate school or graduate degrees)	70	33.33%
Total	**210**	

2023 Weatherization Solutions for Eligible Customers Program Survey

Home Energy Management	11	100%
Total		

How did you learn about the weatherization program?		
Agency/Contractor flyer	3	27.27%
Idaho Power employee	0	0.00%
Idaho Power web site	1	9.09%
Friend or relative	3	27.27%
Letter in mail	2	18.18%
Other (Please specify)	2	18.18%
Total	**11**	

Other Option [Other (Please specify)]
Bill stuffer
Bill stuffer

What was your primary reason for participating in the weatherization program?		
Reduce utility bills	4	30.77%
Improve comfort of home	6	46.15%
Furnace concerns	0	0.00%
Water heater concerns	0	0.00%
Improve insulation	3	23.08%
Other (please specify)	0	0.00%
Total	**13**	

If you received any energy efficiency equipment upgrade as part of the weatherization, how well was the equipment's operation explained to you?		
Completely	2	18.18%
Somewhat	0	0.00%
Not at all	9	81.82%
Total	**11**	

Which of the following did you learn about from the auditor or crew during the weatherization process? (Check all that apply)		
How air leaks affect energy usage	10	18.18%
How insulation affects energy usage	10	18.18%
How to program the new thermostat	2	3.64%
How to reduce the amount of hot water used	11	20.00%
How to use energy wisely	11	20.00%
How to understand what uses the most energy in my home	10	18.18%
Other (Please specify)	1	1.82%
Total	**55**	

Other Option [Other (Please specify)]
Hot tub

Based on the information you received from the agency/contractor about energy use, how likely are you to change your habits to save energy?		
Very likely	7	63.64%
Somewhat likely	3	27.27%
Not very likely	1	9.09%
Not likely at all	0	0.00%
Total	**11**	

How much of the information about energy use have you shared with other members of your household?		
All of it	7	63.64%
Some of it	2	18.18%
None of it	2	18.18%
N/A	0	0.00%
Total	**11**	

If you shared the energy use information with other members of your household, how likely do you think household members will change habits to save energy?		
Very likely	3	27.27%
Somewhat likely	5	45.45%
Somewhat unlikely	1	9.09%
Very unlikely	0	0.00%
N/A	2	18.18%
Total	**11**	

What habits are you and other members of your household most likely to change to save energy? (check all that apply)		
Washing full loads of clothes	2	9.52%
Washing full loads of dishes	2	9.52%
Turning off lights when not in use	1	4.76%
Unplugging electrical equipment when not in use	7	33.33%
Turning the thermostat up in the summer	1	4.76%
Turning the thermostat down in the winter	2	9.52%
Other (please specify)	6	28.57%
Total	**21**	

Other Option [Other (please specify)]
already does
Already does these
already does these items
Already practice these
customer already does these
practice these already

How much do you think the weatherization you received will affect the comfort of your home?		
Significantly	10	90.91%
Somewhat	1	9.09%
Very little	0	0.00%
Not at all	0	0.00%
Total	**11**	

Rate the Agency/Contractor based on your interactions with them. Courteousness		
Excellent	11	100.00%
Good	0	0.00%
Fair	0	0.00%
Poor	0	0.00%
Total	**11**	

Professionalism		
Excellent	11	100.00%
Good	0	0.00%
Fair	0	0.00%
Poor	0	0.00%
Total	**11**	

Explanation of work to be performed on your home		
Excellent	11	100.00%
Good	0	0.00%
Fair	0	0.00%
Poor	0	0.00%
Total	**11**	

Overall experience with Agency/Contractor		
Excellent	11	100.00%
Good	0	0.00%
Fair	0	0.00%
Poor	0	0.00%
Total	**11**	

Were you aware of Idaho Power's role in the weatherization of your home?		
Yes	11	100.00%
No	0	0.00%
Total	**11**	

Overall how satisfied are you with the weatherization program you participated in?		
Very satisfied	11	100.00%
Somewhat satisfied	0	0.00%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	0	0.00%
Total	**11**	

How has your opinion of Idaho Power changed as a result of its role in the weatherization program?		
Improved	4	36.36%
Stayed the same	7	63.64%
Decreased	0	0.00%
Total	**11**	

How many people, beside yourself, live in your home year-round?		
0	3	27.27%
1	6	54.55%
2	1	9.09%
3	0	0.00%
4	1	9.09%
5	0	0.00%
6 or more	0	0.00%
Total	**11**	

How long have you been an Idaho Power customer?		
Less than 1 year	0	0.00%
1-10 years	1	9.09%
11-25 years	4	36.36%
26 years or more	6	54.55%
Total	**11**	

Please select the category below that best describes your age:		
Under 25	0	0.00%
25-34	0	0.00%
35-44	1	9.09%
45-54	1	9.09%
55-64	4	36.36%
65-74	3	27.27%
75 or older	2	18.18%
Total	**11**	

Select the response below that best describes the highest level of education you have attained:		
Less than High School	0	0.00%
High School graduate or GED	1	9.09%
Some College or Technical School	5	45.45%
Associate Degree	4	36.36%
College Degree (including any graduate school or graduate degrees)	1	9.09%
Total	**11**	

2023 Retrofit Simple Survey

How did you learn about the Retrofits program?

Answer	Responses	Percent
Idaho Power employee	10	14.49%
Contractor	39	56.52%
Equipment supplier	11	15.94%
Other business owner	3	4.35%
Other (please specify)	6	8.70%
Total	**69**	

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

Answer	Responses	Percent
Very satisfied	58	84.06%
Somewhat satisfied	8	11.59%
Neither satisfied nor dissatisfied	0	0.00%
Somewhat dissatisfied	3	4.35%
Very dissatisfied	0	0.00%
Total	**69**	

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

Answer	Responses	Percent
Very satisfied	59	85.51%
Somewhat satisfied	8	11.59%
Neither satisfied nor dissatisfied	2	2.90%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	0	0.00%
Total	**69**	

How satisfied are you with the equipment that was installed?

Answer	Responses	Percent
Very satisfied	62	89.86%
Somewhat satisfied	5	7.25%
Neither satisfied nor dissatisfied	2	2.90%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	0	0.00%
Total	**69**	

2023 SBDI Evaluation Results

Overall, how satisfied are you with the program?

Answer	Response	Percent
Very satisfied	46	96%
Somewhat satisfied	2	4%
Somewhat dissatisfied	0	0%
Very dissatisfied	0	0%
Total	**48**	

How easy was it to participate in the program?

Answer	Response	Percent
Very easy	45	94%
Somewhat easy	2	4%
Somewhat difficult	1	2%
Very difficult	0	0%
Total	**48**	

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

Answer	Response	Percent
Very likely	44	94%
Somewhat likely	3	6%
Not very likely	0	0%
Not likely at all	0	0%
Total	**47**	

How satisfied are you with the equipment that was installed?

Answer	Response	Percent
Very satisfied	44	92%
Somewhat satisfied	4	8%
Somewhat dissatisfied	0	0%
Very dissatisfied	0	0%
Total	**48**	

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

Answer	Response	Percent
Very satisfied	44	92%
Somewhat satisfied	3	6%
Somewhat dissatisfied	1	2%
Very dissatisfied	0	0%
Total	**48**	

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

Answer	Response	Percent
Idaho Power Energy Advisor	10	21%
Idaho Power Customer Service	1	2%
Email from Idaho Power	1	2%
Postal Mailing from Idaho Power	31	65%
Vendor or Contractor	3	6%
Idaho Power Website	0	0%
Other Business Owner or Employee	2	4%
Total	**48**	

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

Answer	Response	Percent
More favorable opinion of Idaho Power	29	62%
No change in opinion of Idaho Power	18	38%
Less favorable opinion of Idaho Power	0	0%
Total	**47**	

Which of the following best describes your business?

Answer	Response	Percent
Agriculture, Forestry and Fishing	1	2%
Finance, Insurance and Real Estate	3	6%
Manufaturing	0	0%
Mining	0	0%
Public Administration	0	0%
Retail Trade	5	11%
Services	26	55%
Transportation, Communications, Electric, Gas & Sanitary Services	0	0%
Wholesale Trade	0	0%
Other (please specify)	12	26%
Total	**47**	

2023 Shade Tree Survey Results

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

Answer	Response	Percent
Email from Idaho Power	205	39.12%
Friend or relative	147	28.05%
Neighbor	31	5.92%
Utility employee	25	4.77%
Letter	76	14.50%
Other (please specify)	71	13.55%
Total	**555**	**n=524**

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

Answer	Response	Percent
Tree was free	72	13.74%
Home too warm in the summer	90	17.18%
Reduce energy bill	90	17.18%
Improve landscape/property value	80	15.27%
Wanted a tree	112	21.37%
Help the environment	62	11.83%
Other (please specify)	18	3.44%
Total	**524**	

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

Answer	Response	Percent
Lack of knowledge	82	15.65%
Cost	320	61.07%
Time	46	8.78%
Other (please specify)	76	14.50%
Total	**524**	

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

Answer	Response	Percent
Garden section of do it yourself store	154	29.39%
Nursery/garden store	357	68.13%
Other (please specify)	13	2.48%
Total	**524**	

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

Answer	Response	Percent
10 minutes or less	320	61.30%
11-20 minutes	159	30.46%
21-30 minutes	32	6.13%
31 minutes or more	11	2.11%
Total	**522**	

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

Answer	Response	Percent
Very easy	379	72.47%
Somewhat easy	120	22.94%
Somewhat difficult	19	3.63%
Very difficult	5	0.96%
Total	**523**	

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

Answer	Response	Percent
One	96	18.32%
Two	428	81.68%
Total	**524**	

Ordered One Tree

When did you plant your shade tree?

Answer	Response	Percent
Same day as the tree pickup	35	36.46%
1-3 days after the tree pickup	40	41.67%
4-7 days after the tree pickup	9	9.38%
More than 1 week after the tree pickup	11	11.46%
Did not plant the tree	1	1.04%
Total	**96**	

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

Answer	Response	Percent
North	7	7.37%
South	17	17.89%
Northeast	1	1.05%
Southwest	12	12.63%
East	15	15.79%
West	28	29.47%
Southeast	7	7.37%
Northwest	8	8.42%
Total	**95**	

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

Answer	Response	Percent
20 feet or less	35	36.84%
21-40 feet	54	56.84%
41-60 feet	6	6.32%
More than 60 feet	0	0.00%
Total	**95**	

Received Two Trees

How many shade trees did you plant?

Answer	Response	Percent
One	18	4.21%
Two	405	94.63%
Did not plant the trees	5	1.17%
Total	**428**	

Ordered Two Planted One

When did you plant your shade tree?

Answer	Response	Percent
Same day as the tree pickup	2	11.11%
1-3 days after the tree pickup	6	33.33%
4-7 days after the tree pickup	7	38.89%
More than 1 week after the tree pickup	3	16.67%
Total	**18**	

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

Answer	Response	Percent
North	2	11.11%
South	2	11.11%
Northeast	1	5.56%
Southwest	2	11.11%
East	5	27.78%
West	4	22.22%
Southeast	1	5.56%
Northwest	1	5.56%
Total	**18**	

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

Answer	Response	Percent
20 feet or less	6	33.33%
21-40 feet	9	50.00%
41-60 feet	2	11.11%
More than 60 feet	1	5.56%
Total	**18**	

Ordered Two Planted Two

When did you plant your shade tree?

Answer	Response	Percent
Tree 1		
Same day as the tree pickup	67	16.54%
1-3 days after the tree pickup	206	50.86%
4-7 days after the tree pickup	74	18.27%
More than 1 week after the tree pickup	58	14.32%
Total	**405**	
Tree 2		
Same day as the tree pickup	62	15.31%
1-3 days after the tree pickup	204	50.37%
4-7 days after the tree pickup	80	19.75%
More than 1 week after the tree pickup	59	14.57%
Total	**405**	

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

Answer	Response	Percent
Tree 1		
North	29	7.16%
South	67	16.54%
Northeast	18	4.44%
Southwest	48	11.85%
East	59	14.57%
West	137	33.83%
Southeast	17	4.20%
Northwest	30	7.41%
Total	**405**	
Tree 2		
North	24	5.93%
South	69	17.04%
Northeast	17	4.20%
Southwest	61	15.06%
East	55	13.58%
West	133	32.84%
Southeast	26	6.42%
Northwest	20	4.94%
Total	**405**	

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

Answer	Response	Percent
Tree 1		
20 feet or less	137	33.83%
21-40 feet	204	50.37%
41-60 feet	43	10.62%
More than 60 feet	21	5.19%
Total	**405**	
Tree 2		
20 feet or less	101	24.94%
21-40 feet	210	51.85%
41-60 feet	69	17.04%
More than 60 feet	25	6.17%

Total	**405**	

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

Answer	Response	Percent
Changed my mind	3	12.50%
Did not like the tree	1	4.17%
Did not have time	0	0.00%
Other (please specify)	20	83.33%
Total	**24**	**n=24**

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

Answer	Response	Percent
Very satisfied	442	84.35%
Somewhat satisfied	77	14.69%
Somewhat dissatisfied	5	0.95%
Very dissatisfied	0	0.00%
Total	**524**	

What information did you find most valuable?

Answer	Response	Percent
Planting depth	284	54.51%
Circling roots	81	15.55%
Staking	49	9.40%
Watering	75	14.40%
Other (please specify)	32	6.14%
Total	**521**	

How much do you agree with the following statements:

I am satisfied with the Shade Tree Project pick up event

Answer	Response	Percent
Strongly agree	481	91.97%
Somewhat agree	36	6.88%
Somewhat disagree	5	0.96%
Strongly disagree	1	0.19%
Total	**523**	

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

Answer	Response	Percent
Strongly agree	420	80.31%
Somewhat agree	82	15.68%
Somewhat disagree	17	3.25%
Strongly disagree	4	0.76%
Total	**523**	

It was easy to plant my shade tree(s)

Answer	Response	Percent
Strongly agree	433	83.27%
Somewhat agree	84	16.15%
Somewhat disagree	1	0.19%
Strongly disagree	2	0.38%
Total	**520**	

I would recommend the program to a friend or relative

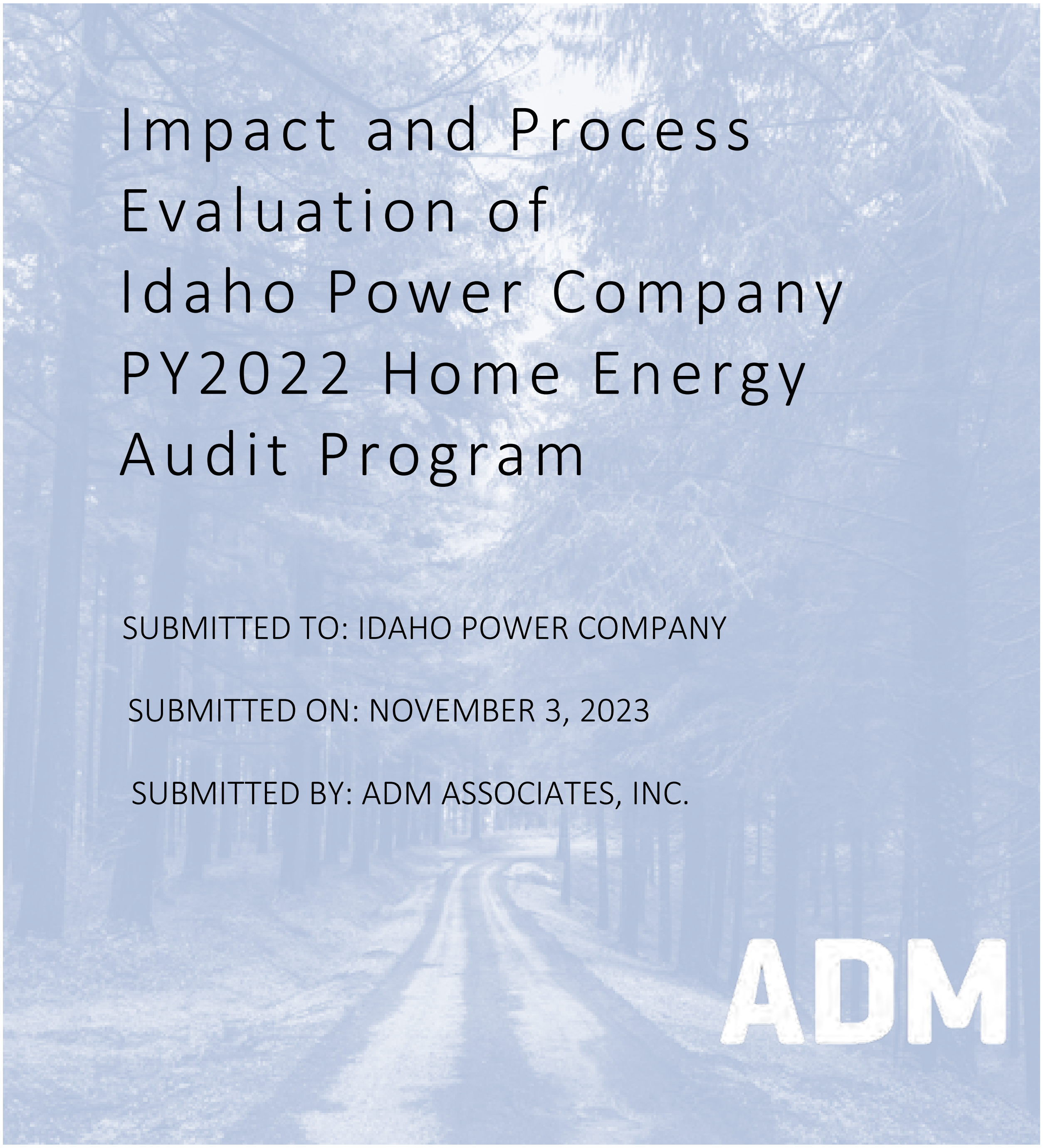
Answer	Response	Percent
Strongly agree	503	95.99%
Somewhat agree	20	3.82%
Somewhat disagree	1	0.19%
Strongly disagree	0	0.00%
Total	**524**	

I am satisfied with my overall experience

Answer	Response	Percent
Strongly agree	486	92.75%
Somewhat agree	35	6.68%
Somewhat disagree	3	0.57%
Strongly disagree	0	0.00%
Total	**524**	

EVALUATIONS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
Impact and Process Evaluation of Idaho Power Company PY2022 Home Energy Audit Program	Residential	ADM	Idaho Power	Impact and Process Evaluation
Impact Evaluation of Idaho Power Company PY2022 Small Business Direct Install Program	Commercial, Industrial	ADM	Idaho Power	Impact Evaluation
Irrigation Efficiency Rewards Evaluation (PY2022)	Irrigation	Tetra Tech	Idaho Power	Impact Evaluation
Residential New Construction Program PY2022 Evaluation	Residential	Tetra Tech	Idaho Power	Impact Evaluation
Shade Tree Project Impact Evaluation	Residential	Tetra Tech	Idaho Power	Impact Evaluation



Impact and Process Evaluation of Idaho Power Company PY2022 Home Energy Audit Program

SUBMITTED TO: IDAHO POWER COMPANY

SUBMITTED ON: NOVEMBER 3, 2023

SUBMITTED BY: ADM ASSOCIATES, INC.

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1. Executive Summary

This report is a summary of the 2022 program year (PY2022) Home Energy Audit (HEA) Program Impact Evaluation for Idaho Power Company (IPC) in Idaho. The evaluation was administered by ADM Associates, Inc. (herein referred to as the "Evaluators").

The Evaluators found the impact evaluation results for the Home Energy Audit Program to align with similar Home Energy Audit programs offered. The impact evaluation resulted in savings of 28,801 kWh at a realization rate of 102%.

The Evaluators conclude that the program is running smoothly and delivers sufficient energy efficiency options to Idaho Power customers. However, the Evaluators provide recommendations for providing additional information to program participants about other Idaho Power Company program offerings in order to remove customer barriers and increase throughput towards other programs.

1.1 Home Energy Audit Program

IPC's Home Energy Audit Program was designed to provide residential customers with a home energy audit conducted by a certified, third-party home performance specialist. The specialist identifies areas of concern and provides specific recommendations to improve the efficiency, comfort, and health of the home. The audit includes a visual inspection of the crawlspace and attic, a health and safety inspection, and a blower door test to identify and locate air leaks. The home specialist also collects information on types and quantities of appliances and lighting in each home, then determines which available energy efficiency measures are appropriate.

While the specialist is in the customer's home, direct install measures are offered to be installed for the customer. Homeowners and/or landlords approve all direct-install measures prior to installation. The direct install measures available include up to 20 LED lightbulbs, one high-efficiency showerhead, pipe insulation from the water heater to the home wall (approximately 3 feet), and a Tier 2 advanced power strip. The following table outlines the measures offered through this program.

Table 1-1: Measure Summary

Measures	End Use
LED general purpose	Lighting
LED globe	
LED high wattage	
LED reflector	
High-efficiency showerhead	Hot Water
Pipe insulation	
Tier 2 advanced power strip	Miscellaneous

In the 2023 program year, the Tier 2 advanced power strips will no longer be offered.[1]

[1] Idaho Power will keep offering power strips until backstock is cleared.

1.2 Savings Results

The Evaluators conducted an impact evaluation for IPC's Home Energy Audit Program during PY2022. In PY2022, Idaho Power completed and provided incentives for residential measures in Idaho under the Home Energy Audit Program. The claimed savings in this report represent direct install measures only; any additional upgrades are claimed through native programs.

The Home Energy Audit Program verified savings amounted to 28,801 kWh with a 101.59% realization rate for the measures overall. The Evaluators summarize the program verified savings in Table 1-2.

Table 1-2: Home Energy Audit Verified Impact Savings by Measure

Measure	Total Claimed kWh Savings by Measure	Total Verified kWh Savings by Measure	Realization Rate
14-Watt LED - canned. 250 - 1049 lumens. High use and outdoor use. Product must be ENERGY STAR certified	1,784.16	1,784.16	100.00%
15-Watt LED - high wattage. 1490 to 2600 lumens. High or moderate use.	881.02	875.44	99.37%
8-Watt LED - globes. 250 - 1049 lumens. Moderate use. Product must be ENERGY STAR certified.	1,329.13	1,329.13	100.00%
9-Watt LED - general purpose. 250 - 1049 lumens. High or moderate use.	15,004.56	15,004.56	100.00%
Smart Strip	2,502.08	2,502.08	100.00%
Pipe insulation	6,849.00	7,305.60	107.00%
Showerheads (electric water heating)	0	0	-
Showerheads (gas water heating)	0	0	-
Total	**28,349.95**	**28,800.97**	**101.59%**

The Evaluators conducted the following evaluation tasks for the PY2022 Home Energy Audit Program impact evaluation:

- Database Review
- Survey verification
- Measure-level savings application review

The Evaluators conducted the following evaluation tasks for process evaluation:

- Staff interviews
- Auditor interviews
- Participant surveys
- Nonparticipant surveys

In the following sections, the Evaluators summarize the findings and recommendations resulting from our evaluation activities.

1.3 Conclusions & Recommendations

The Evaluators provide the following impact evaluation conclusions and recommendations regarding Idaho Power's Home Energy Audit Program:

- **Conclusion #1**: The Evaluators verified 28,801 kWh savings at a 102% realization rate for the Home Energy Audit Program. The Evaluators verified savings and assumptions using a deemed savings approach for the measures included in the program in addition to verifying in-service rates.
- **Conclusion #2**: The Evaluators reviewed all tracking data as well as the project data and confirmed that project-level measure details were tracked accurately and that the RTF equations and assumptions were utilized correctly to calculate expected savings.
- **Conclusion #3 & Recommendation #1:** Realization rates differ from 100% for the 15W LED high wattage, 1490 to 2600 lumens, high or moderate use due to a unit energy savings value application issue. The Evaluators recommend updating the unit energy savings value for this measure to correct manual entry errors.
- **Conclusion #4:** The Evaluators found that the realization rate for pipe wraps is above 100% due to the application of a household-level cap in pipe wrap savings. The Evaluators determined that the 3-foot household level cap in savings is not necessary to apply for households in which two or more pipe wraps were installed. This change led to additional savings for the measure.
- **Conclusion #5:** The Evaluators found that the high-efficiency showerhead is a deactivated RTF measure and there are a few values that cannot be assumed. For these reasons, this measure was not eligible to claim savings, which matched Idaho Power's expectation of the measure.
- **Conclusion #6 & Recommendation #2**: Upon completion of survey efforts, the Evaluators reviewed in-service rate (ISR) results compared to RTF assumed in-service rates for each measure. The in-service rates demonstrated in the table above are well within reasonable comparability to the in-service rates included in the RTF UES. Therefore, the Evaluators recommend that IPC continue to use the in-service rates assumed by the RTF for this program in future cycles.
- **Conclusion #7**: The HEA Program continues to be helpful for IPC customers and customers communicate satisfaction with the program, including interactions with the auditors and the reports they received. However, among the respondents who indicated the audit was not helpful (13.5%), participants noted they did not learn anything new from the audit, wanted more personal recommendations for energy usage improvement, or wanted more information about other IPC programs that promote energy efficiency.
- **Conclusion #8 & Recommendation #3**: The majority of respondents made at least some improvements (81.1%). To date, the program does not track how many HEA participants enroll in other IPC offerings. The Evaluators recommend that IPC start tracking whether HEA participants enroll in other IPC offerings within one to two years of completing the energy audit. This effort will help IPC staff determine whether home energy audits are producing increased participation in other programs, and which programs and measures are popular among HEA participants.
- **Conclusion #9 & Recommendation #4**: Over a quarter of HEA participant respondents (30.6%) chose "don't know" when asked about their satisfaction with the follow-up call with their auditor. This data point may indicate that respondents do not remember the call with their

auditor, or the call did not occur. Due to the strong emphasis program staff place on this call as an additional touchpoint between the utility and customer, the Evaluators recommend program staff consider reiterating the importance of these follow up calls to the auditors.

- **Conclusion #10 & Recommendation #5:** Currently, in the HEA Program, the auditors provide an official audit report within two business days and follow up with the customer within a week via phone to answer any questions. However, auditors and participants desire more information from IPC about the various energy efficiency incentives and rebates offered in order to recommend programs to customers when they can. The Evaluators recommend that IPC provide additional program information to auditors, so they better understand the program offerings available to customers. The evaluators also recommend program staff more strongly encourage auditors to share additional program offering information to customers.
- **Conclusion #11 & Recommendation #6**: Interviewed auditors and survey respondents alike requested having suggested contractors available to customers in order to help them implement the home energy audit recommendations. Although the program currently aims to remain contractor neutral, the Evaluators recommend that allow the auditors to provide customers recommendations for contractors based on recommended energy efficiency upgrades. The Evaluators also recommend IPC provides auditors training regarding how to appropriately recommend contractors related to the suggested energy efficiency improvements made to the customer. This will provide the customer with additional information towards next steps and will remove barriers to additional energy efficiency improvements.
- **Conclusion #12 & Recommendation #7**: Interviewed auditors mentioned that customers with newer homes seem eager to participate, but ultimately there are not many improvements that can be made to a home that is less than 10-15 years old. The Evaluators recommend that IPC incorporate house vintage to target homes for participation in the program that are more than 10-15 years old to target for home energy audits. These homes are more likely to benefit from audits and are more likely to be recommended energy conservation projects with returns within a decent timeframe for the homeowner or tenant.
- **Conclusion #13**: The time it took to schedule the audit had one of the highest rates of dissatisfaction among residents (21.6%). During staff interviews, the program specialist acknowledged the long program waitlist that grew during the pandemic and indicated they are working to reduce wait times to no more than two months. The HEA Program strives to manage waitlist times and ensure all interested customers receive an audit in a timely manner, but delays due to COVID continue to affect customer scheduling.
- **Conclusion #14**: The most common direct install measures installed by both interviewed auditors were pipe insulation and LEDs. The auditors rarely installed power strips or low-flow showerheads, as customers either did not understand how they worked or did not have showerhead mounts conducive to them. One auditor suggested IPC consider adding door sweeps as a direct install measure. The RTF provides door sweep UES measure savings for the region. In addition, customers in the area would benefit from the added weatherization and seem to communicate interest in the measure. IPC indicated that this inclusion is unlikely due to extended installation duration, contractor trainings, and cost issues that have been previously evaluated by the team. However, the Evaluators recommend reassessing this measure for inclusion.

- **Conclusion #15 & Recommendation #8**: Although interviewed auditors were happy with participation in the program, both auditors also communicated difficulty using the software program, Snugg Pro, used to build the home energy reports. They indicated that although Snugg Pro provides a train yourself video, they would like a training session from IPC staff and learn how the software calculates energy savings, since they need to rely on those calculations in their communications with the customers. The Evaluators recommend that IPC include Snugg Pro as part of the regular training sessions with auditors and provide additional guidance and clarification on quality control practices and outputs from the software.
- **Conclusion 16 & Recommendation #9:** Customers that participate in Idaho Power's Home Energy Audit Program are eligible to receive a nonrefundable tax credit of 30% of the total cost of the home energy audit performed, up to $150 total, through the Inflation Reduction Act. In order for IPC customers to remain eligible for claiming the Energy Efficient Home Improvement Credit for home energy audits, the Evaluators recommend that Idaho Power require each home energy auditor is certified by one of the qualified certification Programs listed on the Department of Energy certification programs for the Energy Efficient Home Improvement Credit (Section 25C) and provide the written home energy audit report to customers with the required information (qualified home energy auditor's name and EIN, an attestation that the qualified home energy auditor is certified by a qualified certification program, and the name of such qualified certification program).

2. General Methodology

The Evaluators completed an impact evaluation for each of the measures included in Idaho Power Company's Home Energy Audit Program. Our general approach for this evaluation considers the cyclical feedback loop among program design, implementation, and evaluation. Our activities estimate and verify annual energy savings, identify whether the program is meeting its goals, and provide recommendations for improving savings estimates and program design and implementation. The Evaluators summarize the research objectives for the impact and process evaluation for this program below:

1. Review the program tracking database to determine and verify the energy (kWh) impacts attributable to the 2022 program year;
2. Complete the file reviews and verification of project specific assumptions with a ±10% precision at a 90% confidence interval (90/10);
3. Develop credible and reliable program energy and non-energy impact estimates and ex-post realization rates through the 2022 program year; and
4. Deliver a report with findings, observations, and recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.

The Evaluators used the following approaches to accomplish the impact-related research goals listed above and to calculate energy impacts defined by the International Performance Measurement and Verification Protocols (IPMVP)[2] and the Uniform Methods Project (UMP)[3]:

- Simple verification (web-based surveys)
- Database review
- Application of deemed savings with verified inputs

The Evaluators also conducted a process evaluation in this work. The key process evaluation objectives include the following:

- Evaluate program design to ensure use of industry best practices.
- Evaluate program implementation including quality control, operational practice, and outreach.
- Review program documentation (including forms, manuals, marketing, and materials) and interview staff to understand program goals, rules, and processes.
- Evaluate program administration including program oversight, staffing, management, training, documentation, and reporting.
- Survey program participants about their experiences, including satisfaction with the program and details related to their decision-making.
- Survey nonparticipants to reveal the level of program awareness and identify barriers to participation.

The M&V methodology is determined by previous IPC evaluation methodologies as well as the appropriate rigor considering program contributions to overall portfolio. The Evaluators 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 and Conservation Council Regional Technical Forum (RTF)

[2] https://www.nrel.gov/docs/fy02osti/31505.pdf
[3] https://www.nrel.gov/docs/fy18osti/70472.pdf

- 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.[4]
- IPMVP maintained by the Efficiency Valuation Organization (EVO) with sponsorship by the U.S. Department of Energy (DOE)[5]

The Evaluators kept data collection instruments, calculation spreadsheets, and interview and survey data available for Idaho Power records.

2.1 Summary of Approach

This section presents our approach to accomplishing the impact evaluation of Idaho Power's Home Energy Audit Program. This chapter is organized by evaluation objective. Section 3 describes the Evaluators' measure-specific impact evaluation methods and results in further detail. Section 4 describes the Evaluators' process evaluation efforts, results, and conclusions.

The Evaluators outline the approach for verifying, measuring, and reporting the program impacts as well as summarizing staff, auditor, and customer satisfaction and potential program 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, however, the Evaluators deployed verification surveys for a sample of projects to gather additional information from a representative sample of projects.

Our general approach for this evaluation considered the cyclical feedback loop among program design, implementation, and impact evaluation. Our activities during the evaluation estimated and verified annual energy savings and identified whether the program is meeting its goals. These activities are aimed to provide guidance for continuous program improvement and increase cost effectiveness for future program years.

The Evaluators define one major approach to determining net savings for each of the measures offered in Idaho Power's Home Energy Audit Program:

- A *deemed savings approach:* The deemed savings approach involves using stipulated savings for energy conservation measures for which savings values are well-known and documented. Deemed savings values for all measures considered were systematically reviewed. Wherever possible, evaluated results included the impact of housing type and delivery mechanism on equipment operation, as defined by the RTF.

The Evaluators accomplished the following quantitative goals as part of the impact evaluation:

- Verified annual energy savings with ±10% precision at the 90% confidence level.

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4 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.

5 Core Concepts: International Measurement and Verification Protocol. EVO 100000 – 1:2016, October 2016.

- Used verified results to determine ex post realization rates.

The Evaluators calculated verified savings for each measure based on the RTF UES or appropriate workpapers in combination with the results from document review. The Evaluators also verified in-service rates (ISRs) and from verification surveys for measures which exceeded 90/10 precision requirements from survey responses.

Reported Savings → Database Review → Document Review → Survey Verification → Evaluated Savings

2.1.1 Database Review

At the outset of the evaluation, the Evaluators reviewed the program database to ensure that the program tracking database conforms to industry standards and adequately tracks key data required for evaluation.

Measure-level net savings were evaluated by reviewing measure unit energy savings (UES) and values in the tracking system to assure that they were appropriately applied deemed savings estimates defined by a third party for the relevant region. The Evaluators then aggregated measure-level energy savings to estimate PY2022 kWh reductions due to the program.

2.1.2 Verification Methodology

The Evaluators verified a sample of participating households for verification of measure installation through web-based surveys. Participants received $20 in incentives as a thank you for completing this verification survey. The Evaluators used the following equations to estimate survey completion requirements for the program to achieve 10% precision at the 90% confidence level. Required number of responses 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. 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 survey-based verification.

2.1.2.1 Survey-Based Verification

The Evaluators created a target response goal by measure in order to distribute verification surveys at the 90/10 confidence precision, displayed in Table 2-1. Survey data collection involved verifying equipment operability (installation and functionality) and also provided residents with the opportunity to provide feedback on the measures and program.

The Evaluators conducted surveys that fulfilled the impact and process evaluation needs for each measure (collecting measure installation and functionality rates, heating and cooling equipment, and water heating equipment configuration for impact, and program feedback for process). This survey was important for program savings verification because direct install measures that are not currently operating or installed do not qualify for energy savings and therefore must be removed from calculations.

Table 2-1: Survey Sample Plan by Measure

Measure Description	Project Population	Total kWh Claimed Savings	Planned Sample Size
9-Watt LED - general purpose. 250 - 1049 lumens. High or moderate use.	156	15,004.56	35
8-Watt LED - globes. 250 - 1049 lumens. Moderate use.	69	1,329.13	5
15-Watt LED - high wattage. 1490 to 2600 lumens. High or moderate use.	35	881.02	3
14-Watt LED - canned. 250 - 1049 lumens. High use and outdoor use.	70	1,784.16	5
Pipe insulation	142	6,849.00	17
Smart Strip	31	2,502.08	8
2.0 GPM Showerhead on electric water heater	8	0.00	2
2.0 GPM Showerhead on gas water heater	7	0.00	2
Total	**518**	**28,349.95**	**77**

Once this data was collected, a realization rate across responding households was estimated by measure and applied to the population of projects completed. In addition, the Evaluators reviewed in-service rate (ISR) results compared to RTF assumed in-service rates for each measure.

2.1.3 Impact Evaluation Methodology

The Evaluators employed a deemed savings approach to quantify program impacts for the Home Energy Audit Program. The Evaluators completed the steps outlined below to complete the impact evaluation for the program.

1. Deliver a detailed data request outlining the information we require for each project and measure.
2. Complete a thorough and comprehensive summary of calculated savings.
3. Validate that appropriate inputs to expected savings were used for each measure.
4. Apply observed adjustments based on verification survey.
5. Verify the gross energy (kWh) savings that are a result of the program.
6. Summarize and integrate the impact evaluation findings into the final report.

The following table summarizes the methodology used to evaluate each measure type offered in the HEA Program

Table 2-2: Home Energy Audit Impact Analysis Methodology by Measure

End Use	Measure	Impact Analysis Methodology
Lighting	LED general purpose	RTF Residential Lighting v9.4
Lighting	LED globe	RTF Residential Lighting v9.4
Lighting	LED high wattage	RTF Residential Lighting v9.4
Lighting	LED reflector	RTF Residential Lighting v9.4
Hot Water	High-efficiency showerhead	No Savings Claimed
Hot Water	Pipe insulation	Idaho Power Energy Efficiency Potential Study
Miscellaneous	Tier 2 advanced power strip	RTF Residential Advanced Power Strips v3.1

In the following subsections, the Evaluators provide further details for the following impact evaluation steps:

- Program tracking data review;
- Validate expected savings;
- Verify gross savings; and
- Verified energy impact calculations.

2.1.3.1 Program Tracking Data Review

As a first step in the impact evaluation activities, the Evaluators reviewed program tracking data provided by IPC. The Evaluators reviewed provided documents to verify measure quantity per project, measure equipment installed per project, and project costs match IPC expectations for the program.

2.1.3.2 Validate Ex-Ante Savings

Energy savings claimed for lighting measures and pipe wrap measures are sourced from the current RTF workbook for residential lighting and Idaho Power's Energy Efficiency Potential Study, respectively. Energy savings claimed for the pipe wrap measure was sourced from the Energy Efficiency Potential

Study, which estimates 76 kWh savings per year for pipe wrap measures. The Evaluators also verified, through participant verification surveys, the water heater saturation for customers who received pipe wrap installation.

The Evaluators understand that the RTF has deactivated the low-flow showerheads and advanced power strips in 2020 and 2021. The Evaluators worked with Idaho Power to estimate savings through these measures using appropriate savings sources relative to the program and region.

The Evaluators also included gas savings for gas water heater households by converting verified kWh savings from electric home pipe wrap measures to Therms.

2.1.3.3 Verify Gross Savings

Gross savings were evaluated primarily using the appropriate RTF UES workbooks and relevant Energy Efficiency Potential Study. The Evaluator team ensured appropriate savings values were applied by reviewing project documentation and equipment efficiencies. The Evaluator team calculated verified gross savings by summing deemed kWh savings per measure.

The Evaluators used the RTF savings values in effect during the time budgets and goals were established for each program year. Table 2-2 in the section above summarizes the savings value sources the Evaluators used for the evaluation of the Home Energy Audit Program.

2.1.3.4 Integrate Participant Survey

The Evaluators administered a survey to customers who participated in 2022. 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; and,
- In-service rate and operation of equipment.

The survey was administered online, and customers were recruited by email in June 2023. Each customer received up to three emails asking them to complete the survey. Customers were offered a $20 electronic gift card to complete the survey. Customers with inactive IPC accounts and customers that had previously requested not to receive communications were excluded from the survey sample.

The Evaluator developed the survey guide in conjunction with Idaho Power staff to address objectives described previously through various questions to the participating customers. The survey questions are provided in Appendix A and Appendix B.

2.1.4 Process Evaluation Methodology

The Evaluators performed a process evaluation to meet the objectives outlined previously. The process evaluation primarily focused on documenting how home energy audits encouraged installation of energy efficient measures or influenced customers to make energy-efficiency decisions.

2.1.4.1 Key Researchable Issues

The research questions the Evaluators investigated for the process evaluation include:

- What are current industry best practices for home energy audit programs?
- Does current program design and implementation allow for optimal quality control, operational practice, and outreach?
- Is the current tracking system effective for supporting and documenting home energy audit completion and measure installation?
- Are the current marketing strategies effective?
- Are customers satisfied with their home energy audits?
- Do the audits cover all the essential energy savings measures? Should other measures be included?
- How can the program improve oversight, staffing, management, training, documentation, and reporting to allow for optimal administration and efficiency?
- What are the primary obstacles to participation among non-participants?
- What actions can the program take to increase engagement?

The Evaluators synthesized the process findings into a report section and provided recommendations for program improvement. Specifics regarding process evaluation implementation by task are presented below.

2.1.4.2 Program Tracking Data Review

The Evaluators analyzed program data to understand IPC's processes when collecting individual home energy audit information, tracking project-level status, and organizing program-level data. It was also valuable to assess the degree to which audit recipients subsequently participate in other residential programs offered by IPC by linking participation records across the two data sets. For this reason, the Evaluators reviewed additional program tracking data to determine which customers participated in other programs after having completed a home energy audit with IPC.

2.1.4.3 Program Staff Interviews

The Evaluators met with the IPC program lead or manager, and worked with them to identify additional staff and any key external partners who should be included in the interviews. The in-depth interviews took about an hour to complete and additional follow-up calls with staff were made to discuss topics in greater detail.

2.1.4.4 Auditor Interviews

The Evaluators met with two of the four auditors partnering with IPC to complete the home energy audits for this program. The in-depth interviews took about an hour to complete and discussed subjects such as flow of work, customer satisfaction, customer barriers to completing additional energy efficiency upgrades, and auditor satisfaction with the program and IPC overall.

2.1.4.5 Participant and Non-Participant Surveys

Participant surveys were used to obtain feedback from customers on their experience with the program, to assess their awareness of other IPC efficiency program offerings and measures, and to understand their decisions (and key factors affecting those decisions) to implement the efficient equipment. We designed the survey instrument to address evaluation research questions. We administered the surveys online.

3. Impact Evaluation Results

The Evaluators completed an impact evaluation on Idaho Power's Home Energy Audit (HEA) Program to verify program-level and measure-level energy savings for PY2022. The following sections summarize findings for the electric impact evaluation in the program in the Idaho service area. The Evaluators used data collected from participant surveys, industry standard baseline wattage assumptions, efficient wattages, and annual hours of operation to evaluate savings. The Evaluators found the Home Energy Audit Program resulted in 28,800.97 kWh of verified savings, displaying a 102% realization rate against Idaho Power's expected savings for the program. The Evaluators provide verified savings and realization rates by measure type in Table 3-1.

Table 3-1: Home Energy Audit Program Participation by Measure Type

Measure	Total Number of Projects	Total Claimed kWh Savings by Measure	Total Verified kWh Savings by Measure	Realization Rate
14-Watt LED - canned. 250 - 1049 lumens. High use and outdoor use. Product must be ENERGY STAR certified	70	1,784.16	1,784.16	100%
15-Watt LED - high wattage. 1490 to 2600 lumens. High or moderate use.	35	881.02	875.44	99%
8-Watt LED - globes. 250 - 1049 lumens. Moderate use. Product must be ENERGY STAR certified.	69	1,329.13	1,329.13	100%
9-Watt LED - general purpose. 250 - 1049 lumens. High or moderate use.	156	15,004.56	15,004.56	100%
Smart Strip	31	2,502.08	2,502.08	100%
Pipe insulation	142	6,849.00	7,305.60	107%
Showerheads (electric water heating)*	8	-	-	-
Showerheads (gas water heating)*	7	-	-	-
Total	**503**	**28,349.95**	**28,800.97**	**102%**

*No savings claimed for these measures

The Evaluators have verified and applied the RTF Residential Lighting measure UES for the direct install LED measures installed through the Home Energy Audit Program. The Evaluators found that all measures returned a 100% realization rate except for the 15-Watt LED which was due to a potential database issue. For the pipe insulation measure, the Evaluators have reviewed and applied the Idaho Power Energy Efficiency Potential Study measure savings developed by AEG and found that the realization rate of 107% was due to the removal of a household-level cap in pipe wrap savings.

Due to the deactivation of the RTF Commercial and Residential Showerheads UES measure in June 2020, the Evaluators concluded that this measure was not eligible to claim savings. Although the RTF deactivated the Residential Advanced Power Strips UES measure in November 2021, Idaho Power freezes savings assumptions for the upcoming program year at the time of budgeting which occurred in Fall 2021. Due to limited data, low regional interest, and no new research forthcoming, the Evaluators provided verified savings for this measure in PY2022 using the last RTF workbook prior to the measure's deactivation. The Home Energy Audit Program will install the remaining inventory; however, it will not claim smart strip savings in future program implementation.

3.1.1 Database Review

As a first step to this work, the Evaluators reviewed the HEA Program database. This is conducted to ensure that all proper variables are tracked to properly estimate expected savings for each measure type and facility type. This is also completed to ensure that proper quality assurance and quality control procedures are implemented by the IPC team. The Evaluators found that there might be an improper expected savings value during this review for the 15-Watt LED measure as the last two decimal values look to be interchanged. The Evaluators verified that all other inputs were correct to ensure savings calculations were feasible.

3.1.2 Lighting Evaluation Results

This section summarizes the HEA Program verified impact savings for the lighting measure. Verification of gross savings was accomplished through a systematic review of program tracking data, verification of claimed savings, and calculations of verified gross savings impacts for each project in the sample. Table 3-2 displays the expected kWh savings and verified kWh savings for these measures.

Table 3-2: Home Energy Audit Program Lighting Measure Total Verified Savings

Measure	n Projects	Claimed kWh	Verified kWh	Realization Rate
14-Watt LED - canned. 250 - 1049 lumens. High use and outdoor use. Product must be ENERGY STAR certified	70	1,784.16	1,784.16	100.00%
15-Watt LED - high wattage. 1490 to 2600 lumens. High or moderate use.	35	881.02	875.44	99.37%
8-Watt LED - globes. 250 - 1049 lumens. Moderate use. Product must be ENERGY STAR certified.	69	1,329.13	1,329.13	100.00%
9-Watt LED - general purpose. 250 - 1049 lumens. High or moderate use.	156	15,004.56	15,004.56	100.00%
Total	**330**	**18,998.87**	**18,993.29**	**100.00%**

The lighting measures displayed a realization rate of 100% compared to claimed IPC savings, with verified savings for the program totaling 18,993.29 kWh. The evaluators also found that there was potentially a manual error in expected savings for the 15-Watt LED measure UES as the last two decimal values were interchanged in the RTF data (14.21 was listed instead of 14.12). The UES value of 14.12 would change the realization rate to 100% across all the measures listed above.

The Evaluators calculated verified savings for a sample of the population. This was calculated using verified measure life and verified IPC values. The Evaluators found no adjustments were recommended or required when verifying each sampled project input. In addition, savings calculations were applied properly, as displayed by the 100% realization rate across all lighting measures.

3.1.3 Smart Strip Evaluation Results

This section summarizes the HEA Program verified impact savings for the smart strips measure. Table 3-3 displays the expected kWh savings and verified kWh savings for this measure.

Table 3-3: Home Energy Audit Program Smart Strip Measure Total Verified Savings

Measure	n Projects	Claimed kWh	Verified kWh	Realization Rate
Smart Strip	31	2,502.08	2,502.08	100.00%
Total	**31**	**2,502.08**	**2,502.08**	**100.00%**

The smart strip measures displayed a realization rate of 100% compared to claimed IPC savings, with verified savings for the program totaling 2,502.08 kWh. The Evaluators calculate verified savings for the population. This was calculated using verified quantity and verified UES values. The Evaluators found no adjustments were recommended or required when verifying each sampled project input. Savings calculations were applied properly, as displayed by the 100% realization rate across the smart strip measure and therefore have no recommendations for this measure.

3.1.4 Pipe Insulation Evaluation Results

This section summarizes the HEA Program verified impact savings for the Pipe Insulation measure. Table 3-4Table 3-2 displays the expected kWh savings and verified kWh savings for this measure.

Table 3-4: Home Energy Audit Program Pipe Insulation Measure Total Verified Savings

Measure	n Projects	Claimed kWh	Verified kWh	Realization Rate
Pipe insulation	142	6,849.00	7,305.60	107.00%
Total	**142**	**6,849.00**	**7,305.60**	**107.00%**

The pipe insulation measure displayed a realization rate of 107% compared to claimed IPC savings, with verified savings for the program totaling 7,305.60 kWh. The realization rate is above 100% primarily due to the application of a household-level cap in pipe wrap savings in the expected savings estimates. The Evaluators determined that the 3-foot household level cap in savings is not necessary to apply for households in which two or more pipe wraps were installed. This change led to additional savings for the measure.

3.1.5 High-Efficiency Showerhead Evaluation Results

The Evaluators found that the high-efficiency showerhead is a deactivated RTF measure and there are a few values that cannot be assumed such as the baseline GPM used and whether consumers decide to take longer showers due to the GPM reduction. For these reasons, the Evaluators decided that this measure was not eligible to claim savings, as summarized in the table below. This matched IPC’s expectations for this measure.

Table 3-5: Home Energy Audit Program High Efficiency Showerhead Measure Total Verified Savings

Measure	n Projects	Claimed kWh	Verified kWh	Realization Rate
Showerheads (electric water heating)	8	0	0	-
Showerheads (gas water heating)	7	0	0	-
Total	**15**	**0**	**0**	**-**

3.1.6 Survey Responses & ISR

The Evaluators present participation experience, program satisfaction, communication, firmographics, and additional lessons learned from survey responses gathered during this evaluation work.

The survey effort received 148 total survey completions. Table 3-6 compares the distributions of measures installed at participating households to those who completed the survey. As shown, the survey sample was fairly representative of the participant population in terms of measure type and number of responses.

Table 3-6: Distribution of Measure Type by Survey Respondents

Measure	Population	Proportion of Measure Type	Number of Survey Responses	Proportion of Survey Responses
9-Watt LED - general purpose. 250 - 1049 lumens. High or moderate use.	156	30%	46	30%
8-Watt LED - globes. 250 - 1049 lumens. Moderate use.	69	13%	16	10%
15-Watt LED - high wattage. 1490 to 2600 lumens. High or moderate use.	35	7%	8	5%
14-Watt LED - canned. 250 - 1049 lumens. High use and outdoor use.	70	14%	22	14%
Pipe insulation	142	27%	44	28%
Smart Strip. Infrared sensing advanced power strip for home entertainment electronics	31	6%	14	9%
2.0 GPM Showerhead on electric	8	2%	3	2%
2.0 GPM Showerhead on gas	7	1%	1	1%
Total	**518**	**100%**	**148**	**100%**

The Evaluators calculated in-service rates using survey responses by subtracting removal rate from 100%. The removal rate is the number of instances in which a respondent indicated the measure was removed from the home divided by the total number of measure installs. The verified in-service rates (ISR) for each measure in the program are summarized in the table below.

Table 3-7: Summary of In-Service Rates by Measure

Measure Description	n Responses	ISR	Precision at 90% CI
9-Watt LED - general purpose. 250 - 1049 lumens. High or moderate use.	46	96%	±5.56
8-Watt LED - globes. 250 - 1049 lumens. Moderate use.	16	100%	

15-Watt LED - high wattage. 1490 to 2600 lumens. High or moderate use.	8	100%	
14-Watt LED - canned. 250 - 1049 lumens. High use and outdoor use.	22	96%	
Pipe insulation	44	100%	
Smart Strip	14	73%	
2.0 GPM Showerhead on electric water heater	3	67%	
2.0 GPM Showerhead on gas water heater	1	100%	
Total	**146**	**-**	

The precision for the in-service rates exceeds 90/10 precision goals, with precision at 5.56% at the 90% confidence interval. The in-service rates demonstrated in the table above are well within reasonable comparability to the in-service rates included in the RTF UES. Therefore, the Evaluators recommend that IPC continue to use the in-service rates assumed by the RTF for this program in future cycles.

4. Process Evaluation Results

The Evaluators also completed a process evaluation of the Home Energy Audit Program to evaluate program implementation, program goals, program barriers, and overall customer satisfaction. The following sections summarize findings for the process evaluation in the program in the Idaho service area. The Evaluators used data collected from staff interviews, auditor interviews, participant surveys, and nonparticipant surveys to form conclusions and recommendations for improving program design, outreach, and implementation.

In the following sections, the Evaluators detail responses and findings for each of the data collection efforts completed for this evaluation.

4.1 Staff Interviews

As a first step, the Evaluators interviewed the previous and current HEA program specialist to gain insight into the history and current design of the program. Each interview was conducted using Microsoft Teams and lasted about one hour. The previous program specialist indicated they had been involved in the program since its inception through August 2022, while the current program specialist, who had a long tenure at IPC, took over the HEA Program in the Fall of 2022.

The HEA Program has been part of IPC's energy efficiency portfolio for several years. The program began as a pilot project for the City of Boise which then expanded across the Idaho service area once the pilot proved successful and effective. While the pilot and subsequent expansion program originally focused on electric-only homes, the program has since expanded to include electric, gas, and mixed fuel homes. Currently, program staff consists of the program specialist, staff from the software platform used to conduct the audits, and four home energy auditors who conduct the audits across the state.

In the following subsections, the Evaluators provide further details for the following staff process evaluation efforts:

- Program goals
- Program design
- Auditors
- Marketing & outreach
- Program referrals
- Data tracking

4.1.1 Program Goals

The purpose of the HEA program is to promote other energy efficiency programs offered by IPC. Unlike IPC's other energy efficiency programs, the HEA Program is considered an educational program and therefore does not have specific energy impact-related savings goals nor cost effectiveness standards.

Over the past few years, the program has sought to engage approximately 425 homes per year across the service territory. Although formal program recruitment halted during the COVID-19 pandemic, customers were still able to sign up for the waitlist for a home energy audit. During this time, the waitlist grew considerably. Therefore, much of the program's focus over the past two years has been managing the waitlist and reducing wait times to less than two months post sign up. Program staff noted that wait times have reduced considerably since the pandemic. In addition, customer interest continues to grow.

4.1.2 Program Design

The HEA Program targets single-family stick-built homes (up to four units); mobile, and manufactured homes do not qualify. Although landlords and renters with landlord permission can participate in the program, the majority of participants are homeowners. Audits cost $99 for all electric home customers and $149 for gas and/or mixed fuel home customers. There is no sliding scale for income-qualified customers, however income-qualified customers are referred to IPC's Low-Income Weatherization Programs, as these programs provide similar services free of charge.

Once customers sign up for an audit, their information is routed to the HEA Program specialist who assigns each customer to one of the four participating auditors. The auditors then reach out to customers to schedule the audits. Customers are encouraged, but not required, to join the auditor during the walkthrough. Following the audit, the auditor provides customers recommendations verbally, as well as a formally written report via email within a week of the completed audit. Auditors also reach out to customers after they send the official report to see if customers have any follow up questions or concerns.

The audits serve as an opportunity for customers to get personalized feedback about their home's energy performance, as well as learn about the various energy efficiency offerings provided by IPC. Auditors will leave behind packets of information about other programs. The auditors will also recommend customers to specific programs when applicable.

4.1.3 Auditors

Four auditors are enrolled to conduct home energy audits through the program. Program engagement across the four auditors varies, with one auditor conducting audits across the state full-time, one auditor focusing solely on Eastern Idaho, and two auditors conducting audits across the state part time. All four auditors are considered independent contractors but go through a vetting system to ensure they are a good fit for the program. Both the previous and current program specialist noted they value quality work and strong customer service skills in their auditors – "I want someone I can send to my mom's house." The program specialist is hoping to bring on an additional auditor to focus on Idaho's Sun Valley region but noted it can be difficult to find quality personnel. The HEA Program specialist trains each auditor on the requirements of the program when they first engage and also provides programmatic updates and training to all auditors annually. Recently, all the auditors completed a training course for the new software platform.

When assigning jobs to the auditors, the program specialist considers auditors' geographic preferences and workload capacities. Once assigned a group of jobs, auditors schedule nearby jobs concurrently to avoid extra travel time. Auditors receive a flat fee for each audit and are reimbursed for any travel over 30 miles; they also receive a hotel stipend if they conduct four to five out-of-town audits.

4.1.4 Marketing & Outreach

IPC performs all program marketing and outreach for the HEA Program. The primary marketing outlets include bill inserts, direct mail, emails, and a website banner; staff minimize marketing efforts to manage waitlist times and ensure all interested customers receive an audit in a timely manner. Marketing efforts focus on different regions throughout the year to minimize cross-state travelling.

4.1.5 Program Referrals

The most popular audit recommendations include air sealing and insulation, followed by heating and cooling equipment upgrades, duct sealing, and smart thermostats. Although IPC's Heating & Cooling Efficiency Program provides some incentives for the HVAC-related updates, no incentives are currently offered for air sealing and insulation for non-low-income customers. Program staff noted that one of the program obstacles seems to be the lack of discounted measures offered by IPC. In years past, auditors were able to recommend window and insulation-based programs, however these programs have since been retired due to cost effectiveness issues. Relatedly, staff indicated that one shortfall of the program is that although some customers can afford the audit, they cannot always afford all the changes recommended by the auditor during the review. Auditors will recommend all relevant upgrades specific to the home, regardless of whether IPC has a specific program incentive. However, auditors indicated that they believe they are unable to recommend specific contractors, as the program strives to stay contractor neutral.

4.1.6 Data Tracking

The HEA manager tracks program participation data including application data, customer name, customer account number, customer city, auditor assignment, audit completion date, and audit invoice. To date, the program does not track how many HEA participants enroll in other IPC offerings. The Evaluators recommend that IPC start tracking whether HEA participants enroll in other IPC offerings within one to two years of completing the energy audit.

4.2 Auditor Interviews

In addition to staff interviews, the Evaluators interviewed two of the four participating auditors for the HEA Program. Both auditors have been involved with the HEA program since its inception; they have also both partnered with IPC on other programs for the past 15-20 years. One of the interviewed auditors has a background in construction management while the other auditor is also an HVAC contractor. Both auditors were initially drawn to the HEA Program and continue to partner with the program because they enjoy helping people save energy and money.

In the following subsections, the Evaluators provide further details for the following auditor process evaluation efforts:

- Program design
- Direct install measures
- Satisfaction

4.2.1 Program Design

As outlined in the staff interview, all project leads for the auditors are provided by IPC staff through IPC marketing efforts. Auditors receive 15-30 leads at a time and schedule the audits based on customer availability. One of the interviewed auditors focuses on Eastern Idaho specifically and did not have substantial feedback on the scheduling process. The other auditor, who travels across the state for the audits, noted that scheduling can often be a pain point for the program. This auditor explained that it can be difficult to schedule all the neighboring audits in one trip based on customers' availability, but that in order to make this travel cost effective and reimbursable, five audits would need to be scheduled and completed each hotel night. This auditor noted they use a mapping tool they created to get a better picture of where all the jobs are located. Therefore, this auditor will wait until there are enough leads in a geographic region before scheduling appointments for those homes. This auditor has also streamlined their scheduling processes by initially sending out automated bulk emails.

The auditors indicated that some, but not all, customers join them on the walkthrough of the home. Although the auditors provide a written report of the findings to the customer after the audit is completed, both auditors noted that they prefer when the customer joins them, as they can point out potential issues and provide recommendations in the moment. The auditors explained they fill out a form based on the audit findings, the results are relayed to IPC, and the HEA program specialist sends the official audit report out to customers within two business days and that they try to follow up with the customer via phone call to answer any questions.

Both interviewed auditors noted that they focus their recommendations on realistic updates that are most likely to result in savings for the customers.

> *"I talk to them about money. I look at it from a practical point of view. There's a line there for how much they should spend. It's killing the customer because we're draining their funds on things they'll never get back in their lifetime." –Auditor*

In general, auditors most commonly recommend completing duct work, installing insulation, and installing door sweeps, as well as incorporating behavioral changes like adjusting the thermostat and closing shades and blinds. They noted that "windows are a big wildcard"; most customers do not have the funds to replace all their windows, but poor windows also drain energy, as a result, the auditors often recommend replacing the biggest and/or north facing windows as they will yield the most savings. Both auditors mentioned that customers with newer homes seem eager to participate, but ultimately there are not many improvements that can be made to a home that is less than 10-15 years old. Recognizing that the financial value of recommendations does not always "pencil out", the auditors often emphasize the comfort improvements, as well as the financial savings in their recommendations pitch. The Evaluators recommend that IPC incorporate house vintage to pinpoint homes that are more than 10-15 years old to target for home energy audits. These homes are more likely to benefit from audits and are more likely to be recommended energy conservation projects with returns within a decent timeframe for the homeowner or tenant.

Both auditors requested more information from IPC about the various energy efficiency incentives and rebates offered. They indicated they promote other programs when they can, but they do not always feel as though they are up to date on what is offered. One auditor also thought the program could benefit from having suggested contractors they could connect the customers to in order to help them implement the recommendations. The Evaluators note that IPC provides a list of participating contractors on its website for additional home energy improvement projects[6]. The Evaluators recommend that IPC provides auditors training regarding how to appropriately recommend contractors related to the suggested energy efficiency improvements made to the customer. This will provide the customer with additional information towards next steps and will remove barriers to additional energy efficiency improvements.

4.2.2 Direct Install Measures

The most common direct install measures installed by both interviewed auditors were pipe insulation and LEDs. The auditors rarely installed power strips or low-flow showerheads, as customers either did not understand how they worked or did not have showerhead mounts conducive to them. One auditor suggested IPC consider adding door sweeps as a direct install measure. The RTF does provide savings for door sweeps, and customers in the area would benefit from the added weatherization and seem to communicate interest in the measure. IPC indicated that this inclusion is unlikely due to extended installation duration, contractor trainings, and cost issues that have been previously evaluated by the team. However, the Evaluators recommend reassessing this measure for inclusion.

4.2.3 Satisfaction

As evident by their long tenure with the HEA Program, the interviewed auditors were extremely satisfied with the program. They appreciate the steady flow of work without needing to worry about advertising and outreach. Additionally, although they do not always have robust recommendations for every home, they feel as though that they are making a difference and helping people save energy and money. Although interviewed auditors were happy with participation in the program, both auditors also communicated difficulty using the software program, Snugg Pro, used to build the home energy reports. They indicated that although Snugg Pro provides a train yourself video, they would like a training session

[6]https://www.idahopower.com/energy-environment/ways-to-save/savings-for-your-home/rebates-and-offers/heating-and-cooling-efficiency-program/participating-contractors/

from IPC staff and learn how the software calculates energy savings, since they need to rely on those calculations in their communications with the customers. The Evaluators recommend that IPC include Snugg Pro as part of the regular training sessions with auditors and provide additional guidance and clarification on quality control practices and outputs from the software.

4.3 Participant Surveys

As part of the process evaluation, the Evaluators conducted a participant survey asking respondents to provide feedback on their program awareness, home energy audit experience, and satisfaction of the program and the utility overall.

The survey was administered via email in June and July 2023. 369 customers received an initial outreach email; two reminder emails were sent out to customers. In total, 111 respondents completed the survey with a response rate of 30.0%.

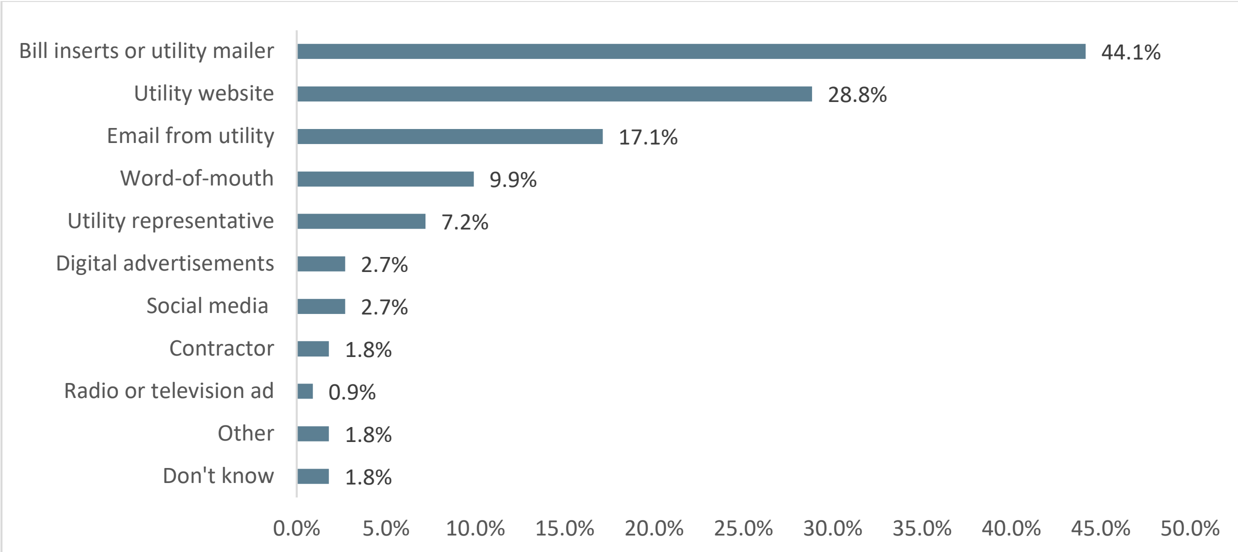
In the following subsections, the Evaluators provide further details for the following participant process evaluation efforts:

- Program awareness
- Program participation
- Direct install measures
- Program satisfaction
- Respondent characteristics

4.3.1 Program Awareness

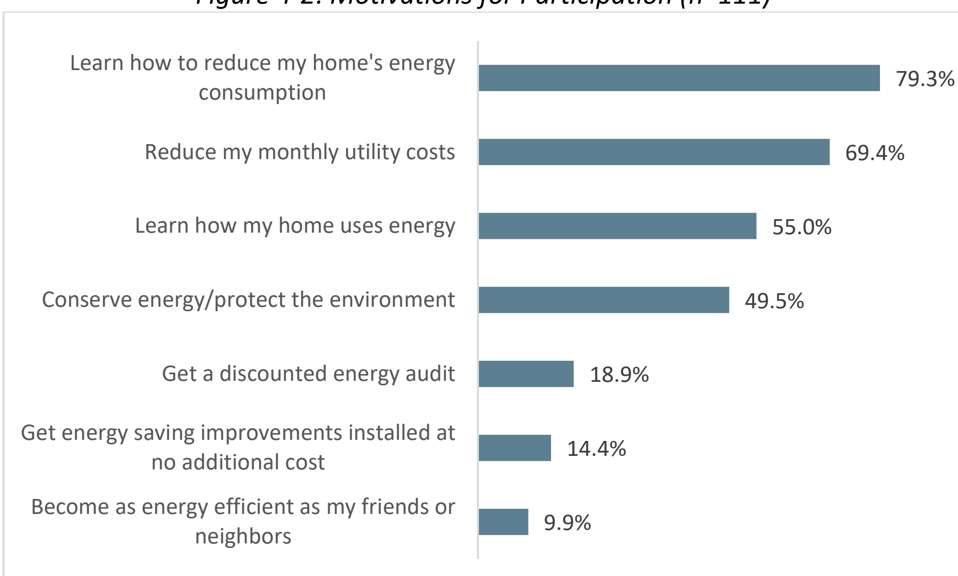
Participants most commonly learned about the HEA Program via bill inserts or utility mailers (44.1%), utility website (28.8%), or an email from IPC (17.1%) (Figure 4-1). Participating respondents were interested in participating in the program because they wanted to reduce their home's energy consumption (79.3%), reduce their monthly utility costs (69.4%), and learn about how their home uses energy (55.0%) (Figure 4-2).

Figure 4-1: Sources of Awareness for the HEA Program (n=111)



*Facebook, Instagram, Twitter, etc.

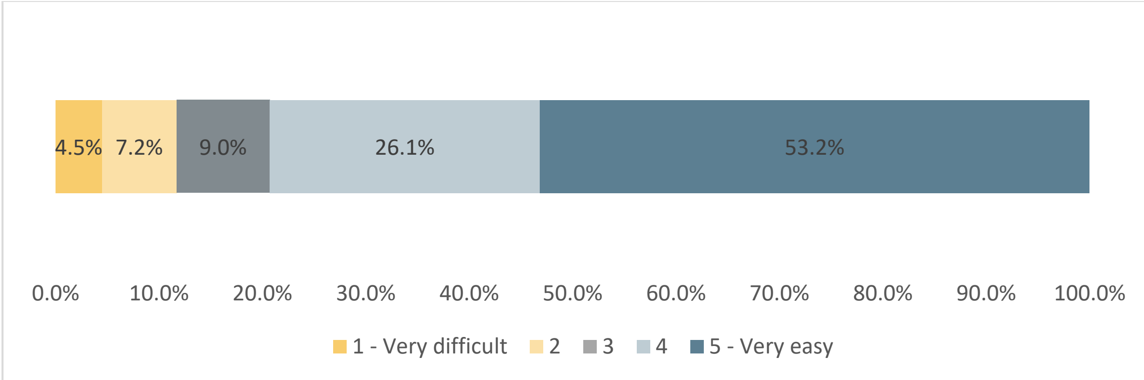
Figure 4-2: Motivations for Participation (n=111)



4.3.2 Program Participation

One quarter of respondents indicated they planned to get a home energy audit prior to learning about the program (24.3%). More than three-quarters of respondents indicated that the process of scheduling the home energy audit was “easy” or “very easy" (79.3%) (Figure 4-3). Respondents who indicated difficulties with the scheduling process (11.7%) referenced program delays due to COVID-19.

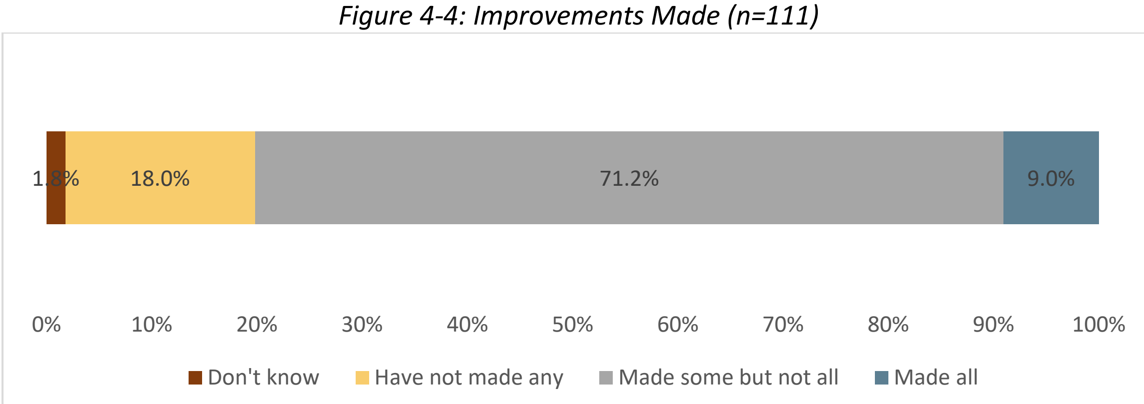
Figure 4-3: Ease of Scheduling Home Audit (n=111)



Two-thirds of respondents indicated the home energy audit was helpful (67.6%). The majority of respondents noted that the auditor asked them if there were specific issues they wanted to address during the audit (86.5%) and discussed potential energy savings they could achieve from making the recommended improvements (94.6%). Additionally, 39.6% of respondents noted that the auditor installed some energy saving improvements during the audit. Among the 15 respondents who indicated they audit was not helpful (13.5%), eight noted they did not learn anything new from the audit, six wanted more personal recommendations for energy usage improvement, and one wanted more information about other IPC programs that promote energy efficiency.

The degree to which respondents followed through on the recommendations made during the audit varied, however, the majority of respondents made at least some improvements (80.2%) (Figure 4-4).

Figure 4-4: Improvements Made (n=111)



The most common reasons for not making the recommended improvements, included cost (60.6%), plans for future implementation (58.6%), and not having time to make the improvement (23.2%) (Table 4-1).

Table 4-1: Reasons for Not Implementing Improvements

Response	Percent of Responses (n=99)
Cost	60.6%
Still planning to implement in the future	58.6%
Do not have time	23.2%
Waiting for current equipment to fail	14.1%
Do not feel they need to be done/will not save energy	13.1%
Did not like the equipment	4.0%
Need more information	3.0%
Can't find a contractor	2.0%
Do not own the property	1.0%
Other	3.0%
Don't know	2.0%

Three-quarters of respondents (75.7%) indicated that they are interested in making additional energy efficiency improvements based on their experience with the HEA. Among this sub sample, the most popular improvements respondents were interested in included wall/floor/attic insulation (29.8%), efficient windows/doors (25.0%), and space heating equipment (14.3%) (Table 4-2).

Table 4-2: Efficient Improvements Respondents Would Be Interested In

Response	Percent of Responses (n=84)
Wall insulation, floor insulation, attic insulation	29.8%
Efficient windows/doors	25.0%
Space heating equipment	14.3%
Water heating equipment	9.5%
Smart thermostats	4.8%
A/C tune-up	2.4%
Advanced power strips	2.4%
Efficient refrigerator	2.4%
Efficient induction stove	2.4%
Energy efficient washer/dryer	2.4%
Lighting	1.2%
Other	7.1%

4.3.3 Direct Install Measures

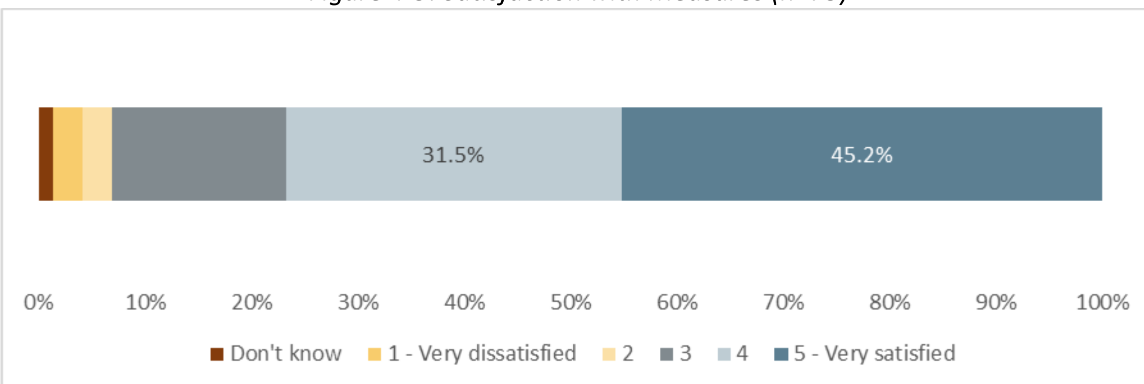
As part of the program, auditors were able to install certain measures during the audit. These measures included LED bulbs, efficient showerheads, advanced power strips, and pipe insulation. Based on program data, LEDs were the most commonly installed measure, followed by pipe wrap insulation (Table 4-3). While the majority of respondents who received LEDs, advanced power strips, and showerheads remember receiving these products, less than one-fifth (17.4%, n=4) remember receiving pipe insulation. Almost half of advanced power strip receiving respondents removed their power strips after the audit (40%, n=4).

Table 4-3 Direct Install Measures

Efficient Measure	Received measure (n)	Remember receiving measure (n)	Measure removed since install (n)	Reason for removal
LED bulbs	33	31	2	Brightness; malfunction
Pipe wrap insulation	23	4	0	NA
Advanced power strip	10	10	4	Power turned off
Efficient showerhead	4	4	1	Low flow

Three quarters of respondents were satisfied with the measures they received during the audit (Figure 4-5).

Figure 4-5: Satisfaction with Measures (n=73)

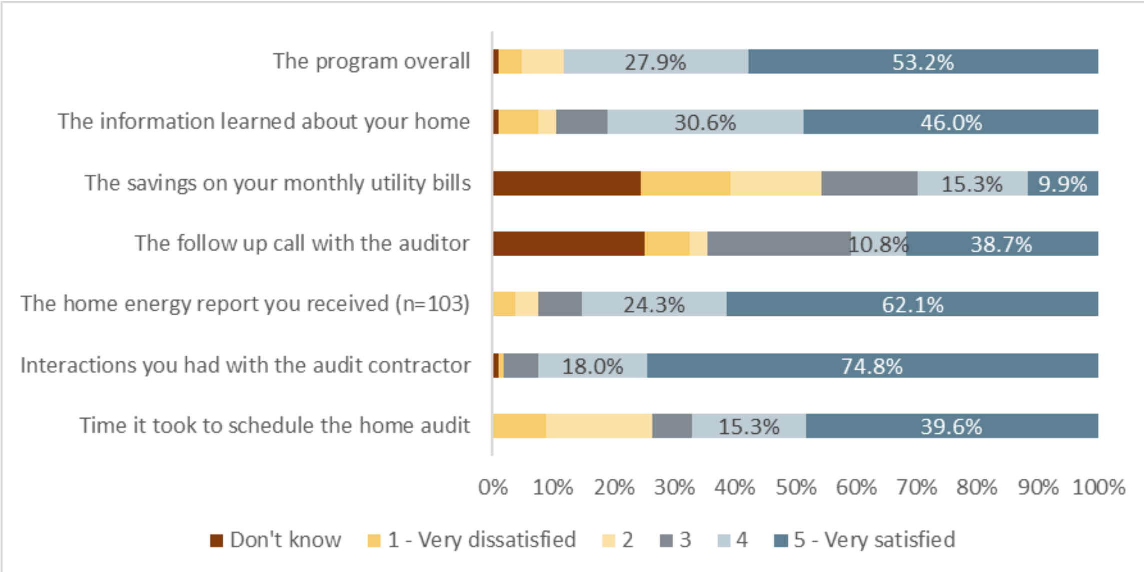


4.3.4 Program Satisfaction

Overall, respondents were mostly satisfied with the program (Figure 4-6); 81.1% of respondents reported satisfaction with the program overall. Respondents were most satisfied with the interactions they had with the auditor (92.8%) and the energy report they received (86.4%).

The time it took to schedule the audit had one of the highest rates of dissatisfaction among residents (21.6%). During staff interviews, the program specialist acknowledged the long program waitlist that grew during the pandemic and indicated they are working to reduce wait times to no more than two months. Satisfaction with savings on their utility bill also witnessed higher levels of dissatisfaction than the other categories listed (25.2%).

Figure 4-6: Program Satisfaction (n=111, unless otherwise noted)

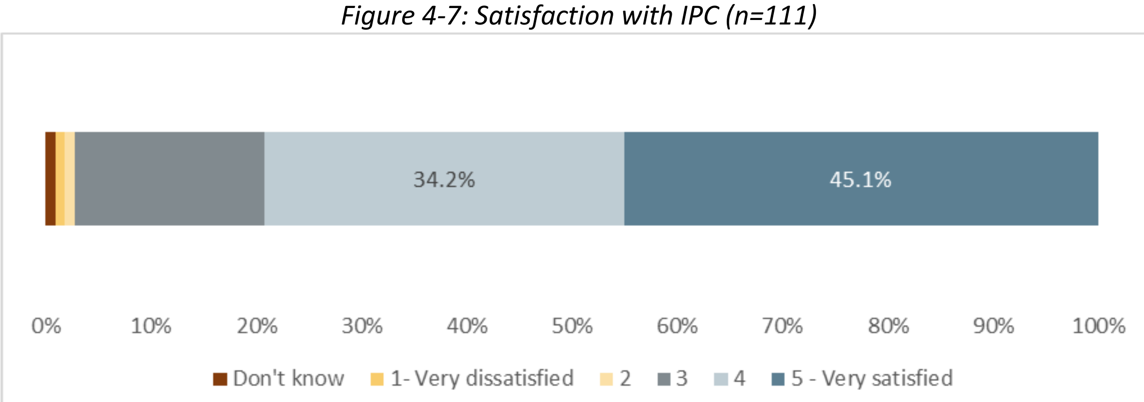


Of note, 30.6% of respondents chose "don't know" when asked about their satisfaction with the follow-up call with their auditor. This data point may indicate that respondents do not remember the call with their auditor or the call did not happen. Due to the strong emphasis program staff place on this call as an additional touchpoint between the utility and customer, program staff may consider reiterating the importance of these follow up calls to the auditors. Additionally, the Evaluator recommends that IPC staff also follow up with the customer to provide additional details about other program offerings and incentives available to complete the recommended energy improvements.

Regarding satisfaction with the savings on energy bills, a high number of respondents gave a neutral rating of 3 on a 5-point scale (28.8%), and 20.7% responded with "Don't know". Together, these neutral responses combined to almost half of overall respondents. This could indicate that these groups of respondents have not compared their energy bills before and after the audit, or that they have not noticed savings on their bill.

The majority of respondents are satisfied with IPC as their utility company (79.3%) (Figure 4-7).

Figure 4-7: Satisfaction with IPC (n=111)



4.3.5 Respondent Characteristics

The participant survey collected information on demographics and residential characteristics from respondents. Most respondents own their home (98.2%), live in a single-family home (92.8%), and more than half of respondents' homes were built in or after 1990 (56.8%). Most respondents reported the area of their homes within the range between 1,000 and less than 3,000 square feet (81.1%). More than half of respondents are aged 55 or older (54.1%) (Table 4-4)

Table 4-4: Participant Demographic and Residential Characteristics

Response	Percent of Responses
Home Ownership (n=110)	
Own	98.2%
Rent	0.9%
Own but to rent to someone else	0.9%
Don't know/refused	0.9%
Residence Type (n=111)	
Single-family home	92.8%
Duplex or townhome	3.6%
Other	3.6%
Don't know/refused	0.0%
Home Construction Year (n=111)	
Before 1960	12.6%
1960 to 1969	5.4%
1970 to 1979	18.0%
1980 to 1989	6.3%
1990 to 1999	21.6%
2000 to 2009	19.8%
2010 or later	15.3%
Don't know/refused	0.9%
Home Square Footage (n=111)	
Less than 1,000 square feet	2.7%
1,000 to 1,999 square feet	39.6%
2,000 to 2,999 square feet	41.4%
3,000 to 3,999 square feet	9.9%
4,000 square feet or more	3.6%
Don't know/refused	2.7%
Age (n=111)	
18 - 24	0.0%
25 - 34	7.2%
35 - 44	18.0%
45 - 54	17.1%
55 - 64	22.5%
65 - 74	22.5%
75+	9.0%
Don't know/refused	3.6%

More than half of respondents have a gas furnace (58.6%) and central air conditioning (64.9%) (Table 4-5).

Table 4-5: Space Heating Demographic Characteristics

Response	Percent of Responses (n=111)
Space Heating Fuel Type	
Natural gas	57.7%
Electricity	31.5%
Propane	4.5%
Wood pellets	0.9%
Oil	0.9%
Geothermal	0.9%
Don't know/refused	2.7%
Space Heating System Type	
Gas Furnace	58.6%
Heat Pump	13.5%
Electric furnace	11.7%
Mini-Split (ductless heat pump)	3.6%
Wood or pellet stove	3.6%
Electric Resistance (i.e. baseboard)	2.7%
Boiler	2.7%
Fireplace	2.7%
Geothermal	0.9%
Don't know/refused	0.0%
Air Conditioning System Type	
Central AC	64.9%
Heat Pump	14.4%
Mini-Split (ductless heat pump)	2.7%
Wall, window mounted, or portable air conditioning unit	3.6%
Don't have AC	12.6%
Don't know/refused	1.8%

4.4 Nonparticipant Surveys

The Evaluators conducted a nonparticipant survey to ask IPC customers who had not participated in the HEA Program about their interest in energy efficiency improvements, program awareness, and satisfaction with IPC as an energy provider.

The survey was administered via email in June and July 2023. 326 customers received an initial outreach email; two reminder emails were sent out to customers. In total, 32 respondents completed the survey with a response rate of 9.8%.

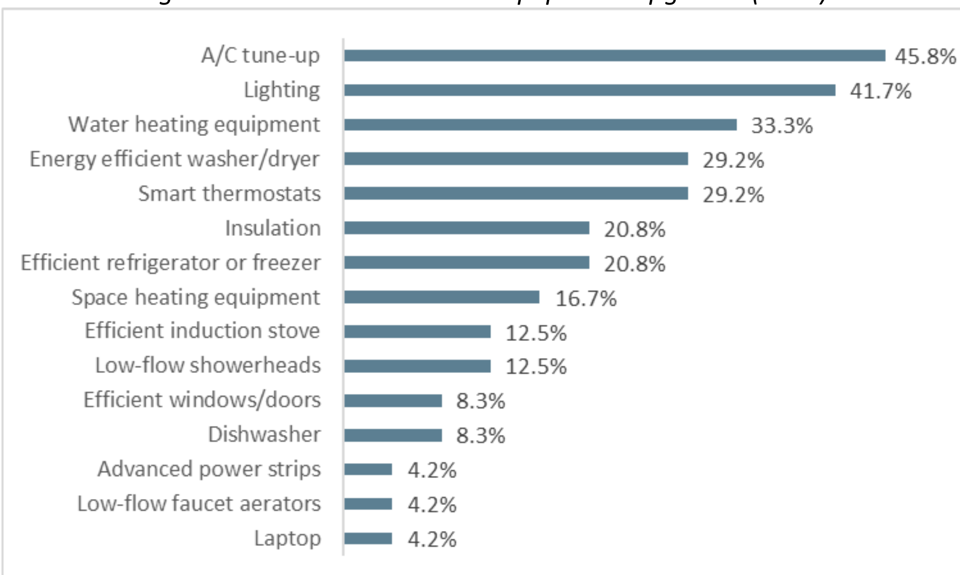
In the following subsections, the Evaluators provide further details for the following nonparticipant process evaluation efforts:

- Experience with energy efficiency equipment
- Program awareness
- Interest in HEA Program
- Respondent characteristics

4.4.1 Experience with Energy Efficiency Equipment

Three-quarters of respondents (75.0%) indicated that they had replaced or made upgrades to electrical equipment in the past three years. The most common equipment upgrades were A/C tune-up, lighting, and water heating equipment (Figure 4-8).

Figure 4-8: Previous Electrical Equipment Upgrades (n=24)



Two-thirds of respondents believed HVAC equipment was the largest energy consumer in their home (65.5%) (Table 4-6).

Table 4-6 Perceived Largest Household Energy Consumer

Response	Percent of Responses (n=29)
HVAC (heating/cooling equipment)	65.5%
Lighting	10.3%
Computer/entertainment equipment	3.5%
Refrigeration	3.5%
Washer/dryer	3.5%
Electric Vehicle	3.5%
Don't know	10.3%

Most respondents knew what type of lights were installed in their home (82.8%). Although the majority of these respondents indicated they had LEDs in their homes (87.5%), more than half of the respondents had other types of lighting equipment (incandescent, fluorescent, halogen), in addition to the LEDs (58.3%).

Most respondents reported having an air conditioner in their home (86.2%). Across these respondents, the air conditioning equipment were most commonly central air conditioners (80.0%), less than 10 years old (68.0%), and had been serviced within the last three years (72.0%) (Table 4-7).

Table 4-7: Air Conditioning Characteristics

Response	Percent of Responses (n=25)
Air Conditioning Type	
Central AC	80.0%
Heat Pump	12.0%
Mini-Split (Ductless Heat Pump)	4.0%
Wall or window mounted AC unit	4.0%
Age of Air Conditioning	
Less than 10 years old	68.0%
10 - 20 years old	12.0%
More than 20 years old	16.0%
Don't know	4.0%
Time Since Last AC Service	
Less than 1 year	48.0%
1 - 3 years	24.0%
More than 3 years	12.0%
Never been serviced	12.0%
Don't know	4.0%

Just under three-quarters of respondents used natural gas to heat their home (72.4%). Two-thirds of respondents had gas furnaces (65.5%), heating equipment that was less than 10 years old (69.0%), and heating equipment that had been serviced in the last three years (72.4%) (Table 4-8). The majority of respondents (79.3%) had a smart (37.9%) or programmable thermostat (41.4%).

Table 4-8: Space Heating Characteristics (n=29)

Response	Percent of Responses
Heating Fuel Type	
Natural gas	72.4%
Electricity	20.7%
Propane	3.5%
Pellet Stove	3.5%
Heating System Type	
Gas Furnace	65.5%
Heat Pump	13.8%
Electric furnace	10.3%
Wood or pellet stove	6.9%
Mini-Split (Ductless Heat Pump)	3.4%
Age of Heating System	
Less than 10 years old	69.0%
10 - 20 years old	10.3%
More than 20 years old	10.3%
Don't know	10.3%
Time Since Last Heating System Service	
Less than 1 year	41.4%
1 - 3 years	31.0%
More than 3 years	10.3%
Never been serviced	10.3%
Don't know	6.9%

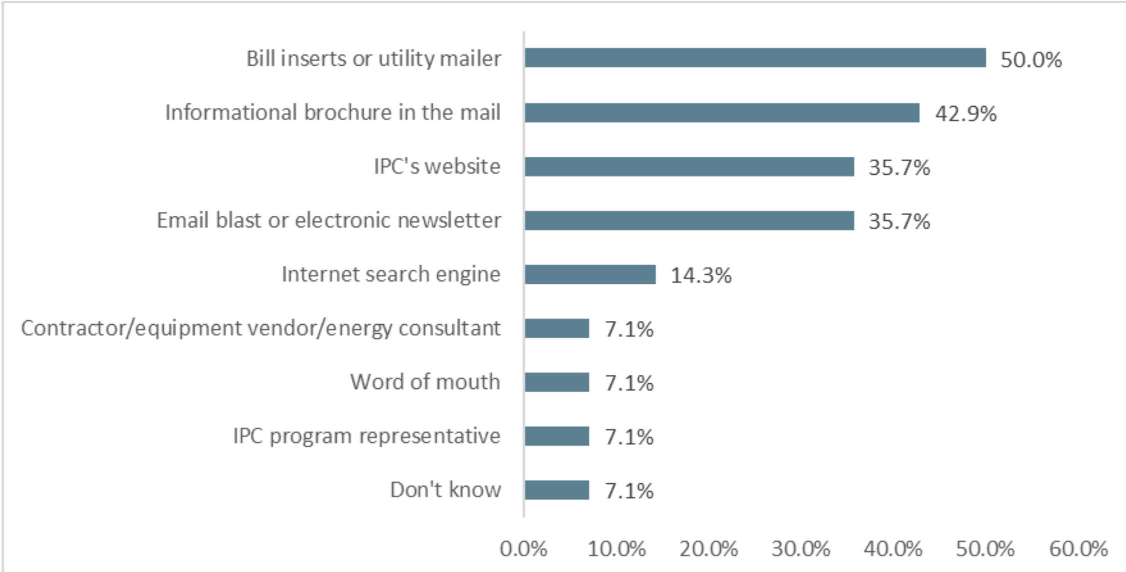
4.4.2 Program Awareness

Half of respondents (50.0%) were aware that IPC provides incentives for energy efficiency equipment purchases and upgrades. Specifically, these 14 respondents reported being aware of heating and cooling incentives, new construction incentives, and the home energy audit program (Table 4-9). Respondents indicated that they learned about these offerings through a variety of avenues including bill inserts/mailers, brochures, IPC's website, and email blasts/newsletters (Table 4-9).

Table 4-9: Awareness of IPC Incentives and Programs (n=14)

Response	Percent of Responses
Incentives for heating and cooling equipment	71.4%
Incentives to incorporate energy efficiency into new construction designs	50.0%
Low-cost Home Energy Audit for Idaho Power Company customers	21.4%

Figure 4-9: Program Awareness Source (n=14)



All but one respondent had full (86.2%) or partial authority (10.3%) to make changes to their home. Across these 28 respondents, the most popular reasons for not participating in IPC's program included being unaware of the programs, incentives not being high enough to offset cost of equipment, and changes not being "worth the trouble" (Figure 4-10). Among the respondents who were aware of the programs but chose not to participate, the most common reasons for not participating included incentives not being high enough to offset cost of equipment (38.5%), changes not being "worth the trouble" (30.8%) and required financial assistance to make improvements (30.8%).

Figure 4-10: Reasons for Not Participating (n=28)

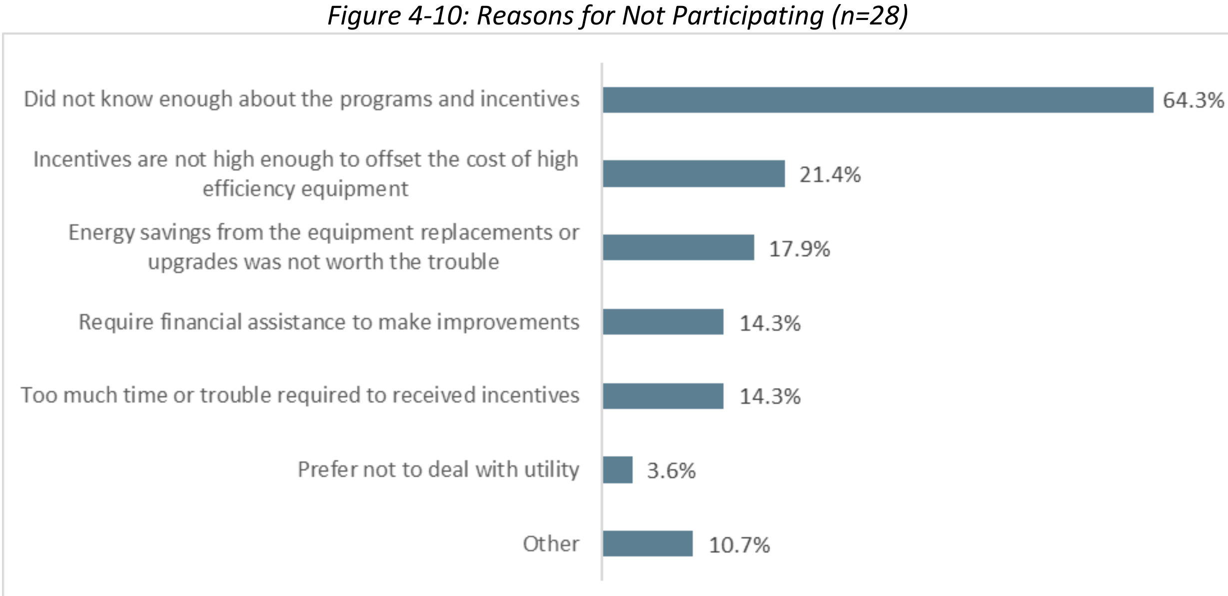


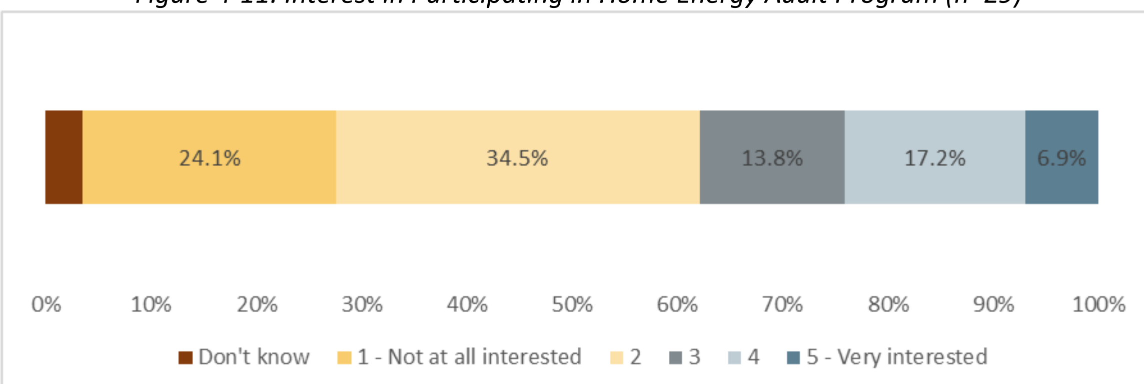
Table 4-10: Reasons for Not Participating in IPC Programs

Response	Percent of Overall Responses (n=28)	Percent of Aware Responses (n=13)	Percent of Unaware Responses (n=15)
Did not know enough about the programs and incentives	64.3%	23.1%	100.0%
Incentives are not high enough to offset the cost of high efficiency equipment (compared to standard equipment)	21.4%	38.5%	6.7%
Energy savings from the equipment replacements or upgrades was not worth the trouble	17.9%	30.8%	6.7%
Too much time or trouble required to received incentives	14.3%	7.7%	20.0%
I am financially able to make the upgrades without assistance	14.3%	30.8%	0.0%
Other	10.7%	15.4%	6.7%
Prefer not to deal with utility	3.6%	7.7%	0.0%

4.4.3 Interest in HEA Program

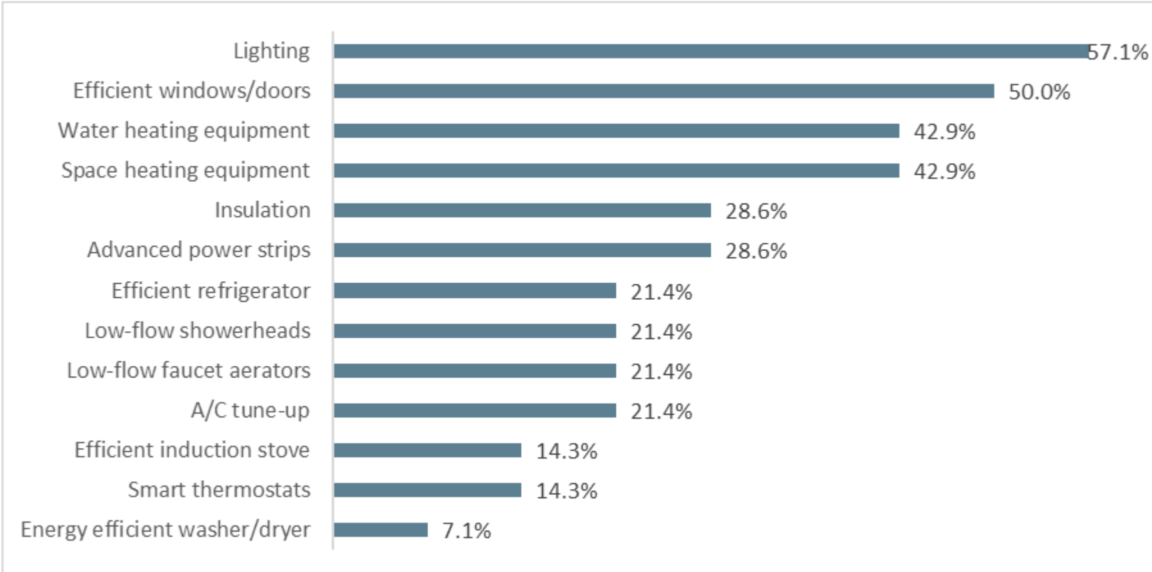
When presented with a description of the HEA program, about one-quarter of respondents were interested in receiving an energy audit (24.2%) (Figure 4-11). Respondents who were not interested in receiving an energy audit (58.6%, n=17) cited a variety of reasons for their disinterest including: they did not know enough about the program (n=7), they were unlikely to replace equipment (n=8), they did not want someone in their home (n=7), they did not want to go through the trouble of scheduling (n=5), they did not want to pay for it (n=4), they are moving and/or remodeling their home (n=2), their landlord is not interested (n=1), and/or their home is new (n=1).

Figure 4-11: Interest in Participating in Home Energy Audit Program (n=29)



About half of respondents were interested in learning about other IPC energy efficiency programs (48.3%). Respondents were most interested in lighting, efficient windows/doors, space heating equipment, and water heating equipment related offerings (Figure 4-12).

Figure 4-12: Interest in Energy Efficient Upgrades (n=14)



4.4.4 Respondent Characteristics

The nonparticipant survey collected information on demographics and residential characteristics from respondents (Table 4-11). The majority of respondents own their own (82.8%) and live in single family homes (93.1%). More than half of the homes were built after 1990 (62.1%) and between 1,000-1,999 square feet.

Table 4-11: Non-Participant and Participant Demographic and Residential Characteristics

Response	Percent of Non-Participant Responses (n=29)
Home Ownership	
Own	82.8%
Rent	13.8%
Own but to rent to someone else	0.0%
Don't know/refused	3.5%
Residence Type	
Single-family home	93.1%
Duplex or townhome	6.9%
Other	0.0%
Don't know/refused	0.0%
Home Construction Year	
Before 1960	3.5%
1960 to 1969	10.3%
1970 to 1979	10.3%
1980 to 1989	6.9%
1990 to 1999	20.7%
2000 to 2009	27.6%
2010 or later	13.8%
Don't know/refused	6.9%
Home Square Footage	
Less than 1,000 square feet	3.5%
1,000 to 1,999 square feet	62.1%
2,000 to 2,999 square feet	34.5%
3,000 to 3,999 square feet	0.0%
4,000 square feet or more	0.0%
Don't know/refused	0.0%
Age	
18 - 24	3.5%
25 - 34	10.3%
35 - 44	13.8%
45 - 54	13.8%
55 - 64	17.2%
65 - 74	27.6%
75+	13.8%
Don't know/refused	0.0%

4.5 Program Tracking Review

The Evaluators assessed the degree to which HEA participants subsequently participated in the other residential programs offered by IPC. This enabled the Evaluators to assess whether the HEA Program effectively accomplishes its primary goal: to encourage customers and remove educational barriers to participate in other energy efficiency programs that would be beneficial to reducing their household energy consumption. For this reason, the Evaluators reviewed additional program tracking data to determine which customers participated in other programs after having completed a home energy audit with IPC.

4.5.1 Uplift Due to Program

The Evaluators reviewed other program tracking data to summarize the likely impacts of uplift in other residential programs due to customer participation in the HEA Program. The Evaluators accomplished this by determining the number of projects completed, total energy savings, and average project savings for each of the HEA Program participants and nonparticipants in other programs offered by IPC. The following table summarizes the results of this analysis.

Table 4-12: Summary of HEA Impacts Towards Other Programs

Measure	HEA Participants	HEA Nonparticipants
Total Households	12	2,000
Total Projects	14	2,099
Total Savings	11,661.94	1,397,226.32
Total Projects per Household	1.16	1.05
Average Savings per Household	971.83	698.61

The Evaluators found that 12 of the 2,000 participants in the Heating & Cooling Efficiency Program and Shade Tree Project Program had also participated in the HEA Program in PY2022. At the household level, HEA Program participants completed more projects and accomplished greater energy savings than nonparticipants, as displayed in the table above. HEA Program participants were observed to install connected thermostats (3), ductless heat pumps (2), air source heat pump conversions (1), storage tank water heaters (1), whole house fans (1), and shade trees (6).

In terms of proportion of HEA Program participants that participated in other programs, the Evaluators found that less than 3% of customers who completed home energy audits with IPC ended up completing additional energy efficiency upgrades through IPC, as displayed in the table below.

Table 4-13: Summary of HEA Participants That Completed Additional EE Projects

Description	Value
Total HEA participants	12
HEA participants participating in other projects	425
Percent of HEA participants participating in other programs	2.82%

Although HEA Program participants are inclined to save additional energy through projects per household compared to nonparticipants, the throughput of customers who completed home energy audits towards completing energy efficiency upgrades could be improved. As seen through the auditor interviews and participant survey responses, there is additional opportunity for IPC staff to recommend and follow up with home energy audit customers to learn about current IPC incentives and connect customers with contractors to streamline home projects and remove customer barriers to additional participation. The Evaluators recommend that IPC track HEA Program participant participation in other IPC programs in tandem with scheduled follow ups between IPC staff and IPC HEA customers.

4.6 Energy Efficient Home Improvement Credit

The Inflation Reduction Act of 2022 created several clean energy credits, a non-refundable Energy Efficient Home Improvement Credit[7] for the purchase and installation of certain energy efficient improvements in taxpayers' principal residences. This credit amount is equal to 30 percent of the total amount that taxpayers pay during the year for:

- Qualified energy efficiency improvements installed during the year
- Residential energy property expenditures, and
- Home energy audits

Therefore, customers that participate in Idaho Power's Home Energy Audit Program are eligible to receive a nonrefundable tax credit of 30% of the total cost of the home energy audit performed, up to $150 total. The Energy Efficient Home Improvement Credit is a non-refundable credit, meaning that it can only reduce the amount of tax you owe and will not create a refund. In order for customers to claim the credit through 2023, the home energy audit must satisfy the following criteria:

1. Include a written report and inspection that identifies the most significant and cost-effective energy efficiency improvements with respect to the home, including an estimate of the energy and cost savings with respect to such improvement, and
2. Be conducted and prepared by a home energy auditor

Starting in 2024, the following additional requirements must be met:

1. The inspection must be conducted by a qualified home energy auditor, defined as an individual who is certified by one of the qualified certification Programs listed on the Department of Energy certification programs for the Energy Efficient Home Improvement Credit (Section 25C)[8] at the time of the audit, or under the supervision of a qualified home energy auditor;
2. The written report must be prepared and signed by a qualified home energy auditor, be consistent with industry best practices, and include:
    a. The qualified home energy auditor's name and relevant employer identification number (EIN) or other type of appropriate taxpayer identifying number, if the auditor does not have an EIN;
    b. An attestation that the qualified home energy auditor is certified by a qualified certification program; and
    c. The name of such qualified certification program

In order for IPC customers to remain eligible for claiming the Energy Efficient Home Improvement Credit for home energy audits, the Evaluators recommend that Idaho Power require each home energy auditor is certified by one of the qualified certification Programs listed on the Department of Energy certification

[7] https://www.irs.gov/credits-deductions/energy-efficient-home-improvement-credit

[8] https://www.energy.gov/eere/buildings/us-department-energy-recognized-home-energy-auditor-qualified-certification-programs

programs for the Energy Efficient Home Improvement Credit (Section 25C)[9] and provide the written home energy audit report to customers with the required information (qualified home energy auditor's name and EIN, an attestation that the qualified home energy auditor is certified by a qualified certification program, and the name of such qualified certification program).

5. Appendix A: Participant Survey

This section provides a copy of the survey sent to participants of the Home Energy Audit Program.

5.1 Pre-Defined Variables

Prepopulated variables are shown in all caps enclosed in brackets, e.g., [PREDEFINED VARIABLE]

Variable	**Definition**
CONTACT	Customer Name
ADDRESS	Home Locations
EMAIL	Email address on file for contact
LINK	In-line customer-specific link to online survey
URL	URL for customer-specific link to online survey
LED	Dummy variable for LED direct installation
SHOWERHEAD	Dummy variable for showerhead direct installation
PIPE	Dummy variable for pipe wrap direct installation

5.2 Email Survey Message

Subject: Invitation to provide feedback on Idaho Power's Home Energy Audit Program.

Dear [NAME],

Idaho Power is conducting a survey regarding your participation in the Home Energy Audit Program, through which it provides free home energy audits to its customers, providing information on home energy usage, as well as recommendations and tips for reducing your home's energy use.

Idaho Power has hired ADM Associates to contact program participants, like you, for feedback on your experience as it relates to the Home Energy Audit Program. The feedback that you provide will be used to help improve the program in the future. As a thank you for completing the survey we will provide a $20 electronic gift card. Please take a few minutes to complete the online survey.

[LINK TO ONLINE SURVEY]

We will treat all data collected in this study confidentially. If you have questions about how we treat collected data, please see ADM's privacy policy at https://www.admenergy.com/privacy. If you have questions about this research, please feel free to contact me by return email

[9] https://www.energy.gov/eere/buildings/us-department-energy-recognized-home-energy-auditor-qualified-certification-programs

(heather.polonsky@admenergy.com) or at 971-339-8774. You may also contact Michelle Toney at Idaho Power at 208-388-2221 or by email at mtoney@idahopower.com.

Sincerely,

Heather Polonsky
ADM Associates (contractor of IPC)

5.3 Survey

Start of Block: Screening

Q1 Welcome! Thank you for taking this survey to tell us about your experience with Idaho Power's Home Energy Audit Program. Your feedback is very important to us and will help us improve programs for customers like you. This survey should take 10-15 minutes. Your responses are confidential and will be used for research purposes only.

The feedback that you provide will be used to help improve the program in the future. As a thank you for completing the survey we will provide a $20 electronic gift card. Please complete the survey to the last question, where we will verify your email to ensure that you receive your gift card.

We will treat all data collected in this study confidentially. If you have questions about how we treat collected data, please see ADM's privacy policy at https://www.admenergy.com/privacy. If you have any questions regarding this survey request, please contact Idaho Power customer service at 208-388-2323 or 1-800-488-6151. You may also contact Michelle Toney at Idaho Power at 208-388-2221 or by email at mtoney@idahopower.com.

Page Break

Q2 Program records indicate that you received a Home Energy Audit through Idaho Power's Home Energy Audit Program at ${e://Field/ADDRESS}. Is this correct?

- Yes (1)
- No (2)
- Don't know (98)

Page Break

Display This Question:

If Q2 = 2

Or Q2 = 98

Q3 Is there someone else we should speak with that might know about the Home Energy Audit you received?

- O Yes – please provide their name and email address or phone number (1) ____

- O No (2)

Skip To: End of Survey If Q3 = 2

End of Block: Screening

Start of Block: Program Awareness

Q4 How did you learn about the Home Energy Audit Program? (Select all that apply)

- ☐ Contractor (1)
- ☐ Utility representative (2)
- ☐ Word-of-mouth (3)
- ☐ Bill inserts or utility mailer (4)
- ☐ Email from utility (5)
- ☐ Social media (Facebook, Instagram, Twitter, etc.) (6)
- ☐ Digital advertisements (7)
- ☐ Radio or television ad (8)
- ☐ Retailer (9)
- ☐ Utility website (10)
- ☐ Other - please describe (96) ____
- ☐ ⊗Don't know (98)

Page Break

Q5 Why did you decide to participate in the Home Energy Audit Program? (Select all that apply)

▢ Learn how my home uses energy (1)

▢ Learn how to reduce my home's energy consumption (2)

▢ Conserve energy/protect the environment (3)

▢ Reduce my monthly utility costs (4)

▢ Become as energy efficient as my friends or neighbors (5)

▢ Get a discounted energy audit (6)

▢ Get energy saving improvements installed at no additional cost (7)

End of Block: Program Awareness

Start of Block: Home Energy Audit

X→

Q6 Were you planning on having a home energy audit BEFORE you learned the program?

O Yes (1)

O No (2)

O Don't know (98)

Page Break

Q7 On a scale of 1 through 5, where 1 means “very difficult” and 5 means “very easy”, how would you rate the process of scheduling your home energy audit?

- 1 - Very difficult (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 - Very easy (5)
- Don't know (98)

Page Break

Display This Question:

If Q7 = 1

Or Q7 = 2

Q8 You indicated some difficulty in scheduling your home energy audit, why do you say that?

____

____

____

____

____

Page Break

Q9 When you had your home energy audit, did the auditor do any of the following?

	Yes (1)	No (2)	Don't know (98)
Ask you if there were any specific issues with your home you wanted to address (1)	o	o	o
Discuss with you the energy savings you might achieve by making the recommended improvements (2)	o	o	o
Install energy saving improvements on the day of the audit (3)	o	o	o

Page Break

Q10 On a scale of 1 through 5, where 1 means “not at all helpful” and 5 means “very helpful”, how helpful was the home energy audit to you?

- 1 - Not at all helpful (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 - Very helpful (5)
- Don't know (98)

Page Break

Display This Question:

If Q10 = 1

Or Q10 = 2

Q11 Why was that audit not helpful to you?

____

____

____

____

____

Page Break

Q12 Since the home energy audit, would you say you have made all of the recommended energy efficiency improvements, made some of them, or not made any?

- Made all (1)
- Made some but not all (2)
- Have not made any (3)
- Don't know (98)

Page Break

Display This Question:

If Q12 = 3

Or Q12 = 2

X→

Q13 What were the main reasons for not making those recommended improvements? (Select all that apply)

- ▢ Cost (1)
- ▢ Do not have time (2)
- ▢ Waiting for current equipment to fail (3)
- ▢ Do not feel they need to be done/will not save energy (4)
- ▢ Do not own the property (5)
- ▢ Need more information (6)
- ▢ Still planning to implement in the future (7)
- ▢ Other – please describe (96) ____
- ▢ ⊗Don't know (98)

Page Break

Q14 Are you interested in making additional energy efficiency improvements?

- Yes (1)
- No (2)
- Don't know (98)

Page Break

Display This Question:

If Q14 = 1

Q15 What additional improvements are you most interested in?

- Lighting (1)
- Space heating equipment (2)
- A/C tune-up (3)
- Smart thermostats (4)
- Low-flow faucet aerators (5)
- Low-flow showerheads (6)
- Water heating equipment (7)
- Advanced power strips (8)
- Efficient refrigerator (9)
- Efficient induction stove (10)
- Wall insulation, floor insulation, attic insulation (11)
- Efficient windows/doors (12)
- Energy efficient washer/dryer (13)
- Other – please describe (96) ____

End of Block: Home Energy Audit

Start of Block: Measure Verification

Display This Question:

If LED >= 1

Q16 Do you remember the Home Energy Audit contractor installing LED bulbs in your home during the audit?

- O Yes (1)
- O No (2)
- O Received bulbs but contractor did not install (3)

Page Break

Display This Question:

If Q16 = 1

Q17 Have any of the LED bulbs been removed?

- Yes (1)
- No (2)
- Don't know (98)

Page Break

Display This Question:

If Q17 = 1

Q18 Why were the LED bulbs removed? (Select all that apply)

- ☐ They were too bright (1)
- ☐ They were too dim (2)
- ☐ They stopped working (3)
- ☐ They flickered (4)
- ☐ Didn't like the color of the light (5)
- ☐ Other – please describe (96) ____

Page Break

Display This Question:

If SHOWERHEAD >= 1

Q19 Do you remember the Home Energy Audit contractor installing an efficient showerhead during the audit?

- O Yes (1)
- O No (2)
- O Received an efficient showerhead but contractor did not install it (3)

Page Break

Display This Question:

If Q19 = 1

Q20 Has the showerhead been removed?

- Yes (1)
- No (2)
- Don't know (98)

Page Break

Display This Question:

If Q20 = 1

Q21 Why was the showerhead removed? (Select all that apply)

- ☐ Not enough water came out (1)
- ☐ Did not like the way it looked (2)
- ☐ Damaged/did not work right (3)
- ☐ Other – please describe (96) ____

Page Break

Display This Question:

If PIPE = 1

Q25 Do you remember the Home Energy Audit contractor installing pipe wrap insulation during the audit?

- O Yes (1)
- O No (2)
- O Received pipe wrap insulation, but contractor did not install it (3)

Page Break

Display This Question:

If Q25 = 1

Q26 Is the pipe wrap insulation still installed?

- Yes (1)
- No (2)
- Don't know (98)

Page Break

Display This Question:

If Q26 = 2

Q27 Why was the pipe wrap removed? (Select all that apply)

▢ Was not installed properly (1)

▢ I installed a different one myself (2)

▢ Other – please describe (96) ____

End of Block: Measure Verification

Start of Block: Satisfaction

Q28 Do you remember receiving a home energy report either by mail or email?

○ Yes (1)

○ No (2)

Page Break

Q29 Using a scale of 1 through 5, where 1 means “very dissatisfied” and 5 is “very satisfied”, how would you rate your satisfaction with the following?

Display This Choice:

If Q28 = 1

Time it took to schedule the home audit (2)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)
Interactions you had with the audit contractor (3)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)
The measures you received during the audit (4)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)
Display This Choice: If Q28 = 1 The home energy report you received (5)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)
The follow up call with the auditor 1-2 weeks after the audit to go over the report (6)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)
The savings on your monthly utility bills (7)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)
The information learned about your home from the audit (8)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)

The program overall (9)	O 1 - Very dissatisfied (1)	O 2 (2)	O 3 (3)	O 4 (4)	O 5 - Very satisfied (5)	O Don't know (98)

Page Break

Display This Question:

If Q29 [1] (Count) >= 1

Or Q29 [2] (Count) >= 1

Q30 Why were you dissatisfied with those aspects of the program?

____

____

____

____

____

Page Break

Q31 Using the same scale, how satisfied are you with Idaho Power as your electricity provider?

- 1- Very dissatisfied (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 - Very satisfied (5)
- Don't know (98)

End of Block: Satisfaction

Start of Block: Demographics

Q32 Please answer the following questions about your household and residence. Your responses are completely confidential and will be used to assess how well this program is serving Idaho Power's customer population. It is okay to not answer any of these questions.

Do you rent or own your home?

- Own (1)
- Rent (2)
- Own but to rent to someone else (3)
- Prefer not to answer (99)

Page Break

Q33 Which of the following best describes your home?

- O Single-family home (1)
- O Duplex or townhome (2)
- O Other – please describe (96) ____
- O Prefer not to answer (99)

Page Break

Q34 Approximately when was your home built?

- Before 1960 (1)
- 1960 to 1969 (2)
- 1970 to 1979 (3)
- 1980 to 1989 (4)
- 1990 to 1999 (5)
- 2000 to 2009 (6)
- 2010 or later (7)
- Don’t know (98)
- Prefer not to answer (99)

Page Break

Q35 About how many square feet is your home? If you're unsure, an estimate is okay.

- Less than 1,000 square feet (1)
- 1,000 to 1,999 square feet (2)
- 2,000 to 2,999 square feet (3)
- 3,000 to 3,999 square feet (4)
- 4,000 square feet or more (5)
- Don't know (98)
- Prefer not to answer (99)

Page Break

Q36 What is the main fuel used for heating your home?

- O Natural gas (1)
- O Electricity (2)
- O Propane (3)
- O Other - please describe (96) ____
- O Don't know (98)
- O Prefer not to answer (99)

Page Break

Q37 What type of heating system do you currently use in your home?

- O Electric Resistance (i.e. baseboard) (1)
- O Gas Furnace (2)
- O Electric furnace (3)
- O Heat Pump (4)
- O Mini-Split (ductless heat pump) (5)
- O Wood or pellet stove (6)
- O Other - please describe (96) ____
- O Don’t know (98)
- O Prefer not to answer (99)

Page Break

Q38 What type of air conditioning do you currently have in your home?

- O Central AC (1)
- O Heat Pump (2)
- O Mini-Split (ductless heat pump) (3)
- O Wall or window mounted air conditioning unit (4)
- O Don't have AC (5)
- O Other - please describe (96) ____
- O Don’t know (98)
- O Prefer not to answer (99)

Page Break

Q39 What is your age?

- O 18 – 24 (1)
- O 25 – 34 (2)
- O 35 – 44 (3)
- O 45 – 54 (4)
- O 55 – 64 (5)
- O 65 – 74 (6)
- O 75+ (7)
- O Prefer not to answer (99)

Page Break

Q40 Thank you for taking the time today to complete this survey. As stated in the email, we are providing a $20 electronic gift card as a thank you for your responses. The email address we have on file for you is ${e://Field/Email}, please confirm this information.

O Yes, please send my electronic gift card to the above email address (1)

O No, please send my electronic gift card to the following email address (2) ____

End of Block: Demographics

---

6. Appendix B: Nonparticipant Survey

This section provides a copy of the survey sent to participants of the Home Energy Audit Program.

6.1 Pre-Defined Variables

Prepopulated variables are shown in all caps enclosed in brackets, e.g., [PREDEFINED VARIABLE]

Variable	Definition
CONTACT	Customer Name
ADDRESS	Home Locations
EMAIL	Email address on file for contact
LINK	In-line customer-specific link to online survey
URL	URL for customer-specific link to online survey

6.2 Email Survey Message

Subject: Invitation to provide feedback on Idaho Power's Energy Efficiency Programs.

Dear [NAME],

Idaho Power is conducting a survey with their customers to better understand awareness of energy efficiency programs. Idaho Power is looking to better understand barriers to program participation as well as interest and awareness of other energy efficiency programs they provide.

Idaho Power has hired ADM Associates to contact their customers like you for feedback. Your responses will be kept completely confidential and the feedback that you provide will be used to help improve the program in the future. As a thank you for completing the survey we will provide a $20 electronic gift card. Please take a few minutes to complete the online survey.

[LINK TO ONLINE SURVEY]

We will treat all data collected in this study confidentially. If you have questions about how we treat collected data, please see ADM's privacy policy at https://www.admenergy.com/privacy. If you have questions about this research, please feel free to contact me by return email (heather.polonsky@admenergy.com) or at 971-339-8774. You may also contact Michelle Toney at Idaho Power at 208-388-2221 or by email at mtoney@idahopower.com.

Sincerely,

Heather Polonsky
ADM Associates (contractor of IPC)

6.3 Survey

Start of Block: Screening

Q1 Welcome! Thank you for taking this survey to tell us about your knowledge and awareness of Idaho Power's energy efficiency programs. Your feedback is very important to us and will help us improve programs for customers like you. This survey should take 10-15 minutes. Your responses are confidential and will be used for research purposes only.

The feedback that you provide will be used to help improve the program in the future. As a thank you for completing the survey we will provide a $20 electronic gift card. Please complete the survey to the last question, where we will verify your email to ensure that you receive your gift card.

We will treat all data collected in this study confidentially. If you have questions about how we treat collected data, please see ADM's privacy policy at https://www.admenergy.com/privacy. If you have any questions regarding this survey request, please contact Idaho Power customer service at 208-388-2323 or 1-800-488-6151. You may also contact Michelle Toney at Idaho Power at 208-388-2221 or by email at mtoney@idahopower.com.

Page Break

Q2 According to our records, Idaho Power Company (IPC) provides electricity service to your home at ${e://Field/ADDRESS}. Is that correct?

- Yes (1)
- No (2)
- Don't know (98)

Skip To: End of Survey If Q2 = 2

Skip To: End of Survey If Q2 = 98

Page Break

Q3 To the best of your knowledge, have you replaced or upgraded equipment that requires electricity in the last three years? This could have been for lighting, refrigeration, computers, insulation, duct sealing, windows, or space heating/cooling equipment.

- O Yes (1)
- O No (2)

Page Break

Display This Question:

If Q3 = 1

Q4 What types of equipment did you upgrade or replace in the last three years? (Select all that apply)

- ▢ Lighting (1)
- ▢ Space heating equipment (2)
- ▢ A/C tune-up (3)
- ▢ Smart thermostats (4)
- ▢ Low-flow faucet aerators (5)
- ▢ Low-flow showerheads (6)
- ▢ Water heating equipment (7)
- ▢ Advanced power strips (8)
- ▢ Efficient refrigerator (9)
- ▢ Efficient induction stove (10)
- ▢ Wall insulation, floor insulation, attic insulation (11)
- ▢ Efficient windows/doors (12)
- ▢ Energy efficient washer/dryer (13)
- ▢ Other – please describe (96) ____

Page Break

Display This Question:

If Q3 = 1

Q5 Did you receive an incentive or rebate from IPC for any of that equipment?

- O Yes (1)
- O No (2)

Skip To: End of Survey If Q5 = 1

Page Break

Q6 Have you ever had a home energy audit conducted on your home? A home energy audit provides residential customers with recommendations to improve the efficiency, comfort, and health of a home, and is conducted by a certified third-party specialist.

O Yes (1)

O No (2)

Skip To: End of Survey If Q6 = 1

End of Block: Screening

Start of Block: End Uses

Q7 What do you think is the largest energy consumer in your home?

O Computer/entertainment equipment (TV, stereo, video game consoles) (1)

O Refrigeration (2)

O HVAC (heating/cooling equipment) (3)

O Lighting (4)

O Cooking appliances (5)

O Washer/dryer (6)

O Other – please describe (96) ____

O Don't know (98)

Page Break

Q8 Are you aware of the type of lighting (LED, incandescent, fluorescent, halogen, etc.) currently installed in your home?

O Yes (1)

O No (2)

Page Break

Display This Question:

If Q8 = 1

Q9 Which of the following lighting technologies is currently installed? (Check all that apply)

- ☐ Incandescent (1)
- ☐ Halogen (2)
- ☐ Fluorescent (i.e. CFL bulbs or fluorescent tubes) (3)
- ☐ LED (4)
- ☐ Other – please describe (96) ____

Page Break

Q10 Does your home have an air conditioner?

- O Yes (1)
- O No (2)

Page Break

Display This Question:

If Q10 = 1

Q11 What type of air conditioning do you currently have in your home?

- O Central AC (1)
- O Heat Pump (2)
- O Mini-Split (Ductless Heat Pump) (3)
- O Wall or window mounted air conditioning unit (4)
- O Other – please describe (96) ____
- O Don't know (98)

Page Break

Display This Question:

If Q10 = 1

Q12 Approximately how old is the air conditioning system?

- Less than 10 years old (1)
- 10 – 20 years old (2)
- More than 20 years old (3)
- Don't know (98)

Page Break

Display This Question:

If Q10 = 1

Q13 When was the last time your air conditioner was serviced?

- Less than 1 year (1)
- 1 – 3 years (2)
- More than 3 years (3)
- It’s never been serviced (4)
- Don't know (98)

Page Break

Q14 What is the main fuel used for heating your home?

O Natural gas (1)

O Electricity (2)

O Propane (3)

O Other – please describe (96) ____

O Don't know (98)

Page Break

Q15 What type of heating system do you currently use in your home?

- Electric Resistance (i.e. baseboard) (1)
- Gas Furnace (2)
- Electric furnace (3)
- Heat Pump (4)
- Mini-Split (Ductless Heat Pump) (5)
- Wood or pellet stove (6)
- Don’t heat the home (7)
- Other – please describe (96) ____
- Don't know (98)

Page Break

Q16 Approximately how old is the heating system?

- Less than 10 years old (1)
- 10-20 years old (2)
- More than 20 years old (3)
- Don't know (98)

Page Break

Q17 When was the last time your heating system was serviced?

- O Less than 1 year (1)
- O 1 – 3 years (2)
- O More than 3 years (3)
- O It’s never been serviced (4)
- O Don't know (98)

Page Break

Q18 What type of thermostat do you use?

- Manual (1)
- Programmable (2)
- Smart thermostat (3)
- Don't know (98)

End of Block: End Uses

Start of Block: Awareness

Q19 Before taking this survey, were you aware that Idaho Power Company provides incentives for energy efficiency equipment purchases and upgrades, and a discounted Home Energy Audit?

- Yes (1)
- No (2)

Page Break

Display This Question:

If Q19 = 1

Q20 Which of the following types of programs or incentives were you aware of? (Select all that apply)

- ☐ Incentives to incorporate energy efficiency into new construction designs (1)
- ☐ Incentives for heating and cooling equipment (2)
- ☐ Low-cost Home Energy Audit for Idaho Power Company customers (3)
- ☐ Other – please describe (96) ____

Page Break

Display This Question:

If Q19 = 1

Q21 In the past year, from what sources have you gotten information about the energy efficiency incentives from IPC? (Select all that apply)

- ☐ From a contractor/equipment vendor/energy consultant (1)
- ☐ From an IPC account representative (2)
- ☐ From an internet search engine (3)
- ☐ From an IPC program representative (4)
- ☐ Received an email blast or electronic newsletter (5)
- ☐ Received an informational brochure in the mail (6)
- ☐ Bill inserts or utility mailer (7)
- ☐ From Idaho Power Company's website (8)
- ☐ Word of mouth (family, friends, colleagues, neighbors, etc.) (9)
- ☐ Other – please describe (96) ____
- ☐ ⊗Don't know (98)

Page Break

X→

Q22 We understand that it is not always possible to make improvements and energy efficiency upgrades to your home. Which of the following best describes your authority to make decisions?

- O No authority – as a renter I am not permitted to make any repairs, improvements or upgrades (1)
- O Some authority – as a renter I am permitted to make some improvements or upgrades (2)
- O Full authority – I am the owner (3)
- O Full authority – as part of my rental agreement I am required to maintain/repair the home (4)
- O Don't know (98)

Page Break

Display This Question:

If Q22 != 1

X→

Q23 Why haven't you participated in any of IPC's programs? (Select all that apply)

▢ Did not know enough about the programs and incentives (1)

▢ Energy savings from the equipment replacements or upgrades was not worth the trouble (2)

▢ Too much time or trouble required to received incentives (3)

▢ Prefer not to deal with utility (4)

▢ Not interested in what IPC is offering (5)

▢ Incentives are not high enough to offset the cost of high efficiency equipment (compared to standard equipment) (6)

▢ I am financially able to make the upgrades without assistance (7)

▢ Other – please describe (96)
____

▢ ⊗Don't know (98)

Page Break

Display This Question:

If Q3 = 1

Q24 Earlier you mentioned you replaced or upgraded equipment that required electricity in the past three years. Did you work with a contractor to complete these replacements or upgrades?

- O Yes, worked with a contractor (1)
- O No, self-installed the equipment (2)
- O Both (3)
- O Don't know (98)

Page Break

Display This Question:

If Q24 = 1

Or Q24 = 3

Q25 Do you recall the name of the contractor/company you worked with?

- O Yes - please provide their name (1) ____

- O No (2)

Page Break

X→

Q26 IPC's Home Energy Audit program offers a discounted home energy audit by a certified energy performance specialist to identify areas of concern and provide recommendations to improve the efficiency, comfort, and health of the home. The audit also includes direct-install measures, which the contractor will install in your home free of charge, including LED lightbulbs, high efficiency showerheads, and pipe insulation.

Using a scale of 1 through 5, where 1 means "not at all interested" and 5 means "very interested", how interested are you in participating in the Home Energy Audit Program?

- O 1 - Not at all interested (1)
- O 2 (2)
- O 3 (3)
- O 4 (4)
- O 5 - Very interested (5)
- O Don't know (98)

Page Break

Q27 What might prevent you from participating in IPC's Home Energy Audit Program? (Select all that apply)

- ▢ Don't know enough about the program (1)
- ▢ Unlikely to replace any equipment (2)
- ▢ Too much time or trouble required to schedule the home audit (3)
- ▢ Not interested in having someone in my home (4)
- ▢ Other – please describe (96) ____
- ▢ Don't know (98)

Page Break

Q28 Are you interested in learning more about other IPC energy efficiency programs or equipment upgrades?

- Yes (1)
- No (2)

Page Break

Display This Question:

If Q28 = 1

Q29 What types of programs and upgrades are you interested in? (Select all that apply)

- [ ] Lighting (1)
- [ ] Space heating equipment (2)
- [ ] A/C tune-up (3)
- [ ] Smart thermostats (4)
- [ ] Low-flow faucet aerators (5)
- [ ] Low-flow showerheads (6)
- [ ] Water heating equipment (7)
- [ ] Advanced power strips (8)
- [ ] Efficient refrigerator (9)
- [ ] Efficient induction stove (10)
- [ ] Wall insulation, floor insulation, attic insulation (11)
- [ ] Efficient windows/doors (12)
- [ ] Energy efficient washer/dryer (13)
- [ ] Other – please describe (96) ____

End of Block: Awareness

Start of Block: Demographics

Q30 Please answer the following questions about your household and residence. Your responses are completely confidential and will be used to assess how well this program is serving Idaho Power's customer population. It is okay to not answer any of these questions.

Do you rent or own your home?

- O Rent (1)
- O Own (2)
- O Own but rent to someone else (3)
- O Prefer not to answer (99)

Page Break

Q31 Which of the following best describes your home?

- O Single-family home (1)
- O Manufactured or mobile home (2)
- O Duplex or townhome (3)
- O Apartment or condominium (4)
- O Other – please describe (96) ____
- O Prefer not to answer (99)

Page Break

Q32 Approximately when was your home built?

- Before 1960 (1)
- 1960 to 1969 (2)
- 1970 to 1979 (3)
- 1980 to 1989 (4)
- 1990 to 1999 (5)
- 2000 to 2009 (6)
- 2010 or later (7)
- Don't know (98)
- Prefer not to answer (99)

Page Break

Q33 About how many square feet is your home? If you’re unsure, an estimate is okay.

- O Less than 1,000 square feet (1)
- O 1,000 to 1,999 square feet (2)
- O 2,000 to 2,999 square feet (3)
- O 3,000 to 3,999 square feet (4)
- O 4,000 square feet or more (5)
- O Don’t know (98)
- O Prefer not to answer (99)

Page Break

Q34 What is your age?

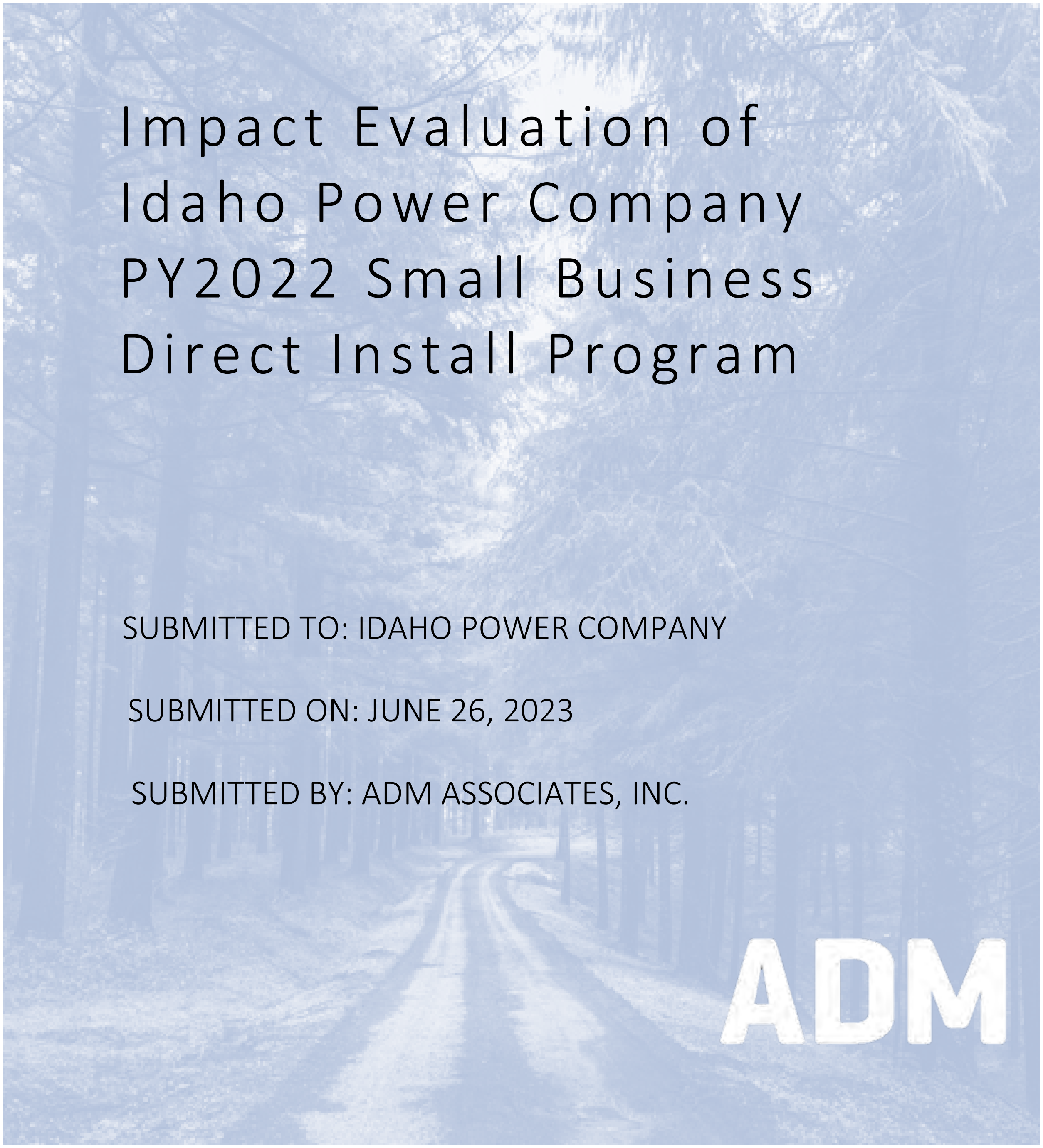
- O 18 – 24 (1)
- O 25 – 34 (2)
- O 35 – 44 (3)
- O 45 – 54 (4)
- O 55 – 64 (5)
- O 65 – 74 (6)
- O 75+ (7)
- O Prefer not to answer (99)

Page Break

Q35 Thank you for taking the time today to complete this survey. As stated in the email, we are providing a $20 electronic gift card as a thank you for your responses. The email address we have on file for you is ${e://Field/Email}, please confirm this information.

- O Yes, please send my electronic gift card to the above email address (1)
- O No, please send my electronic gift card to the following email address (2) ____

End of Block: Demographics



Impact Evaluation of Idaho Power Company PY2022 Small Business Direct Install Program

SUBMITTED TO: IDAHO POWER COMPANY

SUBMITTED ON: JUNE 26, 2023

SUBMITTED BY: ADM ASSOCIATES, INC.

ADM

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1. Executive Summary

This report is a summary of the 2022 program year (PY2022) Small Business Direct Install (SBDI) Program Impact Evaluation for Idaho Power Company (IPC) in the Idaho and Oregon service area. The evaluation was administered by ADM Associates, Inc. (herein referred to as the "Evaluators"). This program is no longer running and was closed on March 31, 2023.

The Evaluators found the impact evaluation results for the Small Business Direct Install Program to align with similar Small Business Direct Install programs offered. The impact evaluation resulted in 100% realization rate.

In addition, the Evaluators found almost all responding customers (95%) were satisfied or very satisfied with the program and less than half of respondents were interested in learning more about other energy efficiency opportunities through Idaho Power (38%). The Evaluators conclude that the program ran smoothly and delivers sufficient energy efficiency options to Idaho Power customers. The Evaluators provide recommendations for providing additional information to program participants about other Idaho Power Company program offerings.

1.1 Small Business Direct Install Program

IPC's Small Business Direct Install (SBDI) Program targets hard-to-reach small business customers in Idaho who use less than 25,000 kWh annually. The program provides eligible customers with a free lighting assessment, recommendations on energy-saving lighting equipment and with the customers agreement, free direct installation of qualifying lighting equipment.

Idaho Power pays the full cost of a lighting assessment and the full cost of installation of eligible measures for the participants. In program year 2021, IPC's SBDI program achieved 2,422 MWh of savings from 452 projects. In program year 2022, IPC's SBDI program achieved 3,228,365 kWh of savings from 680 projects. The remainder of this report details the results of the impact evaluation for the SBDI program in PY2022.

1.2 Savings Results

The Evaluators conducted an impact evaluation for IPC's Small Business Direct Install Program during PY2022. In PY2022, Idaho Power completed and provided incentives for commercial lighting measures in Idaho and Oregon under the Small Business Direct Install Program.

Table 1-1: Measure Summary

Measures
A19 LED
A23 LED
BR LED
Can
Corncob Lighting
Entry
Exit
Flood
Globe
High Bay
Kit Lighting
LED Candelabra
LED Strip
MR16 LED
PAR LED
RLRB
TLED
Wall Pack

The Small Business Direct Install Program verified savings amounted to 3,228,367 kWh[1] with a 100% realization rate for the lighting measures overall. The Evaluators summarize the program verified savings in Table 1-2.

Table 1-2: Small Business Direct Install Verified Impact Savings by Industry

Program	Claimed Savings (kWh)	Verified Savings (kWh)	Realization Rate
Small Business Direct Install	3,228,365	3,228,367*	100%

*The sum of the measure-level verified savings is 2 kWh larger than the program-level claimed savings due to rounding.

The Evaluators conducted the following evaluation tasks for the PY2022 Small Business Direct Install Program impact evaluation:

- Database Review
- Survey verification
- Measure-level savings application review

In the following sections, the Evaluators summarize the findings and recommendations resulting from our evaluation activities.

[1] The sum of the measure-level verified savings is 2 kWh larger than the program-level claimed savings due to rounding.

1.3 Conclusions & Recommendations

The Evaluators provide the following impact evaluation conclusions and recommendations regarding Idaho Power's Small Business Direct Install Program:

- **Conclusion #1:** The Evaluators verified 3,228,367 kWh savings at a 100% realization rate for the Small Business Direct Install Program. The sum of the measure-level verified savings is 2 kWh larger than the program-level claimed savings due to rounding. The Evaluators verified savings and assumptions using the industry-standard lighting engineering algorithm for the lighting measures included in the program in addition to verified baseline wattage and facility annual hours of operation inputs. Verified savings were calculated for a sample of projects, stratified to meet 90/10 precision, with final precision estimates at ±7.61% at 90% confidence.
- **Conclusion #2:** The Evaluators reviewed all tracking data as well as a sample of project data and confirmed that project-level measure details were tracked accurately and that engineering algorithms were utilized correctly to calculate expected savings. The Evaluators have no recommendations for revising the calculation of expected savings for the program.
- **Conclusion #3**: The current tracking data does not summarize measure-level expected savings. Rather, project-level expected savings are summarized.
    - **Recommendation #1:** The evaluators recommend that the Small Business Direct Install Program tracking database, and other programs moving forward, include the measure-level expected savings details in addition to the project-level details to compare verified savings more efficiently and accurately as well as improving quality control/analysis. However, due to the program's close on March 31, 2023, this recommendation may not lead to any necessary action by Idaho Power.
- **Conclusion #4:** The Evaluators deployed verification surveys to investigate in-service rates and customer satisfaction among participants. This effort received 20 responses, leading to ±11.01% precision at 90% confidence. Of the 19 responses received through survey verification efforts, 16 indicated that all lighting equipment remained installed while three customer respondents indicated that one light bulb had been removed either due to the bulb flickering or due to the brightness of the lamp. The Evaluators therefore estimated in-service rates across the program at 100%. This value matches in-service rates assumed in Idaho Power expected savings calculations. The Evaluators therefore recommend no adjustments to ISR values.
- **Conclusion #5:** The Evaluators estimated annual hours of operation from survey responses, however, due to lack of precision by facility type, the Evaluators recommend that Idaho Power continue to use documented annual hours of operation in future program cycles.
- **Conclusion #6:** All survey respondents remembered having lighting measures installed in their place of business. Almost all respondents (95%) were satisfied with the lighting project and indicated that it was completed to their satisfaction. One respondent was not satisfied because their outside patio lights were not replaced despite it being listed on their project proposal.
    - **Recommendation #2:** The Evaluators recommend IPC consider additional supervision and/or QA/QC during direct installs to ensure thorough replacement of equipment listed on the project proposal.

- **Conclusion #7**: The Evaluators asked survey participants if installing contractors had left behind any lighting equipment uninstalled. One hundred percent of respondents indicated that the contractors did not leave behind any spare equipment. Three respondents indicated they removed one bulb installed through the program because they were either too bright (n=1), they flickered (n=1) or stopped working(n=1). These responses were considered but were not used towards further adjustment in impact analysis in-service rates due.
- **Conclusion #8**: Survey respondents were asked about their level of interest in learning more about additional energy efficiency improvements. Twelve respondents indicated they were interested in additional improvements, with the majority interested in lighting controls and smart thermostats for business.
    - **Recommendation #3**: The Evaluators recommend Idaho Power consider including lighting controls and smart thermostats for businesses in IPC's nonresidential program offerings, if not already included.
- **Conclusion #9**: Most survey participants (34%) prefer email as the best way to communicate information on programs and energy efficiency upgrades; followed by in-person communication (23%).

2. General Methodology

The Evaluators completed an impact evaluation for each of the lighting measures included in Idaho Power Company's (IPC) Small Business Direct Install Program (SBDI). Our general approach for this evaluation considers the cyclical feedback loop among program design, implementation, and impact 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 below:

1. Review program tracking database to determine and verify the energy (kWh) impacts attributable to the 2022 program year.
2. Complete the file reviews and verification of project specific assumptions with a ±10% precision at a 90% confidence interval (90/10);
3. Develop credible and reliable program energy and non-energy impact estimates and ex-post realization rates through the 2022 program year; and
4. Deliver a report with findings, observations, and recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.

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)[2] and the Uniform Methods Project (UMP)[3]:

- Simple verification (web-based surveys)
- Document verification (review project documentation)
- Engineering algorithm with verified inputs

The M&V methodologies are determined by previous Idaho Power evaluation methodologies as well as industry best practices for a direct install program evaluation. The Evaluators 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)[4]
- 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[5]

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[2] https://www.nrel.gov/docs/fy02osti/31505.pdf
[3] https://www.nrel.gov/docs/fy18osti/70472.pdf
[4] https://rtf.nwcouncil.org/measures
[5] 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.

- International Performance Measurement and Verification Protocol (IPMVP) maintained by the Efficiency Valuation Organization (EVO) with sponsorship by the U.S. Department of Energy (DOE)[6]

The Evaluators kept data collection instruments, calculation spreadsheets, programming code, and survey data available for Idaho Power records.

2.1 Summary of Approach

This section presents our approach to accomplishing the impact evaluation of Idaho Power's Small Business Direct Install Program. This chapter is organized by evaluation objective. Section 3 describes the Evaluators' measure-specific impact evaluation methods and results in further detail.

The Evaluators outline the approach for verifying, measuring, and reporting the program impacts as well as summarizing potential program 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, however, the Evaluators deployed verification surveys for a sample of projects to gather additional information used towards verification.

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.

To complete impact evaluation activities for the program, consisting of lighting measures only, the Evaluators define one major approach to determining net savings for Idaho Power's Small Business Direct Install Program:

- *Engineering algorithm approach*: Involves using the actual pre and post wattage values as well as the annual hours of use and interactive effects for each facility type by project. These savings values may also include an adjustment for certain measures, such as adjustments for lighting measures in which verified annual hours of operation may differ from expected values.

The Evaluators accomplished the following quantitative goals as part of the impact evaluation:

- Verify savings with 10% precision at the 90% confidence level;
- Cross-verify customer-reported survey values tracking data values; and,
- Where appropriate, apply the more appropriate baseline wattage values to verify lighting measure impacts.

The Evaluators calculated verified savings for each measure based on the RTF UES or Arkansas TRM in combination with the results from document review. The Evaluators also verified in-service rates (ISRs) and annual hours of operation from verification surveys for measures which exceeded 90/15 precision requirements from survey responses.

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[6] Core Concepts: International Measurement and Verification Protocol. EVO 100000 – 1:2016, October 2016.

2.1.1 Database Review

At the outset of the evaluation, the Evaluators reviewed the program database to ensure that the 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 were appropriately applied using industry-standard engineering equations and appropriate assumptions for the applications being evaluated. The Evaluators then aggregated measure-level and program-level energy savings to estimate PY2022 kWh reductions due to the program.

The Evaluators reviewed program documents including savings source workbooks and inputs and assumptions used towards expected savings to verify the tracking data accurately represents the program measures, project details, total participants, and expected savings for each measure and project.

2.1.2 Verification Methodology

The Evaluators verified a sample of participating facilities for verification of measure installation through document verification and web-based surveys. Participants received $50 in incentives as a thank you for completing this verification survey. The Evaluators used the following equations to estimate survey completion requirements for the program in order to achieve 10% precision at the 90% confidence level. Required number of responses 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. 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 survey-based verification and virtual verification.

2.1.2.1 Document-Based Verification

The Evaluators developed a sampling plan, stratified by total magnitude of project-level savings, that achieves a sampling precision of ±7.61% 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 samples for the program's document verification and survey efforts using Equation 2-1 and Equation 2-2. The Evaluators ensured representation for each measure.

Table 2-1: Document-Based Verification Stratified Sampling Table

Stratum	Project Population	Total kWh Claimed Savings	Precision at 90% CI	Sample Size
Savings ≤ 2,000 kWh	126	162,757	±24.37%	7
2,000 kWh < Savings ≤ 4,000 kWh	221	661,727	±10.73%	8
4,000 kWh < Savings ≤ 9,000 kWh	249	1,440,810	±15.49%	6
9,000 kWh < Savings ≤ 15,000 kWh	74	804,131	±7.80%	7
15,000 kWh < Savings	10	158,942	±3.29%	3
Total	**680**	**3,228,365**	**±7.61%**	**31**

*Assumes sample size of 68 for an infinite population, calculated *CV* (coefficient of variation), *d* (precision) = 10%, *Z* (critical value for 90% confidence) = 1.645.

The Evaluators reviewed documentation for a total of 31 participating customers to verify project information details, such as quantity of bulbs, type of bulbs, and installation of bulbs are accurately tracked and documented in IPC and implementer databases. The table above represents the stratified number of customers sampled in the Idaho and Oregon territories combined.

2.1.2.2 Survey-Based Verification

In addition to document-based verification, the Evaluators conducted survey-based verification for the Small Business Direct Install Program. The Evaluators surveyed participating customers to verify installation as well as gather customer satisfaction with the equipment, program, and utility in general.

The table below represents the stratified number of customers the Evaluators received responses for in the Idaho and Oregon territories combined.

Table 2-2: Survey-Based Verification Stratified Sampling Table

Stratum	Project Population	Total kWh Claimed Savings	Precision at 90% CI	N Sample
Savings ≤ 2,000 kWh	126	162,757	±24.37%	7
2,000 kWh < Savings ≤ 4,000 kWh	221	661,727	±15.32%	4
4,000 kWh < Savings ≤ 9,000 kWh	249	1,440,810	±19.05%	4
9,000 kWh < Savings ≤ 15,000 kWh	74	804,131	±15.12%	2
15,000 kWh < Savings	10	158,942	±3.29%	3
Total	**680**	**3,228,365**	**±9.89%**	**20**

*Assumes sample size of 68 for an infinite population, calculated *CV* (coefficient of variation), *d* (precision) = 10%, *Z* (critical value for 90% confidence) = 1.645.

The primary purpose of conducting a verification survey is to confirm that the participant had indeed participated in the program, that the lighting measures were installed, that the measure is still currently operational, and that the annual hours of operation of the business is reflected accurately in the tracking database.

The Evaluators used the sample plan provided previously in Table 2-2 for the program simple verification task. The Evaluators developed a sampling plan that achieved a sampling precision of ±9.89% at 90% statistical confidence for annual hours of operation estimates, stratified by facility energy consumption brackets.

The Evaluators implemented a web-based survey to complete the verification surveys. The findings from these activities served to confirm participation and verify annual hours of operation for a sample of participants, sampled by industry type. These findings were calculated to consider as adjustments to participation, number of measures, or annual hours of operation within verified savings calculations. Findings toward annual hours of operation and ISR were summarized and applied by measure and facility type in Section 3.1.3.

2.1.3 Impact Evaluation Methodology

The Evaluators employed an engineering algorithm with verified inputs approach to quantify program impacts for the Small Business Direct Install Program. The Evaluators completed the steps outlined below to complete the impact evaluation for the program.

1. Deliver a detailed data request outlining the information we require for each project and measure.
2. Complete a thorough and comprehensive summary of calculated savings.
3. Validate that appropriate inputs to expected savings and engineering algorithms were used for each measure.
4. Apply observed adjustments based on verification survey.
5. Verify the gross energy (kWh) savings that are a result of the program.
6. Summarize and integrate the impact evaluation findings into the final report.

The following table summarizes the methodology used to evaluate each measure type offered in the SBDI Program.

Table 2-3: Impact Analysis Methodology by Measure

End Use	Measure	Impact Analysis Methodology
Lighting	A19 LED	Engineering algorithm with verified inputs
	A23 LED	
	BR LED	
	Can	
	Corncob	
	Entry	
	Exit	
	Flood	
	Globe	
	High Bay	
	Kit Lighting	
	LED Candelabra	
	LED Strip	
	MR16 LED	
	PAR LED	
	RLRB	
	TLED	
	Wall Pack	

2.1.3.1 Validate Expected Savings

The Evaluators completed the validation for specific measures across each program using an industry standard lighting engineering algorithm, defined below.

Equation 2-3: Retrofit Lighting kW Reduction Calculation

$$kW_{savings} = \sum\left(\left[N_{fixt(i)} \times \frac{W_{fixt(i)}}{1000}\right]_{pre} - \left[N_{fixt(i)} \times \frac{W_{fixt(i)}}{1000}\right]_{post}\right) \times CF \times IEF_D$$

Equation 2-4: Retrofit Lighting kWh Savings Calculation

$$kWh_{savings} = \sum\left(\left[N_{fixt(i)} \times \frac{W_{fixt(i)}}{1000}\right]_{pre} - \left[N_{fixt(i)} \times \frac{W_{fixt(i)}}{1000}\right]_{post}\right) \times AOH \times IEF_E$$

Equation 2-5: Therms Penalty Calculation

$$therms_{penalty} = kWh_{savings} \times IEF_G$$

Where,

$N_{fixt(i)}$ = Post-retrofit # of fixtures of type i

$W_{fixt(i)}$ = Rated wattage of post-retrofit fixtures of type i

CF = Peak demand coincidence factor

AOH = Annual operating hours for specified building type

IEF_D = Interactive effects factor for demand savings

IEF_E = Interactive effects factor for energy savings

IEF_G = Interactive effects factor for gas heating savings

The Evaluators ensured the proper measure unit savings were recorded and used in the calculation of IPC's ex-ante measure savings. The Evaluators ensured that proper baseline wattages are reflected and consistent with expected lighting baseline, efficient lighting wattages are accurately reflected and properly utilized, and that annual hours of operation are correct for each facility type. The Evaluators documented any cases where recommended values differed from the specific unit energy savings used by IPC.

2.1.3.2 Integrate Participant Survey

The Evaluators administered a survey to customers who participated in the 2022 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
- Facility space and hours of operation characteristics.

The survey was administered online, and customers were recruited by email in May 2023. Each customer received up to three emails asking them to complete the survey. Customers were offered a $50 electronic gift card for completing the survey. Customers with inactive IPC accounts and customers requested not to receive communication were excluded from the survey sample.

The survey effort received 20 total survey completions. Table 2-4 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 in terms of facility type and number of responses.

Table 2-4: Distribution of Facility Type by Survey Respondents

Stratum	Population	Proportion of Kit Type	Number of Survey Responses	Proportion of Survey Responses
Savings ≤ 2,000 kWh	126	19%	7	35%
2,000 kWh < Savings ≤ 4,000 kWh	221	33%	4	20%
4,000 kWh < Savings ≤ 9,000 kWh	249	37%	4	20%
9,000 kWh < Savings ≤ 15,000 kWh	74	11%	2	10%
15,000 kWh < Savings	10	1%	3	15%
Total	**680**	**100%**	**20**	**100%**

The Evaluator developed the survey guide in conjunction with Idaho Power staff to address the above objectives through various questions to the participating customers. The survey questions are provided Appendix A: Participant Survey. In the following section, the Evaluators detail measure-specific impact evaluation results.

3. Impact Evaluation Results

The Evaluators completed an impact evaluation on Idaho Power's Small Business Direct Install (SBDI) Program to verify program-level and measure-level energy savings for PY2022. The following sections summarize findings for the electric impact evaluation in the program in the Idaho and Oregon service area. The Evaluators used data collected from participant surveys, industry standard baseline wattage assumptions, efficient wattages, and annual hours of operation to evaluate savings. The Evaluators found the Small Business Direct Install Program resulted in 3,228,367 kWh of verified savings, displaying a 100% realization rate against Idaho Power's expected savings for the program. The Evaluators provide lighting-type verified savings and realization rates by facility type in Table 3-2.

Table 3-1: Small Business Direct Install Program Participation by Facility Type

Facility Type	Customers	Verified kWh Savings	Contribution to Program Savings
Services	322	1,575,709	48.81%
Finance, Insurance, and Real Estate	116	471,177	14.59%
Retail Trade	84	416,296	12.89%
Construction	45	232,730	7.21%
Manufacturing	32	168,792	5.23%
Transportation, Communications, Electric, Gas, and Sanitary Service	29	133,893	4.15%
Agriculture, Forestry, and Fishing	22	109,398	3.39%
Wholesale Trade	20	70,703	2.19%
Miscellaneous	7	24,913	0.77%
Mining	2	19,507	0.60%
Public Administration	1	5,247	0.16%
Total	**679**	**3,228,367***	**100.00%**

*The sum of the measure-level verified savings is 2 kWh larger than the program-level claimed savings due to rounding.

Table 3-2: Small Business Direct Install Program Verified Impact Savings by Lighting Type

Lighting Type	n Measures Installed	Claimed kWh Savings	Contribution to Program Savings	Verified kWh Savings	RR %
RLRB	10,498	1,581,121	49%	1,581,121	100%
Corncob	438	363,877	11%	363,877	100%
Kit Lighting	1,580	342,945	11%	342,945	100%
A19 LED	2,039	331,681	10%	331,681	100%
BR LED	951	173,300	5%	173,300	100%
PAR LED	487	103,421	3%	103,421	100%
Wall Pack	95	68,615	2%	68,615	100%
A23 LED	138	50,334	2%	50,334	100%
Flood	70	47,572	1%	47,572	100%
Exit	182	44,896	1%	44,896	100%
Globe	262	39,548	1%	39,548	100%
Can	495	38,760	1%	38,760	100%
MR16 LED	183	21,488	1%	21,488	100%
LED Candelabra	50	7,045	0%	7,045	100%
High Bay	7	6,824	0%	6,824	100%
Entry	6	4,436	0%	4,436	100%
TLED	18	2,289	0%	2,289	100%
LED Strip	2	215	0%	215	100%
Total	**17,501**	**3,228,365**	**100%**	**3,228,367***	**100%**

*The sum of the measure-level verified savings is 2 kWh larger than the program-level claimed savings due to rounding.

3.1.1 Database Review

As a first step to this work, the Evaluators reviewed the SBDI Program database. This is conducted to ensure that all proper variables are tracked to properly estimate expected savings for each measure type and facility type. This is also completed to ensure that proper quality assurance and quality control procedures are implemented by the IPC team. The Evaluators confirmed during this review that all proper inputs are documented to ensure savings calculations are feasible.

The Evaluators note, however, that the current tracking data does not include expected measure-level savings for each facility. Instead, the tracking data tracks project-level savings for each facility. Although the expected savings were not summarized in the tracking data, the available data necessary to reproduce total facility savings were provided for each project, and therefore the Evaluators were able to sufficiently compare expected savings to verified savings by facility and by measure. The Evaluators, however, recommend that in future program tracking, expected savings are calculated and summarized by measure level in addition to facility level. This will ensure that future evaluation work can be completed smoothly, and that total project savings are traceable over time.

3.1.2 Document-Based Verification Results

After conducting an overall database review, the Evaluators reviewed a random sample of facility project data to ensure that SBDI Program tracking data are sufficient for calculation of savings and summarizes the project data correctly and accurately. The Evaluators requested a sample of 31 facility project data, as demonstrated in our sampling plan in Table 2-1.

For each of the 31 sampled projects, the Evaluators verified that facility addresses matched project tracking data, proposed measure installations aligned with project tracking data measure completion, and that project installation dates matched the program database. The Evaluators found no discrepancies in the program tracking data. The Evaluators have no recommendation for improving program tracking.

3.1.3 Survey-Based Verification Results

The Evaluators randomly selected a subset of participant customers to survey for simple verification of installed measure. The Evaluators surveyed participant customers in May 2023 using a web approach (online survey). The Evaluators deployed surveys and received responses from 20 unique customers that participated in Idaho Power's SBDI Program. The Evaluators summarize the aggregate results of the survey in Table 3-3. The Evaluators determined whether the provided measures were installed at the business, if customers were interested in additional efficiency upgrades in the future, and asked customers to characterize business operation hours.

Table 3-3: Simple Verification Survey Response Rate

Measurement	Number of Project Sites
Population	680
Customers Contacted by Email	68
Survey Responses	20
Response Rate	29.4%

The sections below demonstrate the in-service rates and annual hours of operation calculated using survey responses for the SBDI Program.

3.1.3.1 In-Service Rates

An annual hours of operation value was determined across respondents in order to compare against assumptions used in expected savings calculations. Table 3-4 summarizes the assumed ISRs used by Idaho Power staff in the development of the claimed kWh savings for the program and the verified ISRs gathered by survey responses, separated by sampling stratum.

Table 3-4: Assumed vs. Verified ISR by Sampling Stratum

Stratum	Assumed ISR	Survey Responses	Verified ISR	Precision at 90% CI
Savings ≤ 2,000 kWh	100%	7	100%	±9.89%
2,000 kWh < Savings ≤ 4,000 kWh	100%	4	100%	
4,000 kWh < Savings ≤ 9,000 kWh	100%	4	100%	
9,000 kWh < Savings ≤ 15,000 kWh	100%	2	100%	
15,000 kWh < Savings	100%	3	100%	
Total	**100%**	**20**	**100%**	

Of the 20 responses received through survey verification efforts, 16 indicated that all lighting equipment remained installed. Three customer respondents indicated that one light bulb had been removed either due to the bulb flickering or due to the brightness of the lamp. The Evaluators therefore estimated in-service rates across the program at 100%. This value matches in-service rates assumed in Idaho Power expected savings calculations. The Evaluators therefore recommend no adjustments to ISR values.

3.1.3.2 Annual Hours of Operation

The Evaluators also used survey responses to estimate annual hours of operation by facility type. Table 3-5 summarizes the assumed annual hours of operation used by Idaho Power staff in the development of the claimed kWh savings for the program and the verified annual hours of operation gathered by survey responses, separated by facility type.

Table 3-5: Assumed vs. Verified Annual Hours of Operation by Sampling Stratum

Stratum	Assumed Annual Hours of Operation	Survey Responses	Verified Annual Hours of Operation	Precision at 90% CI
Savings ≤ 2,000 kWh	2,790	7	1,824	±9.89%
2,000 kWh < Savings ≤ 4,000 kWh	3,027	4	2,418	
4,000 kWh < Savings ≤ 9,000 kWh	3,015	4	2,711	
9,000 kWh < Savings ≤ 15,000 kWh	2,983	2	2,418	
15,000 kWh < Savings	2,996	3	1,889	
Total	**2,974**	**20**	**2,407**	

Each of the 20 respondents indicated the average hours the facility is in operation per day, along with the average number of days the facility is in operation per week. From these responses, the Evaluators estimated, for each sampled stratum, the average annual hours of operation. Across the stratums, the Evaluators estimated annual hours of operation 19% lower than the assumed values used in expected savings calculations. However, due to lack of precision by facility type, the Evaluators recommend that Idaho Power continue to use assumed annual hours of operation from the Idaho Power technical reference manual to calculate expected savings in future program cycles.

3.1.4 Lighting Evaluation Results

This section summarizes the SBDI Program verified impact savings by measure and facility type. Verification of gross savings was accomplished through a systematic review of program tracking data, verification of claimed savings, development of a statistically representative random stratified sample for data collection, calculation of verified gross savings impacts for each project in the sample and extrapolation of project level finds to the stratified populations. Table 3-6 displays the expected kWh savings and verified kWh savings for each annual energy use stratum defined.

Table 3-6: Small Business Direct Install Program Verified Impact Savings by Stratum

Stratum	Claimed kWh Savings	Verified kWh Savings	Realization Rate
Savings ≤ 2,000 kWh	162,757	162,757	100%
2,000 kWh < Savings ≤ 4,000 kWh	661,726	661,726	100%
4,000 kWh < Savings ≤ 9,000 kWh	1,440,810	1,440,810	100%
9,000 kWh < Savings ≤ 15,000 kWh	804,131	804,131	100%
15,000 kWh < Savings	158,942	158,942	100%
Total	**3,228,365**	**3,228,367***	**100%**

*The sum of the measure-level verified savings is 2 kWh larger than the program-level claimed savings due to rounding.

The lighting measures displayed a realization rate of 100% compared to claimed IPC savings, with verified savings for the program totaling 3,228,367 kWh. Table 32 summarizes verified savings by measure type.

The Evaluators calculate verified savings for a sample of the population. This was calculated using verified baseline wattages, verified efficient wattages, verified annual hours of operation in a lighting engineering algorithm, shown below in Equation 2-4. The Evaluators found no adjustments were recommended or required when verifying each sampled project input. In addition, engineering algorithms were applied properly, as displayed by the 100% realization rate across all lighting measures.

The expected savings values used to determine the program-level realization rate were found by multiplying the savings per measure of the lighting measures offered in the program by the total number of each measure installed during PY2022. The verified savings were determined by aggregating the measure-level and facility-level population savings.

The Evaluators found that survey verification reflected 100% in-service rates, equivalent to Idaho Power-assumed ISR inputs. Therefore, the Evaluators recommend no further adjustments to the expected savings calculations.

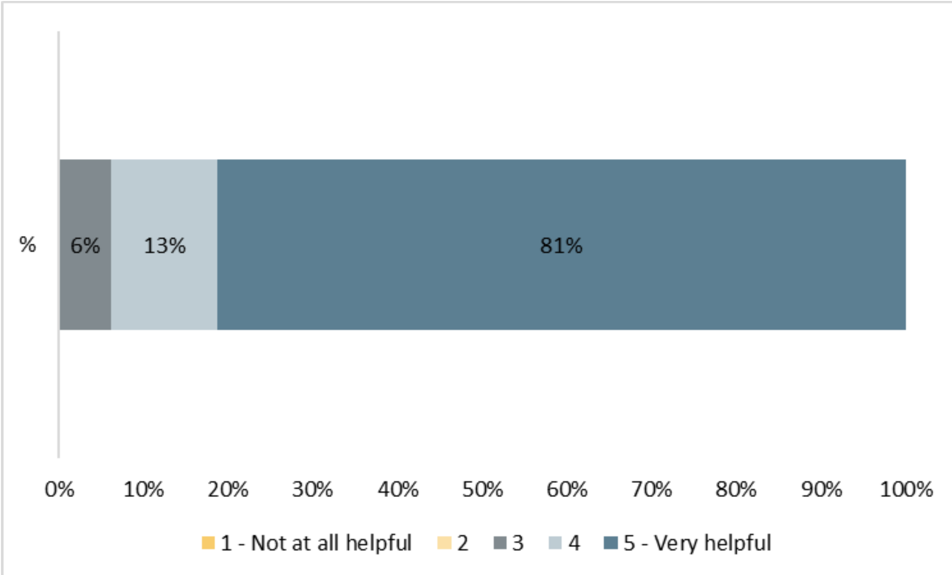
3.1.5 Survey Responses

The Evaluators present participation experience, program satisfaction, communication, firmographics, and additional lessons learned from survey responses gathered during this evaluation work.

3.1.5.1 Participation Experience

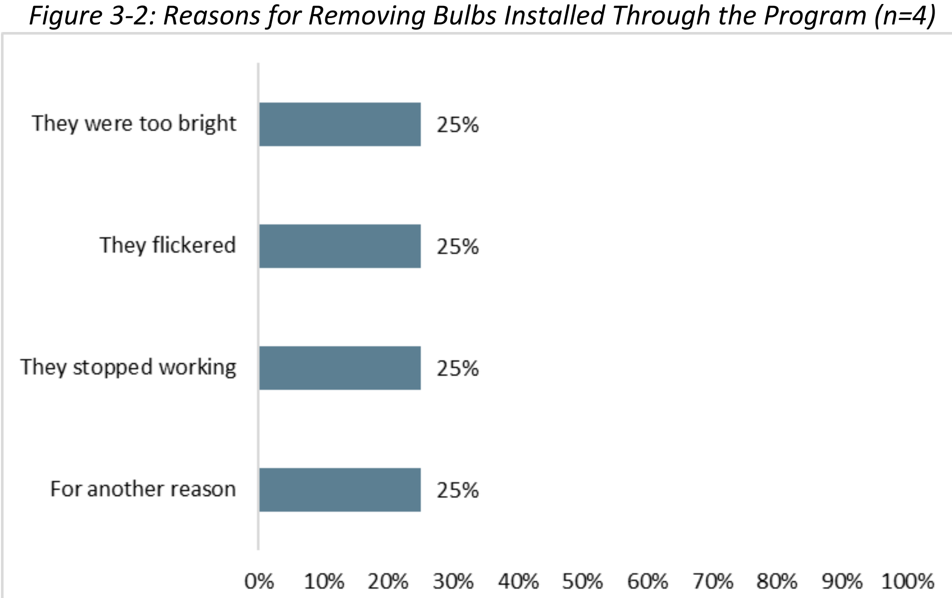
All survey respondents remembered having lighting measures installed in their place of business. Most survey participants (n=16) confirmed they did receive a project or lighting audit, from the SBDI program team, and of those 16 respondents, eighty percent said the project proposal was helpful.

Figure 3-1: Helpfulness of Project Proposal (n=16)



One hundred percent of respondents indicated that the contractors did not leave behind any spare equipment. Respondents were asked if any bulbs have been removed, since participating in the program and having them installed through the SBDI program. Three respondents indicated they removed one bulb installed through the program because they were either too bright (n=1), they flickered (n=1) or stopped working(n=1). The respondent who selected 'for another reason' elaborated that they did not remove any bulbs and must have selected this on accident.

Figure 3-2: Reasons for Removing Bulbs Installed Through the Program (n=4)



3.1.5.2 Program Satisfaction

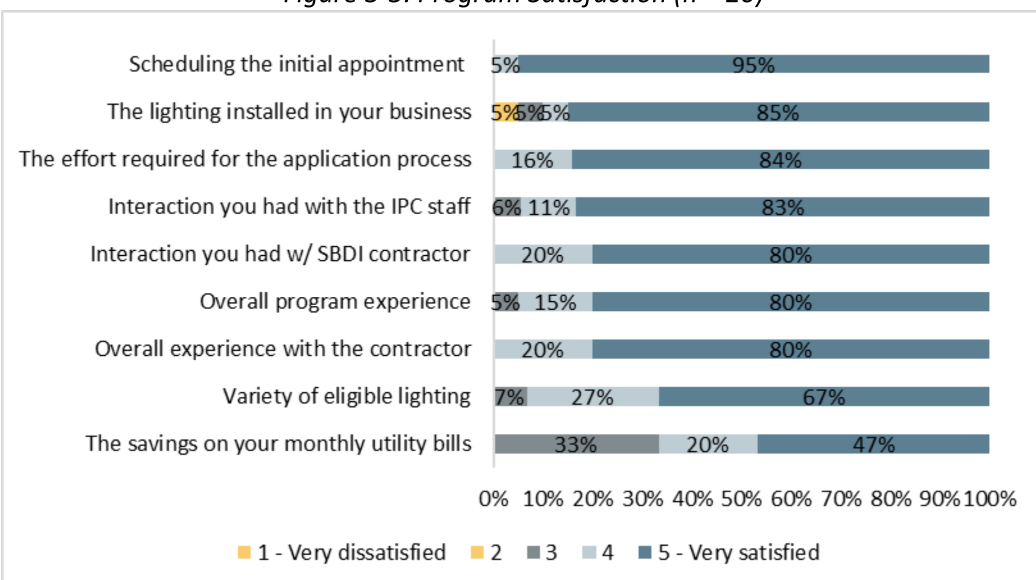
Almost all respondents were satisfied with the lighting project and indicated that it was completed to their satisfaction. One respondent was not satisfied because their outside patio lights were not replaced despite it being listed on their project proposal. This could indicate that additional QA/QC efforts would be helpful during direct installations to ensure thorough replacement of lights listed on the project proposal.

Table 3-7: Satisfaction with Lighting Program (n = 20)

Response	Percentage	Total
Yes	95%	19
No	5%	1
Total	**100%**	**20**

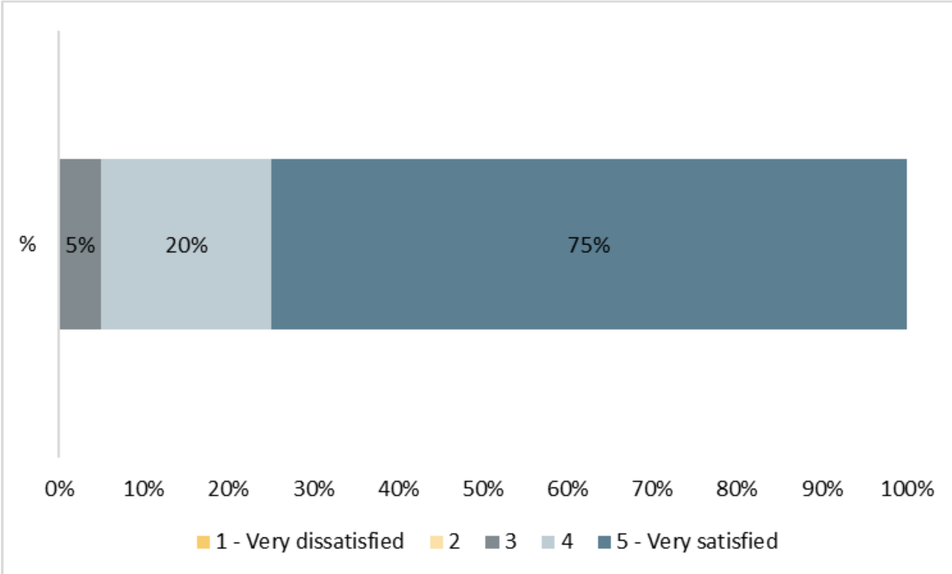
Respondents were most satisfied with the process of scheduling the initial appointment with the SBDI program, where they received a lighting audit or project proposal. Respondents are least satisfied with the savings on their monthly utility bills. This could be related to increased energy costs and or indicates a need to better explain the anticipated savings that will come from the upgraded lighting.

Figure 3-3: Program Satisfaction (n = 20)



Three-fourths of respondents indicated that they are very satisfied with Idaho Power as their electricity provider and 20 percent indicated they are satisfied. No respondents indicated any dissatisfaction with IPC as their electricity provider.

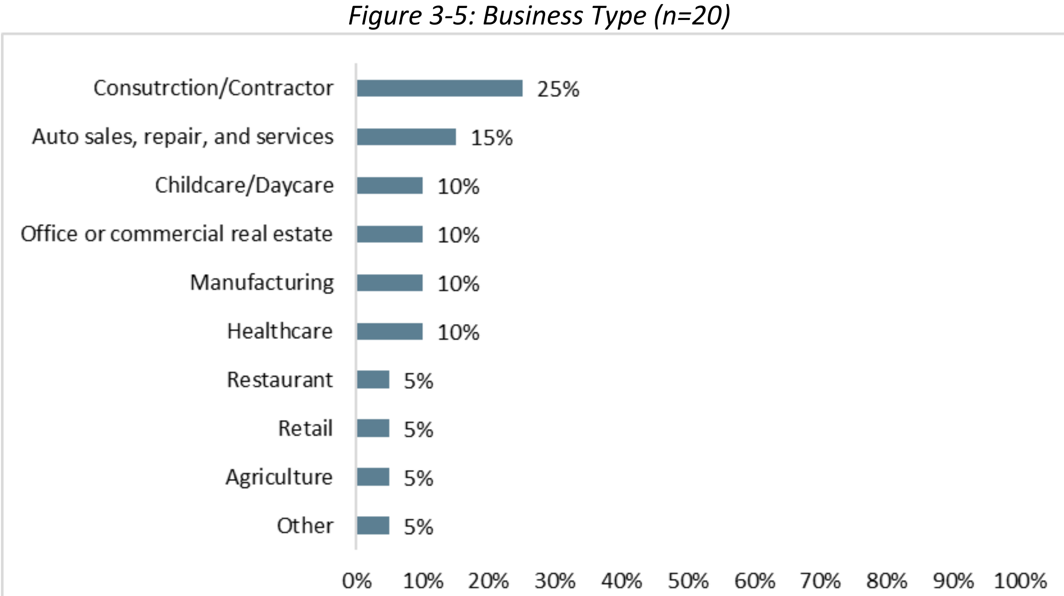
Figure 3-4: Satisfaction with IPC (n=20)



3.1.5.3 Firmographics

Twenty-five percent of respondents indicated that their business has to do with construction or contracting, followed by auto sales, repair, and services. The one respondent who selected 'other' indicated their location is a Masonic lodge.

Figure 3-5: Business Type (n=20)



Most respondents (n=16) indicated that their business is their company's only location, with two respondents indicating their business is one of several locations. One respondent noted their business was the headquarter location of their company, which has several other locations.

Table 3-8: Facility Description (n=19)

Response	Percentage	Total
Your company's only location	84%	16
One of several locations owned by your company	11%	2
The headquarter location of your company with several locations	5%	1

Most survey respondents (n=13) have less than five employees working at their facility, with 13 respondents operating their facility 9 to 12 hours per day. Additionally, a little more than half of respondents are operating their facility five days per week. Please see Table 39 for additional information.

Table 3-9: Facility Operations

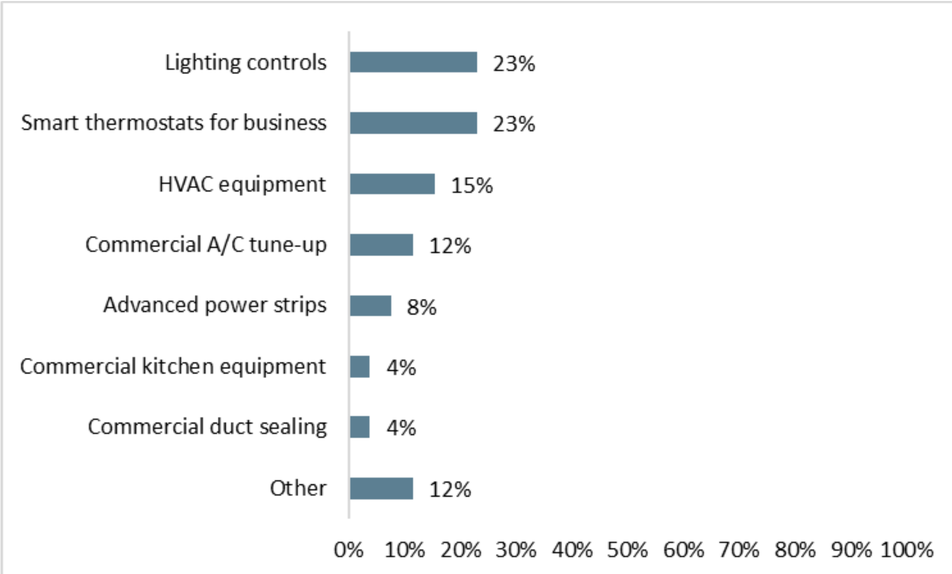
Response	Percentage	Total
Number of Employees		
Less than 5	65%	13
5 to 10	25%	5
11 to 15	5%	1
16 to 10	5%	1
More than 20	0%	1
Hours in operation per day		
Less than 4 hours	16%	3
4 to 8 hours	16%	3
9 to 12 hours	68%	13
More than 12 hours	0%	0
Days in operation per week		
1 day	5%	1
2 days	5%	1
3 days	5%	1
4 days	0%	0
5 days	55%	11
6 days	25%	5
7 days	5%	1

3.1.5.4 Additional Lessons Learned

Although this program closed on March 31, 2023, Idaho Power maintains a separate nonresidential retrofit program that small business customers are still eligible to participate in. Because of this, the Evaluators also attempted to characterize any lessons learned in the Small Business Direct Install Program that could help understand and improve barriers to participation, marketing, and communication for this group of Idaho Power Company customers.

Survey respondents were asked about their level of interest in learning more about additional energy efficiency improvements. Twelve respondents indicated they were interested in additional improvements, with the majority interested in lighting controls and smart thermostats for business.

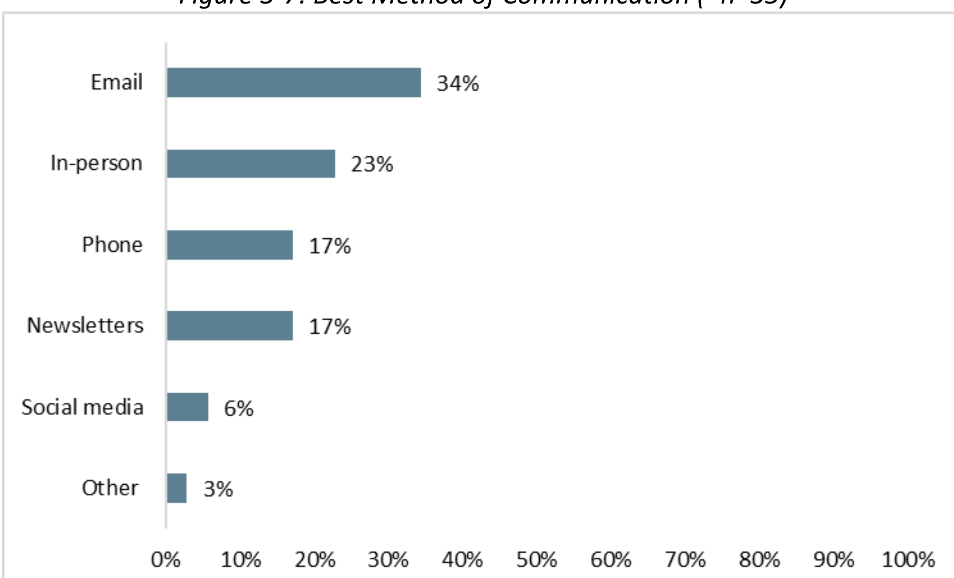
Figure 3-6: Additional EE Improvements (n=20)



**Respondents were able to select multiple responses*

Most survey participants (34%) prefer email as the best way to communicate information on programs and energy efficiency upgrades; followed by in-person communication (23%).

*Figure 3-7: Best Method of Communication (*n=35)*



**Respondents were able to select multiple responses*

4. Appendix A: Participant Survey

This section provides a copy of the survey sent to participants of the Small Business Direct Install Program.

4.1 Pre-Defined Variables

Prepopulated variables are shown in all caps enclosed in brackets, e.g., [PREDEFINED VARIABLE]

Variable	**Definition**
CONTACT	Customer Name
ADDRESS	Business Location
EMAIL	Email address on file for contact
LINK	In-line customer-specific link to online survey
URL	URL for customer-specific link to online survey

4.2 Email Survey Message

Subject: Invitation to provide feedback on Idaho Power's Small Business Direct Install Program.

Hello **[CONTACT],**

Thank you for participating in Idaho Power's Small Business Direct Install Program. Idaho Power is interested in your feedback about the program and invites you to take an online survey.

The survey should take no more than **10 minutes** of your time, and as a thank you, we are providing a **$50 gift card** to those who complete the survey.

Follow this link to the survey:

[LINK]

Or copy and paste the URL below into your internet browser:

[URL]

If you require technical assistance, please contact Heather Polonsky at Heather.polonsky@admenergy.com. In addition, if you have any question regarding this survey request, please contact Idaho Power customer service at 208-388-2323 or 1-800-488-6151. You may also contact Michelle Toney at Idaho Power at 208-388-2221 or by email at mtoney@idahopower.com.

Thank you so much for your time,

Sincerely,

Heather Polonsky
ADM Associates (Contractor of Idaho Power Company)
Heather.polonsky@admenergy.com

971-339-8774

4.3 Survey

Welcome! Thank you for taking this survey to tell us about your experience with Idaho Power's Small Business Direct Install Program. Your feedback is very important to us and will help us improve programs for customers like you. This survey should take no more than 10 minutes. Your responses are confidential and will be used for research purposes only.

Page Break

Q1 Program records indicate that the business at ${e://Field/ADDRESS} received lighting equipment through Idaho Power's Small Business Direct Install program. Is this correct?

- O Yes (1)
- O No (3)
- O I don't know if we received lighting equipment (2)

Skip To: End of Survey If Program records indicate that the business at ${e://Field/ADDRESS} received lighting equipment th... = No

Display This Question:

If Program records indicate that the business at ${e://Field/ADDRESS} received lighting equipment th... = I don't know if we received lighting equipment

Q3 Is there someone else we should speak with that might know about the lighting equipment received through the Small Business Direct Install Program?

- O Yes (please provide their name and email and email address or phone number) (1) ____
- O No (2)
- O Don't know (3)

Skip To: End of Survey If Is there someone else we should speak with that might know about the lighting equipment received... = Yes (please provide their name and email and email address or phone number)

Skip To: End of Survey If Is there someone else we should speak with that might know about the lighting equipment received... = No

Skip To: End of Survey If Is there someone else we should speak with that might know about the lighting equipment received... = Don't know

End of Block: Screening

Start of Block: Lighting Assessment

Q4 Did you receive a project proposal through the program? A project proposal may have been provided if someone from the SBDI program team completed a count of the lighting in your facility prior to installation.

- O Yes (1)
- O No (2)
- O Don't know (3)

Display This Question:

If Did you receive a project proposal through the program? A project proposal may have been provided... = Yes

Q5 Using the scale below, how helpful was that project proposal to you?

- O 1 - Not at all helpful (1)
- O 2 (2)
- O 3 (3)
- O 4 (4)
- O 5 - Very helpful (5)
- O Don't know (6)

Display This Question:

If Using the scale below, how helpful was that project proposal to you? = 1 - Not at all helpful

Or Using the scale below, how helpful was that project proposal to you? = 2

Q6 Why do you think the project proposal was not helpful?

____

____

____

____

____

Q7 Are you interested in making additional energy efficiency improvements?

- O Yes (1)
- O No (2)
- O Don't know (3)

Display This Question:

If Are you interested in making additional energy efficiency improvements? = Yes

Q8 What additional improvements are you most interested in? (Select all that apply)

▢ Lighting controls (1)

▢ HVAC equipment (2)

▢ Smart thermostats for business (3)

▢ Commercial duct sealing (4)

▢ Commercial A/C tune-up (5)

▢ Commercial kitchen equipment (6)

▢ Advanced power strips (7)

▢ Low-flow faucet aerators (8)

▢ Other - please specify (9) ____

End of Block: Lighting Assessment

Start of Block: Measure Verification

Q12 Have any of the bulbs been removed after initial installation?

O Yes - how many have been removed? (1) ____

O No (2)

O Don't know (3)

Display This Question:

If Have any of the bulbs been removed after initial installation? = Yes - how many have been removed?

Q13 Why were the bulbs removed? (Select all that apply)

- ▢ They were too bright (1)
- ▢ They were too dim (2)
- ▢ They stopped working (3)
- ▢ They flickered (4)
- ▢ Didn't like the color of the light (5)
- ▢ For another reason (please describe) (6) ____

Q14 Did the contractors who installed the lighting, leave behind any uninstalled spare equipment (i.e. lighting, lamps, bulbs, etc.)?

- O Yes (1)
- O No (2)
- O Don't know (3)

Display This Question:

If Did the contractors who installed the lighting, leave behind any uninstalled spare equipment (i.e... = Yes

Q28 What kind of uninstalled equipment did they leave behind?

____

End of Block: Measure Verification

Start of Block: Firmographics

Q15 Which best describes your facility located at ${e://Field/ADDRESS}?

- O Your company's only location (1)
- O One of several locations owned by your company (2)
- O The headquarter location of your company with several locations (3)
- O Don't know (4)

Q16 How would you best describe your business?

- O Healthcare (1)
- O Restaurant (2)
- O Auto sales, repair, and services (3)
- O Lodging (4)
- O Manufacturing (5)
- O Government services (6)
- O School (7)
- O Retail (8)
- O Grocery (9)
- O Agriculture (10)
- O Office or commercial real estate (e.g. legal, insurance banking) (11)
- O Other - please specify (12) ____________________

Q17 How many people work at your facility?

____

____

____

____

____

Q18 About how many hours per day is your facility operating?

O Less than 4 hours (1)

O 4-8 hours (2)

O 9-12 hours (3)

O More than 12 hours (4)

O Don't know (5)

Q19 How many days per week is your facility operating?

O 1 day (1)

O 2 days (3)

O 3 days (4)

O 4 days (5)

O 5 days (6)

O 6 days (7)

O 7 days (8)

O Don't know (9)

End of Block: Firmographics

Start of Block: Satisfaction

Q20 Was the lighting project completed to your satisfaction?

- O Yes (1)
- O No (2)

Display This Question:

If Was the lighting project completed to your satisfaction? = No

Q21 What problems did you have with the project?

____

____

____

____

____

Q22 Using the scale below, how would you rate your satisfaction with the following?

	1 - Very dissatisfied (1)	2 (2)	3 (3)	4 (4)	5 - Very satisfied (5)	Don't know (6)
Interaction you had with the SBDI installation contractor (1)	O	O	O	O	O	O
Interaction you had with the Idaho Power staff (2)	O	O	O	O	O	O
The lighting installed in your business (3)	O	O	O	O	O	O
The savings on your monthly utility bills (4)	O	O	O	O	O	O
The variety of lighting types eligible for the program (5)	O	O	O	O	O	O
The effort required for the application process (6)	O	O	O	O	O	O
Scheduling the initial appointment (lighting audit) (7)	O	O	O	O	O	O
Overall experience with the contractor (9)	O	O	O	O	O	O
Overall program experience (10)	O	O	O	O	O	O

Display This Question:

If Using the scale below, how would you rate your satisfaction with the following? = Interaction you had with the SBDI installation contractor [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = Interaction you had with the SBDI installation contractor [2]

Or Using the scale below, how would you rate your satisfaction with the following? = Interaction you had with the Idaho Power staff [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = Interaction you had with the Idaho Power staff [2]

Or Using the scale below, how would you rate your satisfaction with the following? = Interaction you had with the SBDI installation contractor [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = The lighting installed in your business [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = The lighting installed in your business [2]

Or Using the scale below, how would you rate your satisfaction with the following? = The savings on your monthly utility bills [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = The savings on your monthly utility bills [2]

Or Using the scale below, how would you rate your satisfaction with the following? = The variety of lighting types eligible for the program [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = The variety of lighting types eligible for the program [2]

Or Using the scale below, how would you rate your satisfaction with the following? = The effort required for the application process [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = The effort required for the application process [2]

Or Using the scale below, how would you rate your satisfaction with the following? = Scheduling the initial appointment (lighting audit) [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = Scheduling the initial appointment (lighting audit) [2]

Or Using the scale below, how would you rate your satisfaction with the following? = [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = [2]

Or Using the scale below, how would you rate your satisfaction with the following? = Overall experience with the contractor [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = Overall experience with the contractor [2]

Or Using the scale below, how would you rate your satisfaction with the following? = Overall program experience [1 - Very dissatisfied]

Or Using the scale below, how would you rate your satisfaction with the following? = Overall program experience [2]

Q23 Why were you dissatisfied with those aspects of the program you mentioned?

____

____

____

____

____

Q24 Using the same scale, how satisfied are you with Idaho Power as your electricity service provider?

O 1 - Very dissatisfied (1)

O 2 (2)

O 3 (3)

O 4 (4)

O 5 - Very satisfied (5)

O Don't know (6)

Q25 How would you recommend that Idaho Power contact organizations like yours to share information on applicable programs? (Select all that apply)

- ▢ Email (1)
- ▢ Phone (2)
- ▢ In-person (3)
- ▢ Social media (4)
- ▢ Newsletters (5)
- ▢ Other - please specify (6) ____

End of Block: Satisfaction

Start of Block: Gift Card Confirmation

Q27 Thank you for taking the time today to complete this survey. As stated in the email, we are providing a $50 electronic gift card as a thank you for your responses. The email address we have on file for you is ${e://Field/EMAIL}, please confirm this information.

- O Yes, please send my electronic gift card to the above email address (4)
- O No, please send my electronic gift card to the following email address (5) ____

End of Block: Gift Card Confirmation

---

5. Appendix B: Verified Savings by Measure

This section summarizes the count and total verified savings for each bulb type.

Total Quantity Installed	List of Unique Measure Types	Total Verified kWh Savings by Measure	Total Verified kWh Savings by Measure
A19 LED	LED A19 Lamp	585	99,639
	LED A19/A21 Lamp	114	16,467
	V2 LED A19 Lamp	1,290	200,881
	V2 LED A19/A21 Lamp	50	14,693
A23 LED	LED A23 Bypass	15	4,847
	LED A23 Lamp	9	3,804
	V2 LED A23 Bypass	5	3,146
	V2 LED A23 Lamp	109	38,538
BR LED	LED BR30 Lamp	357	62,044
	LED BR40 Lamp	29	8,105
	V2 LED BR30 Lamp	564	102,893
	V2 LED BR40 Lamp	1	258
Can	LED Can Retrofit 4-Pin VT	5	308
	V2 LED Can Retrofit 2-Pin HZ	110	7,036
	V2 LED Can Retrofit 2-Pin VT	30	1,517
	V2 LED Can Retrofit 4-Pin HZ	114	8,072
	V2 LED Can Retrofit 4-Pin VT	136	10,292
	V2 LED Candelabra Lamp	100	11,536
Corncob	115W Corncob	21	22,585
	150W Corncob	2	1,990
	36W Corncob	50	35,106
	50W Corncob	32	21,266
	80W Corncob	68	74,876
	V2 100W Corncob	15	14,231
	V2 36W Corncob	103	50,253
	V2 50W Corncob	14	16,432
	V2 80W Corncob	133	127,138
Entry	12W LED Entry Wall Pack	6	4,436
Exit	Exit BBU Green	13	1,799
	Exit Combo Red	16	3,385
	V2 Exit BBU Green	84	22,401
	V2 Exit BBU Red	4	764
	V2 Exit Combo Green	50	12,926
	V2 Exit Combo Red	15	3,621
Flood	20W LED Flood	7	1,339
	45W LED Flood	21	21,004
	V2 15W LED Flood	23	10,955
	V2 35W LED Flood	19	14,274

Globe	LED 4.5W Globe Lamp	98	15,255
	V2 LED 5.5W Globe Lamp	164	24,293
High Bay	150W LED High Bay	5	4,281
	V2 150W LED High Bay	2	2,543
Kit Lighting	2L 8ft Kit	3	248
	4L 8ft Kit	487	91,530
	V2 4L 8ft Kit	319	67,132
	V3 4L 8ft Kit	771	184,034
LED Candelabra	LED Candelabra Lamp	50	7,045
LED Strip	4ft 23W LED Strip	2	215
MR16 LED	LED MR16 Pin	70	7,523
	LED MR16 Twist	7	830
	V2 LED MR16 Pin	35	5,012
	V2 LED MR16 Twist	71	8,124
PAR LED	LED PAR20 Lamp	119	9,317
	LED PAR30 Lamp	86	23,462
	LED PAR38 Lamp	103	25,890
	V2 LED PAR20 Lamp	40	5,147
	V2 LED PAR30 Lamp	14	2,328
	V2 LED PAR38 Lamp	125	37,276
RLRB	1L 2ft RLRB	6	293
	1L 4ft RLRB	107	10,530
	1L 8ft RLRB	4	566
	1L T5HO 4ft RLRB	10	952
	2L 2ft RLRB	4	302
	2L 4ft RLRB	996	132,406
	2L 8ft RLRB	80	16,416
	2L T5 4ft RLRB	1	90
	2L T5HO 4ft RLRB	25	4,493
	2L U-Bend RLRB	38	4,514
	3L 4ft RLRB	278	35,415
	3L T5HO 4ft RLRB	40	9,318
	4L 4ft RLRB	1,217	246,596
	4L T5HO 4ft RLRB	56	18,814
	V2 1L 2ft RLRB	14	623
	V2 1L 4ft RLRB	327	17,286
	V2 1L T5HO 4ft RLRB	6	666
	V2 2L 2ft RLRB	21	1,881
	V2 2L 4ft RLRB	1,686	179,462
	V2 2L 8ft RLRB	35	5,975
	V2 2L T5HO 4ft RLRB	47	9,734
	V2 2L U-Bend RLRB	58	5,708
	V2 3L 4ft RLRB	494	68,964
	V2 3L T5HO 4ft RLRB	27	5,224
	V2 4L 4ft RLRB	904	185,680
	V2 4L 8ft RLRB	10	4,723
	V2 4L T5HO 4ft RLRB	56	20,717
	V2 6L T5HO 4ft RLRB	6	3,388

	V3 1L 4ft RLRB	190	12,238
	V3 2L 4ft RLRB	1,852	214,329
	V3 3L 4ft RLRB	428	59,876
	V3 4L 4ft RLRB	1,475	303,942
TLED	V2 1L 3ft Type A TLED Retrofit w/ new ballast	3	371
	V2 2L 3ft Type A TLED Retrofit w/ new ballast	12	1,631
	V3 1L 3ft Type A TLED Retrofit w/ new ballast	3	287
Wall Pack	42W LED Wall Pack	11	12,322
	V2 12W LED Entry Wall Pack	1	357
	V2 15W LED Entry Wall Pack	47	22,368
	V2 35W LED Wall Pack	36	33,568
Total		**17,501**	**3,228,367***

*The sum of the measure-level verified savings is 2 kWh larger than the program-level claimed savings due to rounding.

TETRA TECH

Irrigation Efficiency Rewards Evaluation (PY2022)

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ACKNOWLEDGEMENTS

We would like to acknowledge the many individuals who contributed to the 2023 impact evaluation of the Idaho Power Irrigation Efficiency Rewards program; this evaluation effort would not have been possible without their help and support.

We would like to specifically thank Nathan Black, Ray Short, Landon Barber, Michelle Toney, and Quentin Nesbitt of Idaho Power, who provided invaluable insight into the program and operations. These individuals participated in ongoing evaluation deliverable reviews and discussions and graciously responded to follow-up questions and data and documentation requests. Idaho Power's regional agricultural representatives (ag reps) were also valuable sources of information and assistance during the evaluation process.

The Tetra Tech evaluation team was made up of the following individuals: Kimberly Bakalars, Mark Bergum, Mohammed Qandil, Andrew Spista, Graham Thorbrogger, and Laura Meyer.

1.0 EXECUTIVE SUMMARY

Tetra Tech is pleased to provide Idaho Power Company (Idaho Power) with this report covering the evaluation of 2022 program impacts for the Irrigation Efficiency Rewards (IER) 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 a separate section.

1.1 PROGRAM DESCRIPTION

Initiated in 2003, the Irrigation Efficiency Rewards program is designed to improve the energy efficiency of irrigation systems in Idaho Power Company's (IPC) service area through a wide range of financial incentives and educational methods. It is funded through the Energy Efficiency Rider on monthly bills to Idaho Power customers, as approved by the Idaho Public Utilities Commission and the Public Utility Commission of Oregon.

The eligible irrigation sector is comprised of agricultural customers operating water-pumping or water-delivery systems to irrigate crops or pastures. End-use electrical equipment primarily consists of agricultural irrigation pumps and center pivots. The irrigation sector does not include water pumping for non-agricultural purposes, such as the irrigation of lawns, parks, cemeteries, golf courses, or domestic water supply.

The program is delivered by Idaho Power staff, including a Program Specialist, Irrigation Segment Technical Consultant/Ag Engineer, and six Agriculture Representatives (Ag Reps). The program staff works with the customers, vendors, distributors, and installation contractors to promote the installation of energy-efficient system equipment.

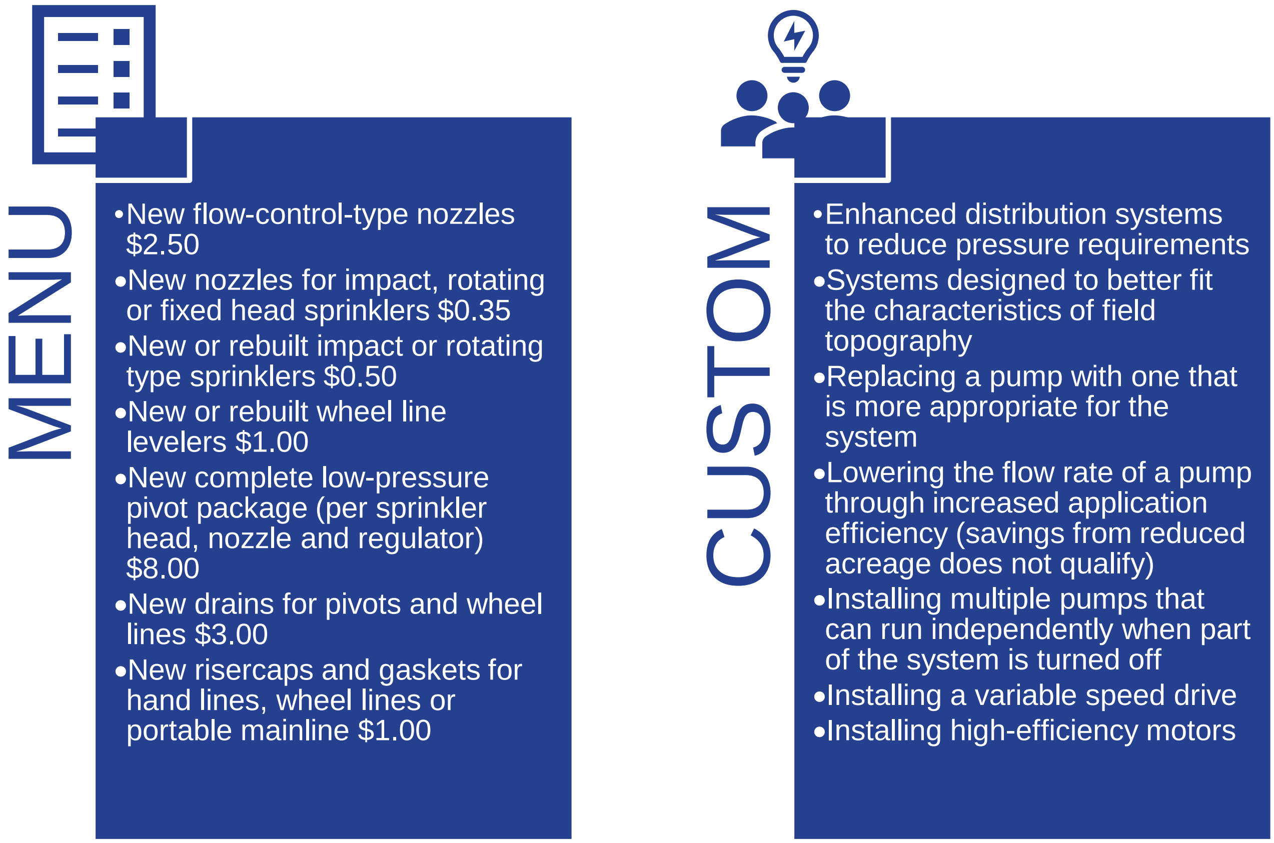
Customers have two options through the Irrigation Efficiency Rewards program for minor or major upgrades to new or existing systems: *Menu* incentives and *Custom* incentives.

The *Menu Incentive Option* is designed for systems in which small maintenance upgrades provide energy savings. Incentives vary based on specific component replacement. Payments are calculated on predetermined average kWh savings per component. IPC reviews and analyzes each proposal for a system or component modification to determine and verify the energy savings. Customers who apply with supporting invoices within one year of purchase can receive incentives.

The *Custom Incentive Option* provides component upgrades and large-scale improvements. To participate, customers submit a project proposal to Idaho Power before starting a project. The customer works with an Ag Rep to determine the project's energy savings and applicable incentive estimate. *Custom* projects require completed installation one year from the signed contract date but could be extended with an additional contract agreement between both parties.

In addition to the irrigation options available through Idaho Power, there is currently a Green Motors program offered by BPA being utilized by Idaho Power. Green Motors Initiative pays service centers $2 per horsepower for motors 15 to 5,000 HP, receiving a Green Rewind from a verified service center. The Green Motors Practices Group certifies the shop is qualified to perform the green rewind under the guidelines and is eligible for the incentive. $1 goes to the center and $1 to the customer as a credit on their rewind invoice.

Figure 1. Menu Incentives and Potential Qualifying Custom Projects



1.2 METHODOLOGY

The evaluation team conducted several evaluation activities, shown in Figure 2, to address the evaluation objectives. The evaluation objectives included verifying energy impacts attributable to the 2022 program, providing estimates of realization rates, and suggesting enhancements to the savings analysis and program tracking.

Figure 2. Impact Evaluation Activities

1.3 FINDINGS AND RECOMMENDATIONS

The IER program is well-managed with comprehensive support from Idaho Power staff, including a highly knowledgeable group of ag reps and program staff. The *Menu incentive option* of the program is streamlined and easily understood. The *Custom incentive option* savings are highly customized and calculated by the ag reps and program engineer. The approach to the evaluation of recalculating the custom energy savings for the sampled projects from scratch naturally creates higher variability in the energy savings because of the individual nature of each project and natural variations in the agricultural production systems. This evaluation approach results in a higher relative precision and more insightful findings.

In 2022, the IER program had 519 participants with claimed savings of 6,937,855 kWh. The program's overall realization rate was 97.4 percent, with a relative precision of 5.4 percent at 90 percent confidence.

Table 1: Program Realization Rate

Program option	Projects	kWh			Peak kW		
		Claimed	Evaluated	Realization rate	Claimed	Evaluated	Realization rate
Menu	439	2,632,945	2,630,312	99.9%	n/a	n/a	n/a
Custom	80	4,304,911	4,124,660	95.8%	810.9	1,153.6	142.3%
TOTAL	**519**	**6,937,855**[1]	**6,754,972**	**97.4%**	**810.9**	**1,153.6**	**142.3%**

1.3.1 Impact Recommendations

The following impact recommendations are provided for Idaho Power's consideration:

- **Streamline *Custom* Incentive Option Calculations.** The current *Custom* calculator has a two-step process to calculate energy savings for most projects. The program can streamline the calculation to a one-step process to compare improved conditions to five-year historical usage for existing systems or new system projects by detailing the baseline and improved conditions and identifying the differences and assumptions included in the savings calculation. This simplification will support quicker and more manageable quality assurance and quality control within the program savings calculations.

- **Create a reference for *Custom* Incentive Option calculation assumptions.** The *Custom* calculation requires assumptions about operating conditions, additional loads, hours of operation, and water volume in addition to the pump and motor efficiencies and hours of operation. The current *Custom* calculation steps include these assumptions, but many are included in the calculation in spreadsheet cells. Creating a reference location for the assumptions and having the equations reference those will ease quality assurance reviews and reduce the potential for hidden equation errors.

[1] Rounding variations leads to a total program energy savings of 6,937,855 kWh. The sum of the rounded numbers does not match to total.

- **Review baseline energy consumption for irrigation system projects with multiple pumps.** The baseline energy consumption calculation needs more detail to account for the baseline pump electrical consumption at varied pump operating points, acres irrigated, and hours of operation. Develop a baseline energy consumption calculation that has matching conditions to the proposed system.
- **Continue to use meter data to calibrate the *Custom* baseline energy consumption.** Electric consumption meter data is effectively used within the program to create more accurate savings. However, this information is used slightly differently for each calculation. Documenting the use of the AMI data within the calculator will provide context for the quality assurance and increase transparency of savings calculation. A specific improvement is to use the AMI data to isolate pumps that will be removed from the system.
- **Continue to organize digital files.** The documentation files for the C*ustom and Menu incentive options* were improved from the previous evaluation. They are consistent and mostly complete. However, the documentation organization could improve when a participant has multiple projects over multiple years. The evaluation team found that the documentation for *Menu* participants that had multiple projects had overlapping documentation. A *Custom* project file did not include the custom calculation for a project that spanned multiple years. A file organization that can connect documentation to participants over multiple years can support quality assurance over multiple years and projects. The organization of digital files was already in process when the evaluation was completed, and much of this recommendation is being addressed.

As part of the impact evaluation, Tetra Tech reviewed Idaho Power's progress against the recommendations made during the last impact evaluation of the 2019 program. The table below highlights Idaho Power's actions to address each of the previous impact recommendations.

Table 2. PY2019 Irrigation Efficiency Rewards Program Recommendations

Category	Key findings and recommendations	PY2022 implementation	Status
Project Documentation	Formalize data collection of system operating conditions for custom projects.	The program made great progress in data collection and documentation. The checklist developed supported complete and consistent documentation. However, many technical components were collected and incorporated into the calculation equations and were challenging to identify.	In progress
Custom Calculations	Streamline custom calculations	The custom calculations have been updated to increase the use of standard assumptions. The calculation steps can be further simplified.	In progress
Custom Calculations	Increase documentation of critical systems components	The critical systems were well documented.	Complete
Process	Continue to develop the electronic program manual	The program manual has been expanded and maintained to current processes. The program should continue to maintain the manual.	Complete
Process	Continue creating an electronic filing system for all project records	The electronic filing system has improved, and documentation is accessible.	Complete
Process	Consider a more systematic method for reviewing vendor activity levels	Vendors were not evaluated during the PY2022 impact evaluation	Not evaluated

2.0 INTRODUCTION

2.1 PROGRAM OVERVIEW

The Irrigation Efficiency Rewards (IER) program is designed to encourage replacing or improving inefficient irrigation systems and components. It is funded through the Energy Efficiency Rider on monthly bills to Idaho Power customers, as approved by the Idaho Public Utilities Commission and the Public Utility Commission of Oregon. The eligible irrigation sector is comprised of agricultural customers operating water-pumping or water-delivery systems to irrigate crops or pastures. End-use electrical equipment primarily consists of agricultural irrigation pumps and center pivots.

Customers have two options for receiving incentives through the IER program: *Menu* incentives and *Custom* incentives. If a customer is repairing or replacing irrigation system parts, they can apply for incentives on specific components through the Menu incentive option. Customers who apply with supporting invoices within one year of purchase may receive incentives. The *Custom* incentive is for extensive retrofits of existing systems or the installation of new systems. To participate, customers submit a project proposal to Idaho Power before starting a project. The customer works with an ag rep to determine the project's energy savings and applicable incentive estimate.

2.1.1 Menu Incentives

The *Menu incentive option* pays an incentive for purchasing and installing specific replacement parts and components for an existing irrigation system. The program refers to the components as measures. The measures have predetermined cash incentives and kWh savings for each. *Menu* measures are limited to two per acre and more than three years between applications for the same system components. Levelers, drains, and gasket incentives are limited to the purchase price.

The *Menu* incentive application process is outlined below:

1. Customers review the sprinkler parts covered by the *Menu* incentive to determine which apply to their system. Idaho Power agricultural representatives and program specialists are available for assistance.

2. Customers purchase and install the parts on their irrigation system.

3. Customers complete the *Menu* incentive application within one year from the date of purchase and mail or email it to Idaho Power, including receipts and invoices showing proof of purchase. The program specialist reviews each receipt and item to verify applicability.

4. Idaho Power pays customer incentives by check once they have determined that customers have complied with the Irrigation Efficiency Rewards program's terms.

The Incentives in PY2022 are different than the incentives in PY2021, although because of the lag in submittals, both incentives were applied in the PY2022 program year.

Table 3. PY2021 and PY2022 Irrigation Efficiency Rewards – Menu Incentives

Measure	2021 Incentive	2022 Incentive
Flow control nozzle	$1.50	$2.50
New nozzle (for impact, rotating, or fixed-head sprinklers)	$0.25	$0.35
New or rebuilt sprinkler heads	$2.75	$0.50
New or rebuilt wheel-line levelers	$0.75	$1.00
New pivot sprinkler package (head, nozzle, regulator)	$8.00	$8.00
New drains for wheel lines and pivots	$3.00	$3.00
Gaskets for wheel lines, hand lines, and portable main lines	$1.00	$1.00
Wheel line hubs for Thunderbird wheel lines	$12.00	NA
Pivot goosenecks with drop tubes	$1.00	NA
Cut and press and weld pipe repair (per joint)	$8.00	NA
Center pivot-based boot gaskets	$125.00	NA

2.1.2 Custom Incentives

Compared with *Menu* incentive projects, *Custom* incentive projects and applications are more involved. Idaho Power agricultural representatives are available to conduct free energy evaluations to help customers determine the changes/improvements that can make their system more energy efficient.

The *Custom* incentive is based on an estimated annual reduction in energy use. For existing systems, the incentive is based on the energy savings of the proposed modifications compared to the historical five-year usage. For new systems, the incentive is based on installing a more energy-efficient system than the standard. Water source changes to an existing system will be treated as a new system.

Table 4. PY2022 Irrigation Efficiency Rewards – Custom Incentives

Type of Project	Incentive per kWh saved annually	Incentive per kW saved annually	Maximum Incentive
Existing System	$0.25	$450.00	75% of the project cost
New System	$0.25		10% of the project cost

Necessary customer steps for a *Custom* incentive application include:

1. Customers determine how or if their irrigation system could be more energy efficient. They can request a system audit or expertise from an Idaho Power Ag Rep in their area.

2. Customers contact an irrigation equipment or pump dealer to obtain an itemized bid to modify or install the irrigation system.

3. Idaho Power reviews customer bid and support documentation, makes recommendations, and calculates energy (kWh) and demand (kW) savings to determine potential incentive estimates.

4. Qualifying projects receive a contract agreement, which must be signed and returned to Idaho Power.

5. After the customer installs the system, they submit the invoices and documentation to support the planned installation.

6. When the installation information has been submitted, Idaho Power Ag Reps will review all project components and calculate energy and demand savings for the installed irrigation system.

7. The Ag Reps submit the project to the Irrigation Segment Technical Consultant/Ag Engineer for final review and approval.

8. Upon final approval, the project is entered into the Upload database, and the incentive check is generated and mailed to the customer or the Ag Rep for hand delivery.

2.1.3 Marketing and Outreach

Idaho Power utilizes various marketing and outreach methods to inform customers about Irrigation Efficiency Reward opportunities.

The program offers customer education, training, and irrigation system assessments. IPC agricultural representatives sponsor, coordinate, conduct, and present educational workshops for irrigation customers, providing expert information and training across IPC's service area. Energy audits are provided to prospective customers by IPC agricultural representatives to evaluate potential savings.

Agricultural representatives from IPC also engage agricultural irrigation equipment dealers in training sessions, increasing awareness of the program and promoting it through the irrigation equipment distribution channels. Marketing efforts include direct mailings, advertisements in agricultural publications, and agricultural trade show participation.

2.1.4 Tracking and Reporting

Idaho Power uses a DSM database system to manage all the applicant's data, create vendors, and pull reports for all pending and paid projects. Menu savings are prescribed annually, and the DSM database completes the adjustment calculations to energy savings based on area or historical energy consumption. There is also a data entry point for a manual adjustment, as determined by program staff. The DSM database collects similar data for the custom participants, although the savings calculations are done in a spreadsheet before entry into the database for tracking.

2.2 EVALUATION OVERVIEW

The goals for the 2022 impact evaluation of the Irrigation Efficiency program include:

- Verify program-tracked savings for *Menu* measures.
- Identify evaluated savings for *Custom* and *Menu* projects with realization rates.

- Provide recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.
- Review the PY2019 evaluation findings to identify related program activities.

2.2.1 Evaluation Activities

The evaluation activities for the IER Program are summarized in Table 5. Researchable issues and the sampling strategy are also discussed in this section.

Table 5. Irrigation Efficiency Rewards Program Evaluation Activities

Activity	Objective
Program manager interviews	Understand key delivery options, how savings are claimed, and how the program is tracked.
Review other research efforts already completed	Examine the Regional Technical Forum (RTF) Irrigation Hardware Research Strategy and other research efforts to inform findings from primary research and review conducted through this current evaluation.
Analyze the tracking database: *Menu* measures	Review the program tracking system to document participation, data availability, and savings. This task includes replicating the impacts of prescriptive measures using the RTF deemed savings for the *Menu* measures.
Analyze the tracking database: *Custom* measures	Review the program tracking system to document participation, data availability, and savings. This task will inform the sampling for the engineering review.
Documentation review and calculations	Review documentation of *Menu* project applications and invoices to comply with Idaho Power and RTF measure requirements and confirm tracking system inputs.
Engineering review and calculations	Review *Custom* measures and engineering assumptions, calculations, and models to estimate equipment or measure savings. The site-specific analyses will check them for consistency, accuracy, and engineering principles in the calculations based on equipment and documented operating conditions.
Virtual site reviews of *Menu* projects	Assess equipment and operating parameters of the irrigation system to verify equipment installed, program assumptions, and calculation methods. Identify the non-energy benefits and assess the quantity and value. Review the application process from the participant's perspective.
Onsite Visits of *Custom* projects	Assess equipment and operating parameters of the irrigation system to verify equipment installed, program assumptions, and calculation methods.

2.2.2 Sampling

The tracking data[2] were uploaded by Idaho Power and downloaded by Tetra Tech on June 30, 2023. The sampling was conducted separately for Custom and Menu projects to meet the evaluation goals. Sampling was conducted by the Pump Number for the *Menu* projects and the Device Location for the *Custom* projects.

A random sample was selected for the *Menu* program. Twenty-one projects covering 24 pump numbers were selected for documentation review. Calls were made to all sampled customers for additional verification of reviewed files. After three attempts, we were able to talk with 10 participants.

The *Custom* program stratum focused on geographic distribution and even distribution between new and existing projects. The results of the stratification are summarized in Table 6.

Table 6. PY2022 Irrigation Custom Stratification Summary

	Number of project IDs		Total kWh savings percentage	
Sampling Stratum	**Existing**	**New**	**Existing**	**New**
Canyon	6	14	24.52%	29.71%
Capital	7	0	6.85%	0.00%
Eastern	2	0	1.73%	0.00%
Southern	12	11	15.25%	8.42%
Western	8	20	5.07%	8.45%
TOTAL	**35**	**45**	**53.43%**	**46.57%**

A sample of 15 custom projects was completed for desk reviews, with five receiving a follow-up site visit. The Canyon region had several large projects responsible for a large portion of the PY2022 savings. Therefore, this region has more sampled projects than others because of the large proportion of kWh savings attributed. The Capital and Eastern regions have fewer projects, all existing, so zero projects are sampled from the new type. The following quantity of projects were sampled in the stratification groups summarized in Table 7.

Table 7. PY2022 Irrigation Custom Sample Summary

	Number of Sampled Project IDs	
Sampling Stratum	**Existing**	**New**
Canyon	2	4
Capital	1	0
Eastern	1	0
Southern	2	2
Western	1	2
TOTAL	**7**	**8**

[2] Custom Program: ICI_DB_Download_2022_External.xlsx and Menu Program: IMI_DB_Download_2022_External.xlsx.

3.0 MENU IMPACT EVALUATION RESULTS

The goals for the impact evaluation of the *Menu incentive option* included:

- Verify program-tracked savings.
- Identify realization rates.
- Provide recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.
- Review the PY2019 evaluation findings to identify related program activities.

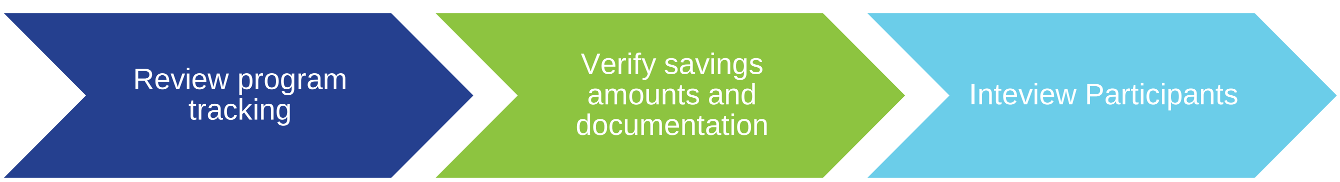
The *Menu incentive option* is prescriptive, and most irrigation equipment dealers understand the requirements of the invoice to claim the menu incentives seamlessly. The documentation typically included copies of the following:

- Submitted application
- Idaho Power annotated application
- Itemized invoice
- Quality Assurance verification documentation

3.1 METHODOLOGY

The *Menu* 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 the *Menu Incentive Option*



Program Tracking Review

The first step in evaluating the IER program was to review the program documentation and energy savings tracking system provided by Idaho Power; Tetra Tech determined that the tracking data were complete for each project. Idaho Power supplied the tracking system to the evaluation team in separate Excel spreadsheets for the Menu components and a data dictionary. The Menu program savings were verified using a census approach to recalculate savings based on tracking system data. Some projects claimed in PY2022 were based on calculations from 2021 and some from 2022. The evaluation used the Agricultural Irrigation Hardware Maintenance V5.3 [3] workbook from the RTF as the basis for energy savings.

[3] https://rtf.nwcouncil.org/measure/irrigation-hardware

Verify Savings and Documentation

An engineer with Tetra Tech reviewed the documentation of 24 claimed projects based on pump numbers sampled to verify the measures claimed and the applicability of energy savings. The findings were applied to the sample energy savings to determine the accuracy of the claimed energy savings.

Interview Participants

Once the documentation verification was complete, the engineers attempted to contact all of the sampled participants to verify the installation of the equipment in the documentation. The evaluation interviewed 10 of the participants. Interview information was used to refine evaluated savings calculations.

3.2 MENU INCENTIVE OPTION RESULTS

The *Menu* application and savings process are streamlined and prescriptive. The tracking system review found no systematic concerns about tracked equipment, energy savings, or adjustment of energy savings. Table 8 shows the overall evaluated energy savings of the *Menu* portion of the program with a 99.0 percent realization rate.

Table 8: PY2022 Menu Program Realization Rate

Program Option	Participants	Claimed kWh	Evaluated kWh	Realization rate
Menu	439	2,632,945	2,630,312	99.9%

Table 9 shows the realization rate of individual projects in the sample. Overall, the savings were accurate, with just one adjustment identified. IRRM13403 was not used to determine the realization rate because the project appeared to have incorrect documentation provided to the evaluator. The participant had several projects in PY2022, which identified a concern for documentation storage, although it did not impact the savings.

Table 9: Menu Program Sample Project Realization Rate

IRRM	Claimed kWh	Evaluated kWh	Realization rate
13310	1,543.84	1,543.84	100.0%
13096	10,439.53	10,439.53	100.0%
13098	2,100.35	2,100.35	100.0%
13304	5,777.88	5,777.88	100.0%
13355	1,041.30	1,041.30	100.0%
13366	5,411.16	5,411.16	100.0%
13382	5,090.46	4,926.12	96.8%
13401	2,291.02	2,291.02	100.0%
13426	23,413.36	23,413.36	100.0%
13473	520.88	520.88	100.0%
13520	4,017.28	4,017.28	100.0%
13526	3,316.43	3,316.43	100.0%
13509	4,858.30	4,858.30	100.0%
13505	289.43	289.43	100.0%
13499	3,005.85	3,005.85	100.0%
13480	6,413.23	6,413.23	100.0%
13434	4,495.48	4,495.48	100.0%
13336	1,094.15	1,094.15	100.0%
13095	16,830.19	16,830.19	100.0%
13110	10,723.56	10,723.56	100.0%
13127	106.93	106.93	100.0%
13135	3,239.07	3,239.07	100.0%
13159	1,207.87	1,207.87	100.0%
TOTALS	**117,228**	**117,063**	**99.9%**

3.2.1 *Menu Incentive Option* Detailed Evaluation

The tracking system review found that the tracking system for the *Menu incentive option* included all the necessary project information to use the RTF calculation to claim first-year energy savings and non-energy benefits. Further, the tracking system included the field area, pump horsepower, historical consumption, and a manual adjustment for the energy savings to meet the savings adjustments detailed in the program manual. The evaluation team confirmed that the claimed savings matched the expected RTF energy savings and non-energy benefits with minimal additional support from Idaho Power. However, the adjusted energy savings that equals the claimed savings, calculated within the DSM database tracking system, was more challenging to evaluate from the tracking system alone. The evaluation team completed this review of the sampled projects.

The PY2022 evaluation of the *Menu incentive option* included 24 sampled projects that received detailed documentation review, savings calculation, and savings adjustment review. Overall, the evaluation team found consistent documentation, and the savings calculation and adjustments were documented. The claimed savings were conservative because the adjustments based on acres and historical energy consumption capped the savings at reasonable levels for each project.

The evaluation team found one project did not have a 100 percent realization rate. The project had a measure that was removed from the program. Below is the specific description.

> **13382**: The project was a 2021 invoice that included a gooseneck measure. The gooseneck measure was removed from the program for PY22, although the program continued to pay rebates to applicants who purchased the equipment before the removal from the program. The evaluation adjusted the savings to account for the removal of the measure and agreed that the rebate to the applicant was part of the program costs in the transition period. This adjustment resulted in an energy savings realization rate of 97%.

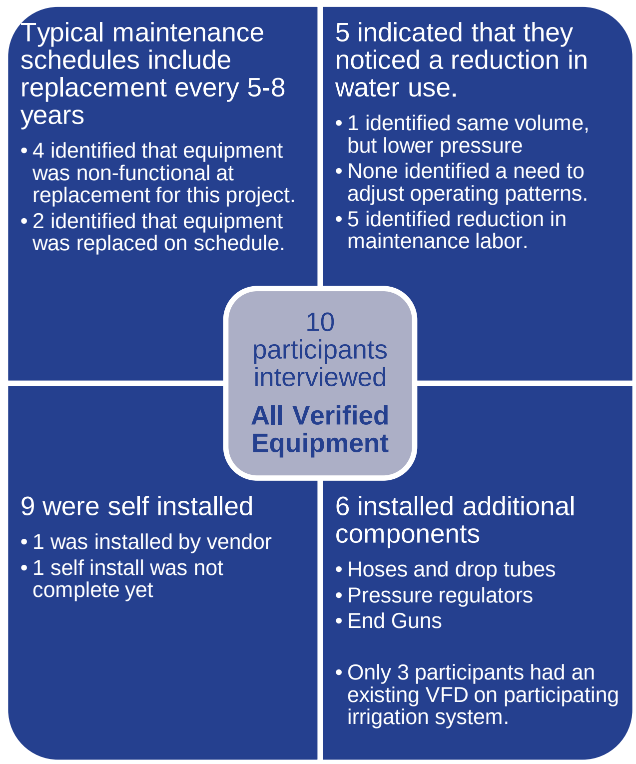
Two other projects had concerns because the documentation did not easily match up to the project. Each project was with a participant who had multiple projects. The first had what appeared to be a duplicate project in the tracking system with a slightly different farm name. The second participant had nine projects submitted in PY2022, and the evaluation received documentation for a different project; this project was removed from the sample.

- **13355**: The project consisted of 72 acres of irrigated land. The project measures and savings appeared duplicated in project 13493, which was identified as the same meter, pump, and location, although it had a different name and submittal date. The program supplied additional documentation to show that the two projects were for identical irrigation distribution systems on different fields with the same pump, but this could not be identified from the tracking system.
- **13403**: This project had a 30 HP pump irrigating 215 acres of land. However, the customer participated in the program at nine locations in the evaluation period. The documentation appears to be for another location from the same customer. The project measures included wheel line hubs, riser caps/gaskets, pipe presses, new nozzles, low-pressure sprinklers, levelers, impact sprinklers, and drains. The tracking system showed that this pump irrigated 450 acres, but it was determined, based on the documentation, that the project irrigated 215 acres. The project documentation did not include the wheel line hubs, pipe press, low-pressure sprinklers, levelers, or drains. The quantities of the riser caps/gaskets, nozzles, and impact sprinklers were adjusted

in the documentation. These adjustments from the project documentation made it apparent that this documentation did not match the claimed project. These adjustments were removed from the sample because they identified a deficiency in the documentation system but not the claimed savings.

3.2.2 *Menu Incentive Option* Participant Interviews

Figure 4: Participant Interview Outcomes



The evaluation team completed phone interviews with participants to verify participation and equipment. The evaluation included interviews with ten participants representing 13 of the sampled projects. All the participants verified the equipment installed in the application. Figure 4 shows the interview outcomes, providing interesting information to support improved implementation but not identifying components that will adjust the evaluated savings. Appendix A includes the complete answers to the interviews.

The equipment was primarily self-installed, with only one participant using a vendor to install it. The primary concern was that one reported self-install had not yet completed the equipment installation. The evaluation does not recommend adjusting energy savings based on this finding because the price of the equipment reduces the likelihood of delayed installation.

The interviews also identified that the typical maintenance schedules of the participants require the replacement of equipment every five to eight years. However, two participants identified that equipment was positively replaced on a maintenance schedule, while four identified the equipment was replaced when it was at least partially non-functional. The remaining four participants did not answer this question. Further data collection is warranted to determine the condition of the baseline equipment because it may be less functional in the participants than in the general irrigation equipment population.

A further interesting finding is that five of the ten participants noticed a reduction in water use, one adjusted the water pressure, and five noticed a reduction in labor or maintenance associated with the participating irrigation system. However, none noted that they changed operations when the equipment was installed, which is a typical response in a program expected to produce small efficiency improvements through equipment upgrades.

3.2.3 *Menu Incentive Option* Findings Discussion

The *Menu incentive option* evaluation identified findings that can support the implementation and increased accuracy of the savings calculation.

1. The program tracks the participant name, meter ID, pump ID, and project number, which is sufficient to uniquely identify projects for participants who complete multiple projects in the same program year. The evaluation found that one project appeared duplicated, and one had mismatched documentation for the field. Improvement in the use of the tracking data to identify duplicate applications and organize supporting documentation will improve the quality assurance process.
2. The gooseneck measure was removed from the program in PY22, although the program continued to pay rebates to applicants who purchased the equipment before the removal from the program. The evaluation adjusted the savings to account for removing the measure and agreed that the rebate to the applicant was part of the program costs in the transition period.

4.0 CUSTOM IMPACT EVALUATION RESULTS

The goals for the impact evaluation of the *Custom incentive option* include:

- Verify program-tracked savings.
- Identify realization rates.
- Provide recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.
- Review the PY2019 evaluation findings to identify related program activities.

Idaho Power has been accommodating and provided a great deal of program documentation to inform the evaluation. Tetra Tech reviewed the application process and requested documentation on the selected custom projects, including the following:

- Submitted application
- Project description
- Itemized bid from the supplier for the project[4]
- Drawing of irrigation system
- Topographical map of the irrigated area with intake/well elevation, critical pressure locations, and elevations showing mainline pipe lengths, sizes, and pressure ratings
- Aerial photo/map of the irrigated area (acres)
- Make and model of pump
- Irrigation system design (existing and improved)
- Pump Curves
- Project energy efficiency calculations for kWh and Peak kW
- Field Data Collection documentation and photos
- Site verification reports and photos

[4] The evaluation will review whether or not itemized supplier bids are necessary for all projects or invoices are sufficient.

4.1 METHODOLOGY

The *Custom* impact methodology consisted of the four primary evaluation activities shown in Figure 5. Each activity is explained in more detail below.

Figure 5. Process for Verifying the *Custom Incentive Option*

Program Tracking Review

The first step in evaluating the IER program was to review the program documentation and energy savings tracking system provided by Idaho Power. Tetra Tech determined that the tracking data were complete for each project. Idaho Power supplied the tracking system to the evaluation team in separate Excel spreadsheets for the *Custom* components, along with a data dictionary.

Verify Savings Amounts and Documentation

Custom savings and documentation were verified by sampling 15 projects for a detailed review of claimed savings and documentation. The evaluation team reviewed the submitted documentation to verify the tracking system data entries for participant information, expected documentation, savings, and other data entry points.

Check Savings Calculations

An engineer with Tetra Tech reviewed the savings calculations for the 15 *Custom* projects sampled and recalculated the savings based on the documentation and additional verification information collected. The engineer examined the project descriptions, drawings, invoices, calculations, and assumptions. Although the submitted calculations were reviewed, the evaluated savings reported results from a new calculation using the documentation.

Participant Site Visits

Once the kWh savings were recalculated for each of the 15 sampled *Custom* projects, the evaluation team called the participants to schedule site visits for five of the 15 projects. The site visits confirmed baseline and post-install conditions, operating parameters, and discussion of the non-energy benefits realized since installation. The evaluation team used the information from the September 28-30 site visits to refine evaluated savings calculations.

4.2 IMPACT REVIEW RESULTS

The *Custom incentive option* application and savings process are standardized throughout PY2022 and PY2023 to streamline documentation and calculation processes. This effort decreases the variability identified in the custom project savings and leads to a more consistent implementation. Table 10 shows the overall evaluated energy savings of the *Custom* portion of the program with a 95.8 percent realization rate for kWh and 142.3 percent realization rate for peak kW.

Table 10: PY2022 *Custom Incentive Option* Realization Rate

Participants	Claimed kWh	Evaluated kWh	Realization rate kWh	Claimed Peak kW	Evaluated Peak kW	Realization rate Peak kW
80	4,304,911	4,124,660	95.8%	810.9	1,153.6	142.3%

The tracking system review found that the tracking system accurately reflected the applications and documentation. Overall, findings from the impact evaluation of the *Custom incentive option* show the program savings calculations are overstated for the kWh savings, and the peak kW estimations are understated. However, the overstatement of kWh savings was concentrated in one type of project, a new system project that operated a multiple-pump arrangement. This type of system has the most complicated energy modeling for the proposed approach. Because the system is a new system, it does not have the operating history to develop a realistic baseline. Table 12 shows the realization rate results from variations between the existing retrofit and new system project types used to develop the overall realization rate.

Table 11: PY2022 Evaluation Results for New and Existing Project Types

Program Option	Count	Claimed kWh	Evaluated kWh	Realization rate kWh	Claimed Peak kW	Evaluated Peak kW	Realization rate Peak kW
Existing	35	2,300,035	2,460,613	107.0%	305.8	478.3	156.4%
New	45	2,004,876	1,664,047	83.0%	505.1	675.3	133.7%

4.2.1 *Custom Incentive Option* Documentation

The custom project documentation was significantly improved from the PY2019 evaluation. The most significant improvement was the development of a checklist to support the project's quality assurance/quality control. Each project included a checklist signed and dated by the program implementer.

The checklist is added to the front of all the project files to ensure that critical items and dates are easily determined if they are eligible and accessible within the files. The checklist developed included.

- ✓ Ag Rep
- ✓ Pump #
- ✓ Date of Signed Application
- ✓ Date of signed contract
- ✓ Date of Invoice
- ✓ Identification of non energy benefits
- ✓ Date of project eligibility
- ✓ Calculation sheet complete
- ✓ Identification of VFD projects
- ✓ Letter from power quality engineer
- ✓ Life of project
- ✓ Verify 2021 usage
- ✓ Area irrigated
- ✓ Existing system description
- ✓ Planned system description
- ✓ Mapping
- ✓ Pump curve with operating points
- ✓ Photos
- ✓ Final customer signature
- ✓ Identification of rate controls
- ✓ Tax ID
- ✓ Email notes
- ✓ Date of peer approval
- ✓ Date of entry into the DSM database
- ✓ Backcheck of spreadsheet data link
- ✓ Latitude/Longitude
- ✓ Sign off date and electronic signature

The documentation package provided to the evaluation team was consistent and generally included the information identified in the checklist. Some documentation packages did not include the pump curve or the system's map, but they were generally more straightforward projects that only had 1-2 pivots served by the pumping, and it was not necessary to determine evaluated savings.

4.2.2 *Custom Incentive Option* Detailed Results

The energy savings realization rates for each project are shown in Table 12 and Table 13 below, broken out by existing retrofit and new system projects. The combined realization rate for the *Custom incentive option* portion of the program is shown in Table 10. There is a significant difference in the realized results between the two types of projects; therefore, the results are stratified below.

Table 12: *Custom Incentive Option* Sample Project Realization Rate – Existing retrofit projects

ID	Claimed kWh	Evaluated kWh	Realization rate kWh	Claimed kW	Evaluated kW	Realization rate Peak kW
2925	55,768	58,224	104.4%	-1.3	-1.3	100.0%
2926	153,587	201,106	130.9%	29.2	29.2	100.1%
2943	713,238	713,238	100.0%	-38.0	-38.0	100.0%
2971	138,207	148,541	107.5%	79.5	172.0	216.0%
2973	26,009	26,009	100.0%	13.5	13.5	100.0%
2977	46,332	42,554	91.8%	31.5	28.7	91.1%
2990	15,976	15,976	100.0%	8.6	8.6	100.0%
2999	119,440	151,474	126.8%	44.7	49.6	111.0%
Grand Total	**1,268,557**	**1,357,122**	**107.0%**	**167.7**	**262.3**	**156.4%**

Table 13: *Custom Incentive Option* Sample Project Realization Rate – New System

ID	Claimed kWh	Evaluated kWh	Realization rate kWh	Claimed kW	Evaluated kW	Realization rate Peak kW
2930	86,098	52,252	60.7%	32.5	31.7	97.5%
2939	294,582	200,230	68.0%	73.2	97.7	133.5%
2940	474,112	526,001	110.9%	113.2	153.7	135.8%
2941	288,964	164,428	56.9%	59.5	90.9	152.8%
2954	24,244	16,721	69.0%	10.0	12.0	120.0%
2986	42,066	44,725	106.3%	11.0	19.9	180.9%
2988	23,428	19,076	81.4%	9.9	7.5	75.8%
Grand Total	**1,233,494**	**1,023,433**	**83.0%**	**309.3**	**413.4**	**133.7%**

4.2.2.1 Custom Calculations

The *Custom* calculation for both existing and new system projects follows the same standard custom calculation process. First, the base consumption is determined, then the more efficient system usage is determined, and savings are calculated to identify the savings from operating a more efficient upgraded system. If the system only included upgrading the pumps or reducing pressure, this is the claimed savings.

The second step of the calculation includes enhancements such as VFD or multiple pump systems. This calculation sets a baseline for a single pump without control to match the system's various flow and head conditions. This identified the baseline and upgraded conditions in a simple-to-read table that identifies the various operating conditions, associated consumption, and irrigation water delivered from each. The evaluation team used a calculation approach which only used the format of the second step to calculate the whole project savings.

To calculate the base consumption and savings, the first step does several important calculations by calibrating the baseline consumption to match historical consumption, matching annual hours of operation to historical consumption, and calculating the energy consumption associated with the pivot motors and end gun boosters. However, the calculations do not flow sequentially on the page and include many hidden additions and subtractions within the calculation cells. Many of the minor evaluation adjustments to energy savings resulted from changes in equations, which were difficult to identify in the review. Some examples included the savings associated with removing end guns, reducing pressure through pipe improvements, converting from horsepower to watts multiple times, or using AMI data in custom ways. Providing a location where calculation assumptions and components can be easily identified will reduce the program's quality control/quality assurance needs and create a more transparent calculation for the irrigation market actor and participants to understand.

The PY2019 evaluation of the program identified many of these areas as opportunities to improve the program implementation, including developing a single calculation focused on energy consumption variations, developing standard assumptions, and incorporating AMI data into baseline development. Significant improvements have been made in developing standard assumptions and incorporating AMI data into the baseline development. However, the calculation is still in multiple steps, and it is challenging to identify the key drivers of savings based on the form. The calculation sheet can also be improved to identify the custom assumptions included in the calculation and complete internal quality assurance/quality control.

There have been many good improvements in standardizing the calculation since the PY2019 evaluation. The next step to creating a consistently implemented custom irrigation program is creating a single entry point for assumptions and project information. The equations which use the information should reference the single data entry point. This system will ease quality assurance by consistently laying out the assumptions and critical project information. It will also decrease the risk of hidden equation errors, which can occur when the assumptions or project information is entered into multiple individual equations. Finally, the reference point

4.2.2.2 Existing retrofit projects

The evaluation team sampled eight existing retrofit projects and focused on the kWh realization rate. Three existing retrofit projects in the sample had a realization rate of 100 percent. Three projects had a realization rate within 10 percent of claimed. The remaining two projects had realization rates of 127 and 131 percent. These last two projects are the ones that drive the variability of savings, and each project's results are discussed below.

- **2925**: The project installed a VFD to an existing pump to reduce operating pressure on 215 acres of irrigated land. The evaluation team adjusted the hours of operation from 1,541 hours to 1,991 hours to match the proposed condition and better match the AMI data. This adjustment increased savings slightly to 104 percent realization rate for kWh. The Peak kW was evaluated at 100 percent realization rate.

- **2926**: The project rebuilt a 250-horsepower pump, reduced the pressure requirements of the nozzles, and installed a VFD. These upgrades reduced the run time of a supplemental deep well pump and a booster pump to provide flow and pressure for the irrigation system. The evaluation team found that the deep well pump will operate for fewer hours than the claimed calculation assumed. This adjustment increased savings to 131 percent realization rate for kWh. The Peak kW was evaluated at 100 percent.

- **2971**: The project retrofitted an existing multi-pump system through improvements to piping and rebuilt existing pumps. The historical system operations varied the amount of irrigated land and water provided per year. The claimed energy system assumed an average operation for multiple meters and adjusted that overall operation to a new overall operation. The evaluation team increased the detail of the calculation to use each pump meter individually and determine the adjustment from 2013-2021 baseline to the proposed annual operation. The evaluation calculation removed the well pump from the baseline and accounted for the increased water delivered by the other metered pumps. The increased level of calculation detail for each of the multiple pumps impacted the energy savings to 107 percent realization rate for kWh. The Peak kW was evaluated at 216 percent realization rate.

- **2977**: The project installed a VFD on an existing pump and upgraded piping to increase the use of gravity head available on 195 acres of irrigated land. The evaluation team agreed with the submitted gravity head calculations, although the pump efficiency was slightly higher than identified in the pump curve. The decreased pump efficiency resulted in reduced savings to 92 percent realization rate for kWh. The Peak kW was evaluated at 91 percent realization rate.

- **2999**: The project replaced the bowl and assembly of a pump on the irrigation system for 697 acres of irrigated land. The evaluation team adjusted the baseline kW to match the AMI meter data from the five-year historical records. This adjustment increased savings to 127 percent realization rate for kWh. The Peak kW was evaluated at 111 percent realization rate.

4.2.2.3 New system projects

The evaluation sampled seven new system projects and focused on the kWh realization rate. Five new system projects were similar as they installed systems that had multiple pumps and multiple fields, and three of the projects were from the same large system conversion to pivot irrigators. These five multi-pump projects were responsible for most of the savings reduction of new system projects. The remaining two projects had much smaller savings and better realization rates of 106 and 81 percent.

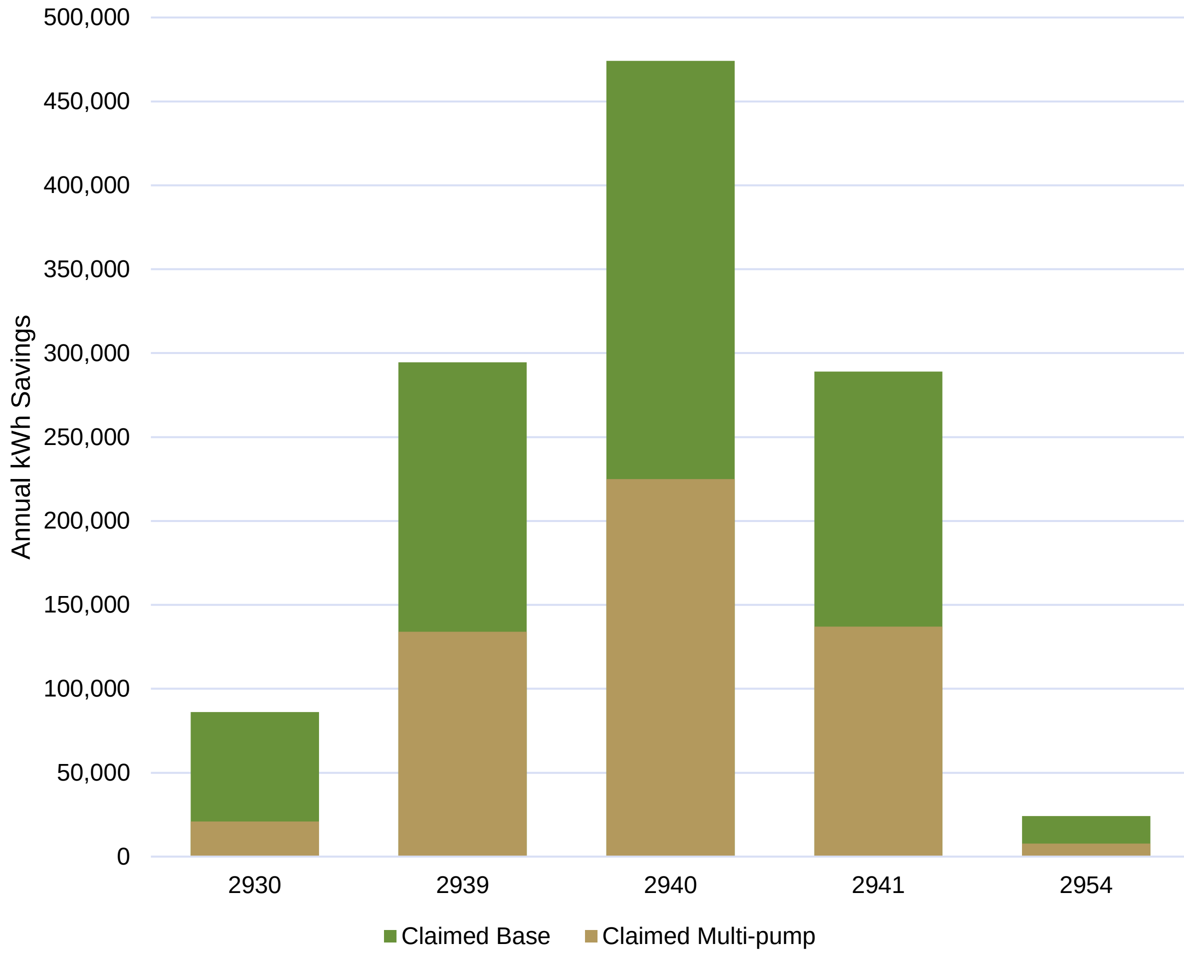
- **2986**: The project replaced surface irrigation with a pivot system and installed piping to capture the gravity head, meaning the pump power was unnecessary for much of the pivot rotation. The evaluated savings calculation found a slight increase in energy savings because the gravity head provided was slightly greater than assumed. This adjustment increased savings to 106 percent for kWh. The Peak kW was evaluated at 181 percent.
- **2988**: The project installed two pivot systems with pumping, which was more efficient than a standard installation. In addition, the pumping system provided flow to a solid set of magpie sprinklers in the four corners. The evaluation team eliminated the savings for pressure reduction at the magpie guns, which was included in the claimed calculation. This adjustment decreased savings to 81 percent for kWh. The Peak kW was evaluated at 76 percent.

Multi-pump new system projects

The multi-pump new system projects resulted in the most significant adjustments to kWh savings in the evaluation. The evaluation team found that the standard calculation used for the other new system projects overestimated the baseline energy consumption of the pumping systems. The evaluation team confirmed the consumption of the installed system for all these projects except 2930, described below.

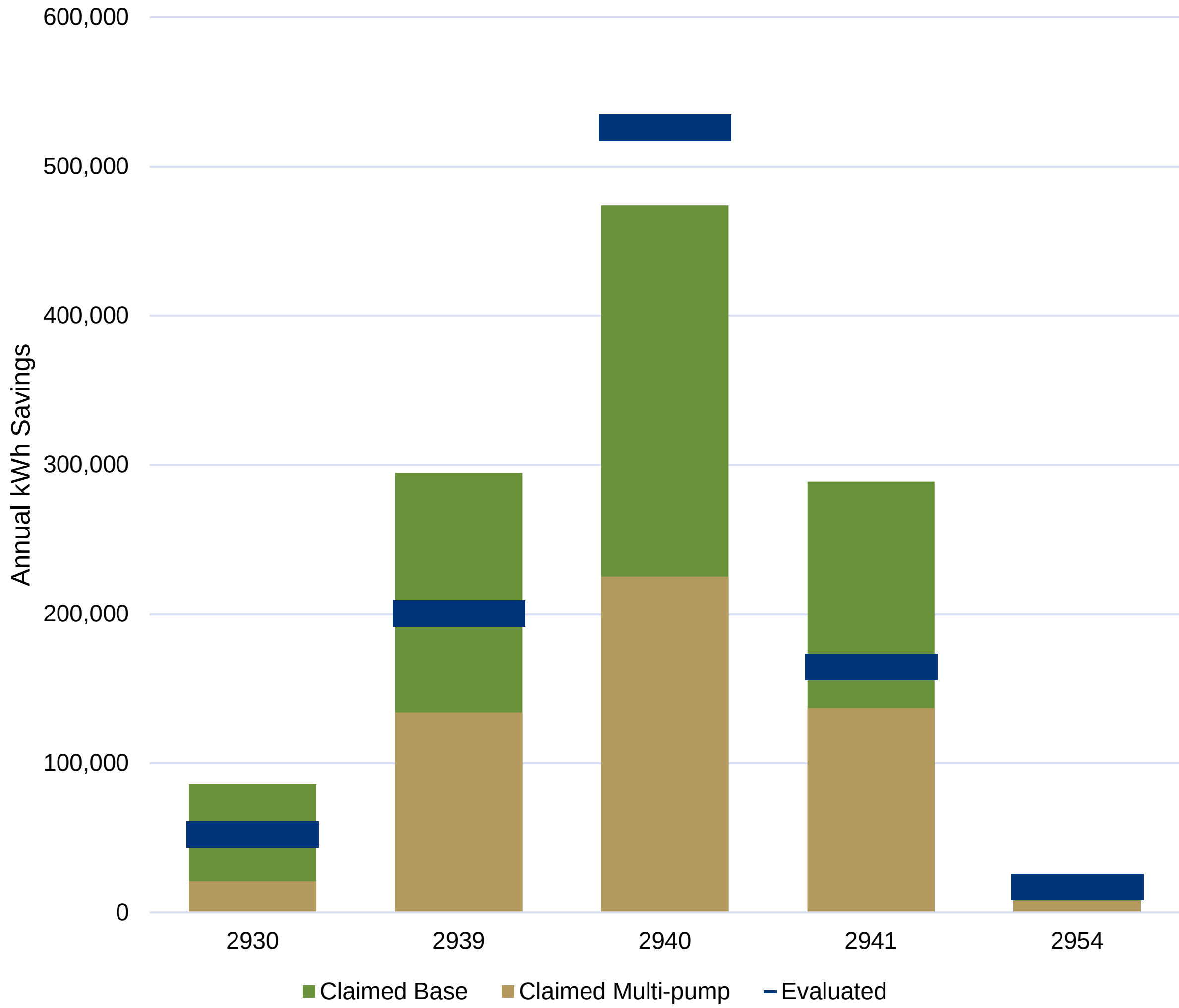
The calculations for the *Custom* projects are standardized to follow a similar format for each new system project. A base consumption is calculated to identify the usage from operating a more efficient single pump system. The multi-pump savings were calculated to determine the consumption and savings associated with changing from an efficient single pump to a multiple-pump system to match the various operating points based on pivots turned on and off throughout the irrigation season. Figure 6 shows the claimed savings amount for the multi-pump new system projects with the savings claimed by each calculation step identified. Each contributes about 50 percent of the savings for each project.

Figure 6: Claimed Energy Savings Components of the New System Multi-pump Projects



The evaluation team identified that the new system projects that installed multiple pump solutions were typically systems that had multiple fields and cycled the pivots regularly. The claimed savings assumed the base system is a single pump meeting the maximum head and flow condition for all the hours which does not match the operating conditions for systems with pivot cycling. The base system is expected to operate to meet the varied head and flow conditions of the pivot cycling of the project equipment. This generally means an increased hours of operation and lower pump head and flow which leads to a base system with a lower energy consumption. The evaluated savings for these five projects in the sample recalculated the baseline assuming the pivot cycling and single pump. Figure 7 adds the line for the evaluated savings with the new baseline system consumption calculated for each sampled project for a combined 80 percent realization rate.

Figure 7: Claimed Energy Savings Components of the New System Multi-pump Projects



- **2930**: The project installed a multi-pump new system and had the baseline adjustment described above. However, in addition to the adjustment described above, the evaluation completed an additional calculation adjustment. The equations in the multi-pump calculation included two conversions from horsepower to watts in the spreadsheet equations. This conversion decreased energy consumption by a factor of 0.746 for both proposed and baseline conditions. This adjustment is included in the evaluated savings above.

4.2.3 *Custom Incentive Option* Findings Discussion

The *custom incentive option* evaluation identified findings that can support the implementation and increased accuracy of the savings calculation.

1. The current *Custom* calculator has a two-step process to calculate energy savings for most projects. The program can streamline the calculation to a one-step process to compare improved conditions to five-year historical usage for existing systems or new system projects by detailing the baseline and improved conditions and identifying the differences and assumptions included in the savings calculation. This simplification will support quicker and more manageable quality assurance and quality control within the program savings calculations.
2. The use of AMI data to calibrate the baseline conditions is working well. The use of the AMI data varies between projects, but how it is used for each calculation is not documented.
3. The baseline energy consumption for new system systems with cycling pump and pivot operations needs more detail to account for the baseline pump electrical consumption at varied pump operating points.
4. The claimed custom energy savings calculation does not effectively capture when pumps are turned off or removed from the system. Isolating the pump baseline operation to be subtracted in the proposed system and then using the proposed system to provide the water volume will provide better savings estimates.

APPENDIX A: *MENU INCENTIVE OPTION* PARTICIPANT INTERVIEW

No.	IPC Irrigation Efficiency Rewards	Results	Count
1T	Can you confirm that you installed the following measures:	Yes	7
		Yes. He didn't think they had 42 pivots on their equipment, but he may define the quantities differently.	1
		Yes. *Vendor* installed most of them, some still need to be installed.	1
		replaced 2 complete pivot packages - pressure regulator - 3 to 4 boxes or units, some nozzles for the wheel.	1
2T	Did you install any other components that did not receive a rebate at the same time?	Yes	5
		No	5
2.1T	(If yes) what components?	end gun	1
		hoses	2
		pressure regulators	1
		drop hoses on all pivots	1
3T	Do you remember when the components were installed?	No	3
		Beginning of the season	1
		March-August	1
		Late fall 2021 -early spring 2022	1
		Sep-22	1
		2022, some purchased components still need to be installed.	1
		Spring 2022	2
4T	Who was the vendor that sold you the equipment?	Slimand & Butler	3
		The Sprinkler Shop	1
		Butte Irrigation	1
		Don's Irrigation	1
		Farmore of Idaho	1
		Agri-lines	1
		Knudsen Irrigation	1
		Double M	1
		United Distributors	1
5T	Did you complete the install or did the vendor install?	self-install	9
		vendor install	1
6T	Were the existing components before the replacement:	fully functional	5
		fully functional but with significant problems	4
7T	Prior to this project, how long since you last replaced these components?	never, existing were original components	3
		5 years	2
		7-8 years	2
		7-8 years on a pivot package. some wells suck sand & that wears out nozzles faster.	1
17T		2 types - timed & problem related	2

No.	IPC Irrigation Efficiency Rewards	Results	Count
	What is your typical maintenance schedule, & why?	service pivots in spring, winterize in fall	1
		timed	1
		replace when non-functional	2
		(empty)	4
8T	What type of irrigation system are the components installed on?	Center pivot w/ end gun	8
		Center pivot w/o end gun	1
		Handline	1
9T	How many acres are irrigated?	12-137	
10T	What crops do you typically grow?	hay	5
		barley	2
		corn	5
		potatoes	6
		beans	3
		alfalfa	3
		sugar beets	3
		grain	1
		wheat	3
		peas	1
11T	How many inches of water do you apply in a typical year?	depends on the crop	
11.1T	Has the volume of water decreased with the installed components?	yes	5
		no	3
		same volume of water but lower pressure	1
12T	Was there a need to adjust operating controls or conditions after installing the new equipment?	no	9
		unknown	1
13T	What is the pump horsepower?	8-250HP	
13.1T	Is there a VFD on that pump?	yes	3
		no	7
14T	Do you know the critical pressure (typically the end point) you maintain in your irrigation equipment?	15-85lbs	
14.1T	(If not) What is the pressure provided at the pump?	50-65lbs	
15T	Has there been any other benefits or costs with the new components?	no	5
		benefit - better distribution of water	4
		cost - labor for installation	1
15.1T	Has your maintenance labor decreased?	yes	5
		no	5
16T	Is there anything else you would like to share about	no comment	7

No.	IPC Irrigation Efficiency Rewards	Results	Count
	your experience with the Irrigation Efficiency Rewards program or Idaho Power?	the program works well.	2
		the program is no longer worth their time due to reduced rebates.	1

TETRA TECH

Residential New Construction PY2022 Evaluation

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ACKNOWLEDGEMENTS

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The Tetra Tech evaluation team was made up of the following individuals: Kimberly Bakalars, Mark Bergum, Najoua Jouini, Graham Thorbrogger, and Laura Meyer.

1.0 EXECUTIVE SUMMARY

Tetra Tech is pleased to provide Idaho Power Company (Idaho Power) with this report covering the evaluation of 2022 program impacts for the Residential New Construction program. This report section includes an introduction describing the program, evaluation activities, and key findings and recommendations. The program's impact evaluation is detailed in a separate section.

1.1 PROGRAM DESCRIPTION

The Residential New Construction Pilot Program launched in March 2018, replacing the ENERGY STAR® Homes Northwest Program, and transitioned to a regular program in 2021. The program offers builders a cash incentive to build energy-efficient*, all-electric homes* that use heat pump technology in Idaho Power's Idaho service area. These homes must meet strict requirements that make them at least 10 percent, 15 percent, or 20 percent more energy efficient than homes built to standard state energy code.

Builders must contract with a certified rater to ensure the home design meets program qualifications. The rater works with the builder throughout the project, performs required energy modeling using REM/Rate modeling software, and completes the necessary tests and inspections. Idaho Power claims energy savings based on the modeled savings completed by the raters for each home participating in the program.

1.2 METHODOLOGY

The evaluation team conducted several evaluation activities, shown in Figure 1, to address the evaluation objectives. The evaluation objectives included identifying program documentation prepared by raters or reviewers that will streamline delivery, verifying that reported model output savings and tracked savings match and providing ex-post realization rates for projects finalized in the program year (PY) 2022, and offering recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.

Figure 1. Impact Evaluation Activities

1.3 FINDINGS AND RECOMMENDATIONS

In PY2022, the program had 109 participants with claimed savings of 337,562 kWh and a budget of $235,732.[1] The tracking system was well organized and contained information to support the understanding of projects. The savings from the reported model output and tracking match, resulting in an overall realization rate of 100.0 percent.

1.3.1 Impact Recommendations

The following impact recommendations are provided for Idaho Power's consideration:

- **Monitor the Primary Heating Rating (HSPF) of installed heating equipment and discuss equipment selection and modeling practices with builders and raters.** The program savings are predominately achieved through heating. The evaluation showed that a higher equipment HSPF correlated with higher savings per unit. The evaluation team recommends following up with the builders and raters to learn more about their equipment selection recommendations and modeling practices and to inform them that heating efficiency is the primary driver of the energy savings identified in participating homes.
- **Educate raters on potential savings from water heating.** Some detached single-family homes sampled achieved savings by installing heat pump water heaters. The program has the opportunity to significantly increase savings by expanding the use of heat pump water heaters. The evaluation team recommends Idaho Power focus on opportunities to install heat pump water heaters in detached single-family homes where the installation is easier. Installing heat pump water heaters in other home types is more complicated and Idaho Power can educate builders and raters about the benefits of supporting additional installations.
- **Monitor average ceiling height.** The model output report included information about the conditioned area and conditioned volume. The evaluation revealed that the conditioned volumes for some homes entered in the model were unreasonably high compared to the conditioned area. Ensuring that the entered conditioned volume is reasonable compared to the conditioned area will increase the model's accuracy in calculating savings.

[1] Demand-Side Management 2022 Annual Report (idahopower.com)

2.0 INTRODUCTION

2.1 PROGRAM OVERVIEW

The Residential New Construction Pilot Program launched in March 2018, replacing the ENERGY STAR® Homes Northwest Program, and transitioned to a regular program in 2021. The Residential New Construction program offers builders a cash incentive to build energy-efficient, *all-electric homes* that use heat pump technology in Idaho Power's Idaho service area. These homes must meet strict requirements that make them at least 10%, 15%, or 20% percent more energy efficient than homes built to standard state energy code.

The Regional Technical Forum (RTF) and Northwest Energy Efficiency Alliance (NEEA) have created specific modeling requirements and program guidelines to ensure the program provides reliable energy savings for utilities across the Northwest. These homes feature high-performance HVAC systems, high-efficiency windows, increased insulation values, and tighter building shells to improve comfort and save energy. Idaho Power claims energy savings based on each home's individual modeled savings.

Builders must contract with a Residential Energy Services Network (RESNET)-certified rater to ensure the home design will meet program qualifications. The rater will work with the builder from the design stages through project completion; perform the required energy modeling using REM/Rate modeling software; perform site inspections and tests; and enter, maintain, and submit all required technical documentation in the REM/Rate modeling software and the NEEA-maintained AXIS database. This data determines the energy savings and the percent above code information needed to certify the home.

The Washington State University (WSU) Energy Program performs file review and file and field QA services on home energy ratings performed by the program raters. The university's contract also includes new rater training, onboarding, and working with current rater technical problems and issues.

The Idaho energy code increased on January 1, 2021, moving from the 2012 IECC (amended to 2009) to the 2018 IECC, with amendments. Homes initiated before January 1, 2021 were certified under the 2012 IECC. Homes initiated January 1, 2021 and after are certified under the 2018 IECC.

2.1.1 Marketing and Outreach

Idaho Power uses several marketing and outreach methods to inform customers about Residential New Construction opportunities. Idaho Power publishes Customer Connection articles to drive engagement in the Residential New Construction program. In addition, they host events and a program landing page that contains details about qualifications, incentives, and program eligibility.

In addition to the various energy efficiency outreach efforts across all programs, Idaho Power specifically marketed the Residential New Construction program in 2022 through the following methods:

- Participated in Snake River Valley Building Contractors Association (SRVBCA) and Building Contractors Association of Southwestern Idaho (BCASWI) Builders' Expos and sent marketing materials to the winter and fall Idaho Building Contractors Association (IBCA) board meetings.

- Supported 2022 Parade of Homes events with full-page ads in the Parade of Homes magazines of the following BCAs: The Magic Valley Builders Association (MVBA), the BCASWI, the SRVBCA, and the Building Contractors Association of Southeast Idaho (BCASEI).
- Included a print ad in the April construction issue of the Idaho Business Review publication and a digital app ad and company listing as part of the advertising package with the MVBA.
- Sent a bill insert to 305,714 Idaho customers in May to promote the program.
- Left the program brochure at the City of Boise permitting office as a hard copy handout.

2.1.2 Tracking and Reporting

All Residential New Construction program certification data is retrieved from the regional AXIS database overseen by NEEA and created and maintained by Pivotal Energy. Idaho Power staff then verifies that the information in the Utility Report is accurate and addresses any data entry errors. A checkmark is made as each section of the Utility Report is reviewed. The document is marked by Idaho Power staff as having been reviewed. The data from the AXIS documentation is then entered into Idaho Power's DSM Database and placed into the payment upload for incentive payment.[2]

The DSM Database tracks participant information (address and phone) and information about the project status, home type, square footage, fuel type, builder name, rater name, QA status, kWh savings, and received incentive. The Utility Reports include more details about the project that are not included in the DSM Database. However, as mentioned above, Utility Reports are used by Idaho Power as part of Idaho Power's QA process.

2.2 EVALUATION OVERVIEW

The goals for the 2022 impact evaluation of the Residential New Construction program include:

- Identify program documentation prepared by raters or reviewers that will streamline delivery.
- Verify reported model output savings and tracked savings match and provide ex-post realization rates for projects finalized in the 2022 program year.
- Provide recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.

[2] Residential New Construction Handbook

2.2.1 Evaluation Activities

The Residential New Construction program evaluation activities are summarized in the table below. Researchable issues and the sampling strategy are also discussed in this section.

Table 1. Residential New Construction Program Evaluation Activities

Activity	Sample Size	Objective
Idaho Power staff interview	✓	Understand key delivery options, how savings are claimed, and how the program is tracked.
DSM Database tracking system review	✓	Review program tracking system to document participation, data availability, and savings.
Model output review	24	Review model outputs, claimed savings, and program guidelines for accuracy and consistency in models to identify credible and reliable energy impact estimates.

Idaho Power Staff Interview

The evaluation team interviewed Idaho Power staff involved in designing and delivering the Residential New Construction program on June 19, 2023. The interview provided information on how the program is delivered, program objectives, and what program staff want to learn from the evaluation.

Program Tracking System Review

The evaluation team reviewed the program documentation and savings tracking data provided in Idaho Power's DSM Database to develop a sampling approach to ensure sufficient geographic distribution of sampled projects and that each rater has multiple models reviewed.

Data in the DSM Database were verified by sampling 24 projects and comparing the data to the model output reports provided by Idaho Power (Utility Reports). The evaluation team reviewed the tracking system data entries for participant information, savings, and other data entry points.

Model Output Review

The evaluation team reviewed the model output reports (Utility Reports) for the 24 sampled projects. As mentioned above, results of the REM/Rate modeling software are maintained in the AXIS database. The Utility Reports include AXIS data as well as checkmarks noting that Idaho Power reviewed the data.

The model output review included combining the data from the 24 reports into one spreadsheet to identify any inconsistencies or outliers. The evaluation team also compared the data entries and results across builders, raters, home types, home sizes, and other equipment characteristics.

2.2.2 Sampling

Sampling was conducted at the Project ID level. Idaho Power uploaded the PY2022 tracking data[3] to the secure FTP site on June 23, 2023. Tetra Tech reviewed the data and confirmed that the Project ID provided sufficient comprehensiveness per customer for sampling.

We used probability proportional sampling (PPS) for electric savings to select projects. Several strata were also identified to ensure sufficient breadth of the sample beyond savings to develop the recommendations. The sample was constructed to meet the following criteria:

- A minimum of 2 projects from each rater
- A minimum of 2 participants from the combined tracked cities of Hailey & Ketchum
- A minimum of 2 participants from the combined tracked cities of Twin Falls & Buhl
- A maximum of 8 participants from zip code 83686 (Nampa)

The criteria were selected to ensure sufficient geographic distribution of sampled projects and that each rater has multiple models reviewed. The results of the stratification by rater and location are summarized in Table 2.

This approach was developed to provide the best opportunity to achieve 90/10 confidence and precision and offer robust recommendations to the program.

Table 2. PY2022 Residential New Construction Stratification Summary

Rater	City	Number of project IDs	Ex-Ante kWh
Rater A	Nampa	53	139,230
Rater B	Twin Falls	31	48,768
Rater C	Garden City	10	22,199
Rater D	Garden City	6	24,850
Rater E	Boise	2	2,331
Rater F	Hailey	2	30,183
Rater G	Parma	1	14,087
Rater H	Buhl	1	5,332
Rater I	Ketchum	1	34,154
Rater J	Boise	1	8,972
Rater K	New Plymouth	1	7,456
TOTAL		**109**	**337,562**

[3] RNC 2022 CLRIS.xlsx

3.0 IMPACT EVALUATION RESULTS

The total reported savings for the program in PY2022 were 337,562 kWh across 109 projects. Table 3 outlines the number of projects and reported savings by home type.

Table 3. PY2022 Residential New Construction Projects Summary by Home Type

Home type	Number of project IDs	Ex-Ante kWh
Attached/Townhouse/Condo	100	226,522.2
Detached single-family	9	111,039.8
Total	**109**	**337,562.0**

The evaluation team sampled 24 projects for a detailed review of the modeling parameters. The 24 projects included nine builders, three certification organizations, three rating/verification companies, and 10 HVAC contractors. Four of the sampled homes received installed heat pump water heaters. As outlined in Table 4, five homes were detached single-family homes.

Table 4. Sampled Residential New Construction Projects Summary by Home Type

Home type	Number of project IDs	Ex-Ante kWh
Attached/Townhouse/Condo	19	47,335.7
Detached single-family	5	91,403.7
Total	**24**	**138,739.4**

3.1 TRACKING SYSTEM REVIEW

The evaluation team assessed the DSM Database tracking system for accuracy and data availability. The tracking system parameters include the project status, home type, square footage, fuel type, builder name, rater name, QA status, kWh savings, and received incentive.

Overall, the evaluation team found that the tracking system was well organized and contained sufficient information to support the understanding of projects. Reported model output savings and tracked savings matched, resulting in a realization rate of 100 percent.

3.2 MODEL OUTPUT REVIEW

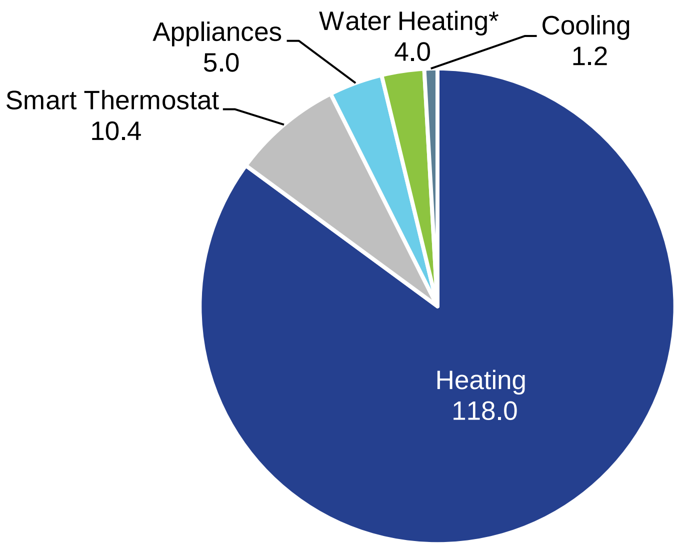
In addition to reviewing the tracking system, the model output reports were evaluated. The reports include all variables the rater uses in the REM/Rate modeling software. In addition to the participant information (project ID, address) and information about the companies involved (builder, sponsor, certification organization, QA/QC company, rating/verification company, and HVAC contractor), the model output report included specific information about the home type, home size (number of bedrooms and stories, conditioned area, and conditioned volume), building envelope parameters (ceiling and wall R-values and window U-values, infiltration, duct leakage, and ventilation), and specifications of installed heating, cooling and water heating systems. The model output reports also include the modeled savings for heating, cooling, smart thermostats, water heaters, appliances, and utility incentive calculations. The report's last section shows the inspection checklist and QA/QC notes.

The evaluation team combined the data from the model output reports for the 24 sampled projects into one spreadsheet to identify any inconsistencies or outliers. The evaluation team also compared the data entries and results across builders, raters, home types, home sizes, and other equipment characteristics.

Heating Savings

Figure 2 shows the energy savings distribution for the 24 sampled projects by the source of savings. It is clear from the figure that program savings are predominately achieved through heating (over 80 percent), followed by smart thermostats and appliances. Water heating savings were calculated for only three projects that installed a heat pump water heater.

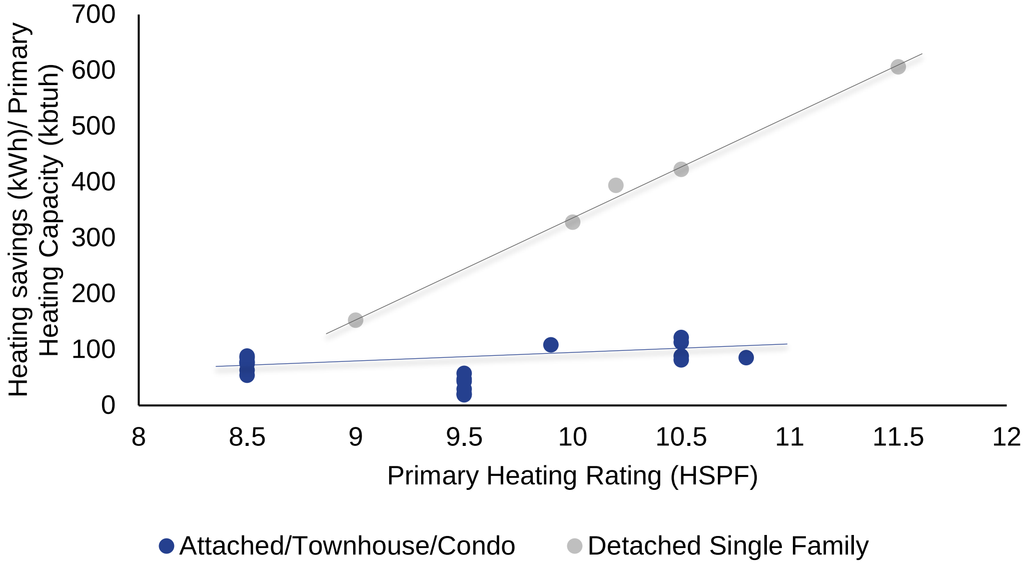
Figure 2. Energy Savings [MWh] for the 24 sampled projects by Savings Source



*Only three projects that installed a heat pump water heater

The evaluation team analyzed the impact of home and equipment characteristics on heating savings across builders, raters, and home types. The analysis revealed that the Primary Heating Rating (HSPF) of installed heating equipment has a significant impact on heating savings, especially for detached single-family homes; the higher the equipment HSPF, the higher the savings per capacity of the unit regardless of the other variables, as shown in Figure 3. The evaluation team noted a set of outliers for the home type Attached/Townhouse/Condo with 9.5 HSPF. The projects were completed by the same builder and were identified as units which may have had an excessive conditioned volume compared to the conditioned area. However, the data available in the model output reports was insufficient to identify the reason for these homes' lower savings. Additional information about the equipment selection recommendations and modeling practices may provide more insights. Since the finding identified conservative energy savings, the realization rate was unchanged.

Figure 3. Heating Savings per Heating Capacity Increase by HSPF for Each Home Type



Water Heating

Figure 4 and Figure 5 compare the average calculated savings in MWh for projects with water heater savings (n=3) and the average calculated savings in MWh for projects with no water heater savings (n=21). The three projects that have water heating savings are detached single-family homes that installed a heat pump water heater. The water heater savings ranged between 1,300 and 1,400 kWh for each home. Based on the number of bedrooms and house area for Attached/Townhouse/Condo home types, the evaluation team estimates that savings will be slightly lower than single-family; however, water heater savings are additive to other claimed savings and could add 25 to 33 percent to the total savings per unit. The challenge is that installing heat pump water heaters in homes other than the detached single-family can be more complicated.

Figure 4. Average Savings [MWh] per Sampled Projects with Water Heater Savings (n=3)

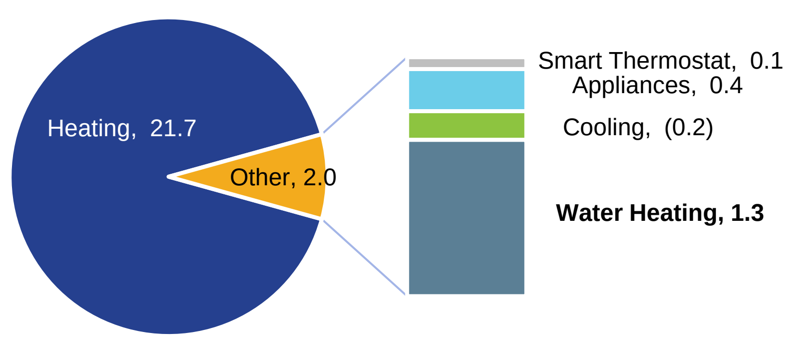
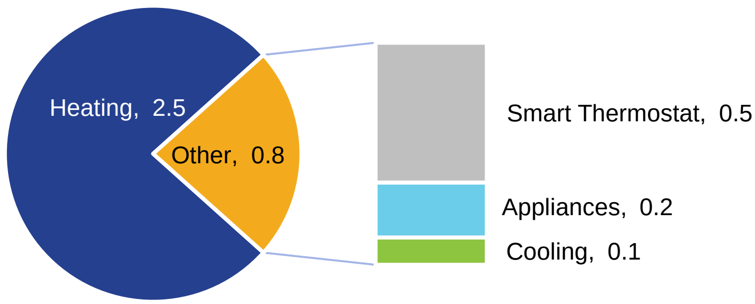


Figure 5. Average Savings [MWh] per Sampled Projects with no Water Heater Savings (n=21)



Data Entry

Overall, the model output reports were well-organized, complete, and included detailed inspection for quality assurance processes. The evaluation team identified several items in the model output reports which may indicate that the building model could be improved, although all were conservative assumptions, so no adjustment was made to the evaluated savings.

- Ceiling R-values were left blank or set to zero for three projects (RNCP652, RNCP637, and RNCP656). Based on the available information, it appears that the R-values did not significantly impact the modeling results, indicating the values were not required for those specific models.
- One of the four projects that installed a heat pump water heater claimed no water heater savings (RNCP686).
- No smart thermostat savings were calculated for two projects (RNCP686 and RNCP631). However, the inspection checklist shows that smart thermostats were installed in the homes.
- The model output report identified two homes (RNCP627, RNCP598) that were modeled as single-family homes, but the actual site photographs and the DSM Database tracking system identified them as Attached/Townhouse/Condo.
- The conditioned volume entered in the model for a set of projects completed by one builder appeared to be unreasonably high. Table 5 shows the calculated height based on the model's conditioned area and volume for those projects.

Table 5. Calculated Height for Projects with High Conditioned Volume

Project ID	Conditioned area (sq ft)	Conditioned volume (cu ft)	Calculated height (ft)
RNCP622	1,205	31,640	26.3
RNCP591	1,205	31,640	26.3
RNCP617	1,062	32,875	30.1
RNCP670	1,233	32,875	26.7
RNCP588	1,062	32,875	31.0
RNCP613	1,205	31,640	26.3
RNCP615	1,205	31,640	26.3

Shade Tree Project Impact Evaluation

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We would like to acknowledge the many individuals who contributed to the 2023 impact evaluation of the Idaho Power Shade Trees Project; this evaluation effort would not have been possible without their help and support.

We would like to specifically thank Mindi Shodeen, Landon Barber, Michelle Toney, 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.

The Tetra Tech evaluation team was made up of the following individuals: Kimberly Bakalars, Mark Bergum, Andrew Spista, Graham Thorbrogger, Christy Meyer, Kevin Williams, and Laura Meyer.

1.0 EXECUTIVE SUMMARY

Tetra Tech is pleased to provide Idaho Power Company (Idaho Power) with this report covering the combined audit and impact evaluation results for the Shade Tree Project. This report section consists of an introduction describing the program, evaluation activities, and key findings and recommendations. The program's audit results and impact evaluation are detailed in separate sections.

1.1 PROGRAM OVERVIEW

Idaho Power offers no-cost shade trees to Idaho residents in small geographic areas each spring and fall. Idaho Power customers enroll using the Arbor Day Foundation's online Energy-Saving Trees tool. During enrollment, participants locate their homes on a map in the tool, select from the available trees, and evaluate the potential energy savings from planting in different locations. Idaho Power uses its Demand-Side Management (DSM) database to track participation and screen applicants for eligibility requirements. Participation remains limited to two trees per address for the life of the program.

Up through 2019, enrolled customers could pick up their trees at specific events. Due to COVID-19 restrictions, the program was suspended in 2020. To ensure the safety of customers, employees, and volunteers, Idaho Power partnered with the Arbor Day Foundation for the 2021 events and had the trees shipped directly to customer homes rather than holding in-person pick-up events. Trees provided through events were typically 3-gallon, and trees delivered were 1-gallon.

At the tree pick-up events, participants receive additional education on where to plant trees for maximum energy savings and other tree care guidance from local experts. Customers that received trees in the mail were emailed a copy of the same Tree Planting Guide made available at the in-person pick-up events. Each fall, Idaho Power sends participants from the previous two offerings a newsletter with reminders on proper tree care and links to resources, such as tree care classes and educational opportunities in the region.

A survey is emailed to participants after each offering. The survey asks questions about program marketing, tree-planting education, and participant experience with the enrollment and tree delivery processes. Results are compared, offering to offering, to look for trends to ensure the program processes are still working to identify opportunities for improvement. Data is also collected about where and when the participant planted the tree.

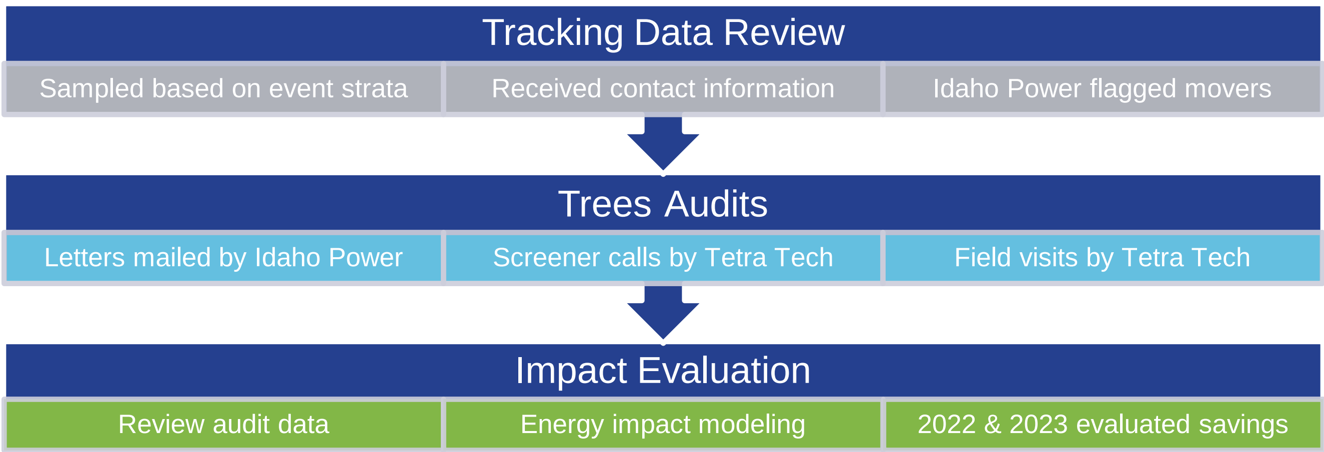
1.2 METHODOLOGY OVERVIEW

The evaluation team conducted several evaluation activities, shown in Figure 2, to address the evaluation objectives. Activities began with a review of the tracking data, followed by audits of sampled trees and input of measured tree data into i-Trees.

The goals for the Shade Tree Project audits included 1) sampling trees with various maturities to understand growth characteristics, tree mortality, and tree location, 2) conducting audits of sampled tree plantings for the impact evaluation, and 3) providing collected data as input to the savings calculator.

The goals for the Shade Tree Project impact evaluation included 1) reviewing the program tracking database to determine and verify the energy (kWh) impacts for shade trees handed out in past events, 2) providing credible and reliable program energy and non-energy impact estimates and ex-post realization rates, and 3) reporting findings, observations, and recommendations that enhance the effectiveness of future ex-ante savings analyses and the accurate and transparent reporting of program savings. 4) Review the feasibility of the current calculation and recommend options for new program savings calculation.

Figure 1. Evaluation Activities



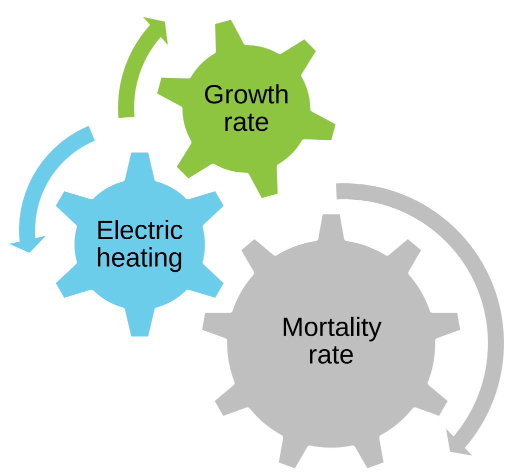
1.3 FINDINGS AND RECOMMENDATIONS

The audit and evaluation identified several key aspects of the Shade Tree Project that impact the annual calculated savings of the program. Our findings focus on the variations from the expected annual electricity calculated based on trees planted since 2013 and the following recommendations focus on opportunities for the Shade Tree Project to increase the impact of future trees and how to incorporate the findings into current calculations.

The tree mortality rate is higher than estimated.

Sampling 2014 previously audited and alive trees allowed us better to understand tree mortality rates after the initial mortality. The audit found that the mortality of trees after the first growing season was higher than estimated.

- The audit identified that the initial mortality rate in Year 1 is similar to the estimate of 36 percent. However, an average 5.4 percent annual mortality rate was applicable from Year 2 through the end of Year 9.



- Smaller trees delivered during the 2021 program had an increased mortality rate that was about 10 percent higher than the other program years. Idaho Power program staff already understood the challenges with these smaller trees, and audits confirmed the initial mortality rate concern.

The current audits found electric heating is more prevalent around Twin Falls.

The audit identified that nearly all residences have air conditioning, and there are various heating sources, including natural gas, propane, wood, heat pumps, and electric resistance. The participants in the Treasure Valley were electrically heated for 19 percent of the audit, 10 percent heat pumps and 9 percent electric resistance. The audits identified that as the delivery region expanded to the Twin Falls area, more heat pumps are used to heat the homes. The number of audited participants with a heat pump increased to 31 percent of the audited residences around Twin Falls while the electric resistance heating was 8 percent of residences. Each heat pump and electric resistance heated home must incorporate the heating energy savings into the energy impacts of each tree.

- For residences with a heat pump, assuming it provides 100 percent of the heating, the electricity impact of the average modeled mature tree is nearly zero for trees planted to provide shade in summer. The most valuable trees for these residences are on the north side of the home.
- For residences with gas heat, the electricity reduction is still greatest for trees planted on the south and west sides of the residence.

Tree growth is ahead of schedule for previously audited trees.

Sampling trees from the 2014 participants that had been previously audited and confirmed alive allowed us to understand better the forecasted impact of trees planted. The forecasted results for Year 9 of the 2018 and 2019 trees can be compared to the measured impact of Year 9 of the 2014 trees. The measured impact was greater than the forecasted impact, indicating that the growth of the trees is faster than the model results.

- Forecasted growth between Year 9 and 35 is expected to be approximately four years ahead of the model, although the maximum potential impact of the mature trees does not increase.

The existing calculator is providing reasonable savings estimates but is complicated.

The existing impact calculator for the Shade Tree Project was acceptable for determining the 2023 energy savings based on known assumptions. The evaluated savings identified before the mortality and electric heat adjustments were within 10 percent of the calculated savings for trees outside Pocatello area.

- The calculator completes annual energy savings through an Excel-based calculator that estimates energy savings per event for each year of the tree's life based on species, orientation and distance from home reported by the participant, age, and town. It then adjusts for mortality and the realization rates calculated in the 2018 Trees evaluation.
- The evaluated savings were determined using the i-Trees Design V7.0 model for each tree measured to determine the impact of the average tree living from each program year. An adjusted mortality rate was used to determine the quantities of trees living in 2023 from each event and an overall electric heat adjustment was applied to the

heating savings modeled. Updating the mortality rate and adjusting for electric heat results in the majority of the difference between the calculated and evaluated savings. The adjustments are detailed in Section 4.

Table 1 show the overall realization rate of the trees plated through 2018 which calculated savings through PY2022. Trees planted in 2019 and later calculate zero savings in PY2022. Because the first savings calculated for a tree is in the 5th year after planting, Idaho Power plans to claim savings for the 2019 trees in PY2023.

Table 1. PY2022 Program Realization Rate

Sampling stratum	Trees	Total Annual kWh (Incremental kWh)[1]			Total Annual MMBTU (Incremental MMBTU)		
		Calculated	Evaluated	Realization rate (%)	Calculated	Evaluated	Realization rate (%)
2013-2018	11,059	189,600 (39,595)	132,720	70	-1,929 (-476)	-1,543	120
2019-2022	6,907	0	0	NA	0	0	NA

1.3.1 Audit Recommendations

As a result of the screening calls and field audits, we have some general suggestions for the Shade Tree Project to improve participant commitment to the program trees and attempt to reduce mortality rates.

Provide participants with "browsing" control tips. During the audits, we found that both deer and goats had reportedly eaten trees. To improve survival chances, Idaho Power could add some tips to reduce animal damage in their Handout Packet for tree recipients. It is already full of good information on planting techniques. Idaho Power can check with arborists they currently work with for specific recommendations, but some of the tips may include using fencing around new trees or predator scent spray to deter animals.

Consider charging a small fee for each tree. Idaho Power customers who are interested can pick up two trees at Shade Tree events. However, not everyone plants both their trees, and the mortality rates are high. It may help with commitment to the trees if they are not completely free. We found one program that is charging $25 per tree, with a limit of two.[2]

Consider providing a watering bag with each tree. With dry conditions over the summer, spring event trees especially require constant watering. Including a watering bag may promote better watering and reduce mortality rates by making it easier for customers to keep trees watered. The Shade Tree Project staff could investigate whether they can get a discount on watering bags if other Idaho Power departments also use them.

Adjust planting guidance for electrically heated homes. Electric heating (heat pumps in particular) is approximately 20 percent of the market in the Treasure Valley and larger in the Twin Falls region. A home with a heat pump will gain the most overall value from trees planted

[1] The program claims incremental saving each year. A single year evaluation of the shade trees cannot determine the incremental savings because the overlapping historical measures cannot be reduced to a single year adjustment.
[2] Alliant Energy - One Million Trees Residential Tree Program

on the north side of the home while planting on the south or west side maximizes the electricity reduction from cooling only. The current Handout Packet focuses planting instructions on locations most advantageous to cooling savings.

Partnering with residential builders for new construction projects. Getting trees planted and in the right spot is important, and educating builders can be an efficient way to address planting opportunities early. As builders focus on electric heat in new construction[3], discussing advantageous planning locations, including more on the north side of homes, can get program trees into better positions to maximize savings.

1.3.2 Impact Recommendations

The impact evaluation applied the findings from the audit to provide recommendations to develop more accurate energy savings for the Shade Tree Project. The following impact recommendations are provided for Idaho Power's consideration:

Adjust the mortality rate for the first 10 growing seasons. The audits identified an increased mortality rate over what was expected for the growing seasons 2 to 10 years after the participants receive trees. This increased annual rate of 5.4 percent should be applied to the calculation after the initial mortality rate in the first growing season. The program can implement strategies to reduce the initial mortality rate and decrease the annual mortality rate through the first ten growing seasons. The evaluation team recommends keeping the 1.0 percent mortality rate for Years 10 through 40.

Incorporate electric heating adjustments into calculations. Many Idaho Power customers are heating their residences with heat pumps. A home with a heat pump will gain the most overall value from trees planted on the north side of the home while planting on the south or west side maximizes the electricity reduction from cooling only. Since the previously planted trees are primarily on the south and west sides of the home, a portion of the negative MMBTU energy savings should be converted to electricity, which ultimately reduces the electricity saved by the program.

Adjust energy savings calculations. The existing calculator provides a sufficient calculation of energy savings estimate before adjusting the mortality rate, electric heat, and tree growth. These adjustments can be incorporated into the existing calculator or into a new simplified calculator based on future implementation.

Continue to use the spillover and non-energy benefits calculated. The spillover and non-energy benefits calculated with the current calculator are conservative and provide an acceptable estimate of additional benefits.

[3] The Idaho Power Residential New Construction Program requires participant homes to be all electric.

2.0 INTRODUCTION

2.1 PROGRAM DESCRIPTION

Idaho Power offers no-cost shade trees to Idaho residents in small geographic areas each spring and fall. Idaho Power customers enroll using the Arbor Day Foundation's online Energy-Saving Trees tool. During enrollment, participants locate their homes on a map in the tool, select from the available trees, and evaluate the potential energy savings from planting in different locations.

Marketing and Outreach

At the start of the spring and fall campaigns, Idaho Power sends direct-mail letters and emails to select customers, explaining the benefits of shade trees and encouraging program enrollments. When necessary, Idaho Power also utilizes social media and issues press releases to promote the offering.

Up through 2019, enrolled customers could pick up their trees at specific events. Due to COVID-19 restrictions, the program was suspended in 2020. With the cancellation of the 2020 Shade Tree events, Idaho Power had compiled a large list of customers who had submitted their information to be notified of the next Shade Tree offering in their area. Customers on this list were notified of both the 2021 spring and fall events. Additional email notifications, news briefs, and Facebook postings increased awareness and interest. To ensure the safety of customers, employees, and volunteers, Idaho Power partnered with the Arbor Day Foundation for the 2021 events and had the trees shipped directly to customer homes instead of holding in-person pick-up events.

Since trees were delivered in 2021 and participants could not speak with a tree expert to learn how to plant and maintain their trees properly, emails were sent to customers with tree maintenance tips and a copy of a *Tree Planting Guide*. For the spring event, an email was sent once the trees were shipped with planting instructions, and a follow-up email was sent a few weeks later with tips on how to maintain their new trees. For the fall event, the Arbor Day Foundation sent out the initial "How to plant your tree" email and Idaho Power sent a follow-up email on how to take care of the trees.

Implementation

Ensuring trees are appropriately planted helps them grow and provides maximum energy savings. At the tree pick-up events, participants receive additional education on where to plant trees for maximum energy savings and other tree care guidance from local experts. These local specialists include city arborists from participating municipalities, Idaho Power utility arborists, county master gardeners, and College of Southern Idaho (CSI) horticulture students.

Each fall, Idaho Power sends participants from the previous two offerings a newsletter with reminders on proper tree care and links to resources, such as tree care classes and educational opportunities in the region.

Idaho Power tracks the program data in its DSM database, which is also used to screen applicants during enrollment to determine whether participants meet the eligibility requirements for the project, such as residential status within the eligible counties. Participation remains limited to two trees per address for the life of the program. Unclaimed trees are donated to cities, schools, and other non-profit organizations in all program years.

Trees provided through events are typically 3-gallon, and trees delivered are 1-gallon. The trees delivered through the mail are estimated to be approximately one year younger than those distributed at the in-person events, which the calculator was based on. To adjust for this, the year that Idaho Power could begin claiming savings for delivered trees was pushed out a year.

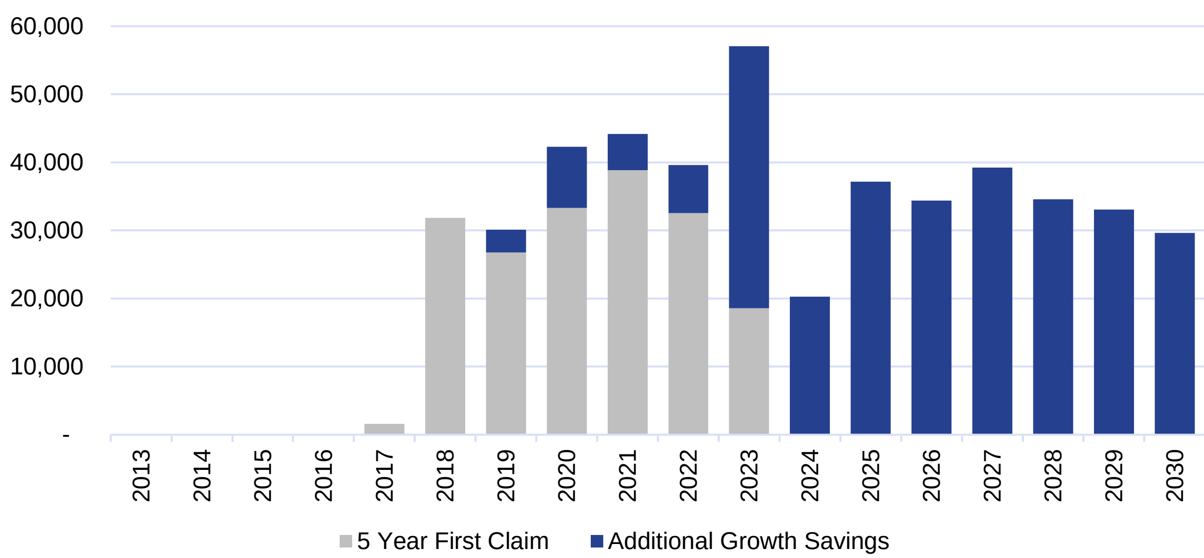
After each offering, a survey is emailed to participants. The survey asks questions about program marketing, tree-planting education, and participant experience with the enrollment and tree delivery processes. Results are compared, offering to offering, to look for trends to ensure the program processes are still working to identify opportunities for improvement. Data is also collected about where and when the participant planted the tree. This data is used by Idaho Power to refine energy-saving estimates.

2.1.1 Claiming Savings

The Shade Tree Project claims savings annually for the trees planted in previous program years. The first savings claimed for a tree is for the 5th year after planting. This savings is claimed with a 40-year estimated life. For example, first savings are claimed for the 2014 trees in program year 2018, and the trees distributed in 2015 first claimed savings for program year 2019. Figure 2 shows the first claim for the trees distributed in 2013 through 2019 in grey. This calculated planned savings is determined after the distribution of trees based on the calculator.

Since the savings is claimed with a 40-year measure life, the initial claim accounts for the base savings for the trees distributed. There is additional calculated savings annually because of continued tree growth that is included in annual incremental savings. This is represented by the blue below. Currently, the incremental savings is a relatively small component of the annual claimed savings, but in the future, the incremental growth increases as the trees grow. Again, this savings is planned based on the calculator.

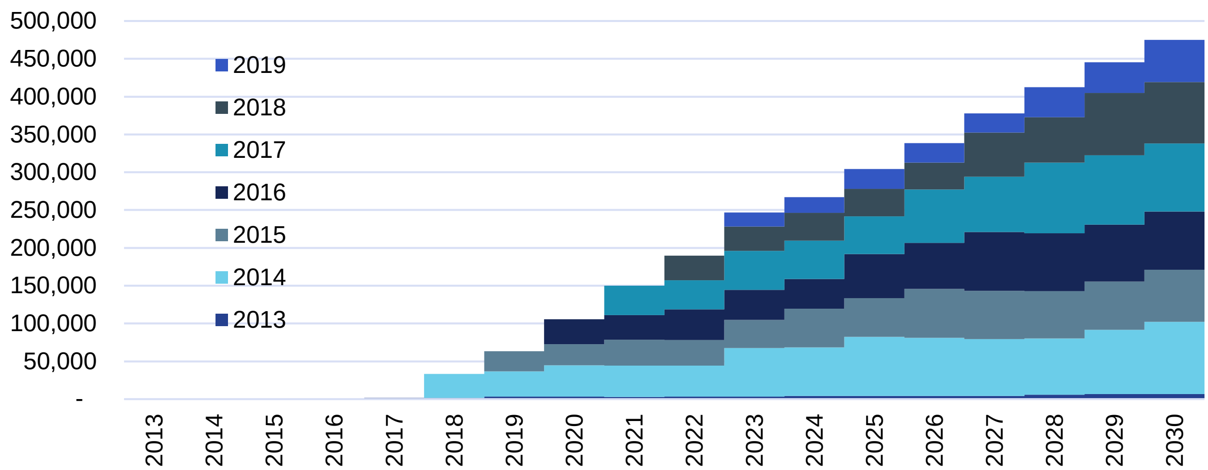
Figure 2. Planned Incremental Savings for Trees Distributed in 2013-2019



It is important to note that the Project did not distribute trees in 2020 and the 2021 Project included trees delivered by mail. Because the 2021 trees were smaller than previously provided trees, Idaho Power decided to delay claiming savings by one year. The result of that implementation means that there will be no first tree claims in 2024 or 2025.

The incremental savings represent the claimed savings per year but is only a portion of the annual calculated savings generated by the trees because the previously claimed value is already providing benefit through the measure life component of the benefit cost analysis. The evaluation will focus on the current year benefit of the trees planted. Figure 3 shows the calculated total kWh benefit of the shade trees separated by the year distributed. Although each group only increases slightly after the initial 5-year claim, the total annual benefit is increasing as more trees pass the 5th year.

Figure 3. Total Calculated kWh Benefit of Trees Distributed in 2013-2019



2.2 EVALUATION OVERVIEW

The goals for the audits for the Shade Tree Project included:

- Sampling trees with various maturities to understand growth characteristics, mortality, and location.
- Conducting audits of sampled tree plantings and collecting data for the impact evaluation.
- Providing collected data as input to the savings calculator.

The goals for the impact evaluation of the Shade Tree Project included:

- Reviewing the program tracking database to determine and verify the energy (kWh) impacts attributable to the 2023 calendar year for shade trees handed out in past events.
- Providing credible and reliable program energy and non-energy impact estimates and ex-post realization rates for trees.

- Reporting findings and observations and providing recommendations that enhance the effectiveness of future ex-ante savings analyses and the accurate and transparent reporting of program savings.
- Review the feasibility of the current calculation and recommend options for new program savings calculation.

Tetra Tech conducted the following audit and impact evaluation activities, as summarized in the table below, to address the objectives for the audit and impact evaluations.

Table 2. Shade Tree Project Audit and Impact Evaluation Activities

Activity	Objective
Idaho Power staff interview	Understand key delivery options, how savings are calculated, and how the program is tracked.
Analyze the tracking database	Review program tracking system to document available tracked tree and planting information.
Sample by stratum	Sample by event timeframes to enable coverage for previously audited trees, not yet audited event trees, and the newest delivered trees.
Outreach	Contact all potential sampled customers to alert them of upcoming audits, screen for deceased trees, and identify any visit issues.
Audit visits	Auditors visit sampled homes to complete audits of plantings. Audit data were collected electronically and used to populate the impact analysis.
Impact calculations	Analyze the audit data and develop an individual energy impact model based on individual tree location and growth. Combine the program energy and non-energy impacts from the model to determine the stratum's average annual impact per tree. Provide credible and reliable program energy and non-energy impact estimates.

Idaho Power Staff Interview

The evaluation team interviewed Idaho Power staff involved in designing and delivering the Shade Tree Project on June 13, 2023. The interview provided information on how the program is delivered, program objectives, and what program staff want to learn from the evaluation.

Program Tracking Review

The first step in evaluating the Shade Tree Project was to review the program documentation and energy savings tracking system provided by Idaho Power. The tracking data[4] were uploaded by Idaho Power and downloaded by Tetra Tech on June 23, 2023. Tetra Tech reviewed the data and confirmed that the Order ID provided sufficient comprehensiveness per customer for sampling. Contact information was not provided until after sampling.

[4] ST_Tracking_Data_2014-2021_Names_Removed.xlsx

Sampling

Sampling was conducted at the Order ID level representing each residence. To meet the evaluation goals, the sampling was stratified to ensure completion across three main strata based on order date: 2014, 2018-2019, and 2021 participants. Tetra Tech sampled trees from 2014 that had previously been audited and were identified as present and alive to collect sufficient data to understand mortality rates and growth patterns.

Figure 4. Sampling Stratum Descriptions

We targeted an audit of 270 trees through screening phone calls and field audits. The random sampling within each stratum provided tree species and geographic diversity based on the sample size for 2018-2019 and 2021 participants. Many sites include multiple plantings, which resulted in enough trees to reach the goals of audited plantings even if trees could not be identified or an audit was refused.

Table 4 summarizes the sampling frame of trees per stratum, the number of households sampled, the target number of trees to audit, and the actual number of trees audited through the screener calls and field visits.

Table 3. Shade Tree Audit Sampling Summary

Sampling stratum	Sample Frame (Order ID)	Sampled Households (Order ID)	Target Trees Audited	Actual Trees Audited
2014 participants	224[5]	50	40	**57**
2018-2019 participants	2,336	120	130	**144**
2021 participants	1,602	100	100	**118**
TOTAL	4,162	270	270	**319**

*Precision of ± 4.4% for audit results at the 90% confidence interval.

Once Tetra Tech sampled each stratum, Idaho Power provided contact information for each participant and a flag indicating if someone new had moved into the house since the trees were received.

Screening Calls

On September 18, 2023, before the screening calls, Idaho Power mailed all sampled participants a letter on Idaho Power letterhead from the Program Specialist alerting the sampled

[5] The 2014-2017 strata only included the planted trees that had previously been audited in 2015 and 2017 and were identified as present and alive, this reduces the stratum population from the total population based on order date equal to 5,111.

participants of the upcoming evaluation. One version was sent to participants who received the trees, while an adjusted version was sent to those who moved into a home that had previously received trees.

Tetra Tech began calling sampled participants on September 20, 2023 and concluded on September 27, 2023. Tetra Tech attempted to contact the customer at least three times to ask them questions about their trees, including where they were planted, if they are still alive, to confirm deceased or gifted trees, and to collect any logistical information needed for the field visits. Tetra Tech was able to complete calls with 82 participants. We also identified 17 with no knowledgeable respondents, and 15 more were unreachable. At least 150 did not respond to the calls but were left three voicemail messages about the evaluation and passed through to the field visits. The screener can be found in Appendix A.

All screening data were used to inform the field visit list. Any participants who reported deceased trees or trees that were no longer on their property were considered a completed audit and excluded from the field visit list.

Field Audits

Results from the screener calls were reviewed with the Tetra Tech audit team in Idaho. Households eligible for a visit after the screener calls were grouped by geographic area, including Boise, Pocatello, and Twin Falls, to facilitate travel efficiency and ensure coverage for different geographies.

The field audit team visited homes to measure existing trees between October 3, 2023 and October 18, 2023. Any visit preferences collected in the screener calling were followed. Auditors called locations before visiting and did not access a homeowner's property without permission. Door hangers were left at each residence if auditors were unable to talk with a homeowner.

During the field audits, the auditors measured various aspects of the tree planting needed to support the i-Trees analysis. Key measurements included direction from the home, distance from the home, height of the tree, diameter of the tree, and type of heating and cooling equipment. A list of data fields collected can be found in Appendix B.

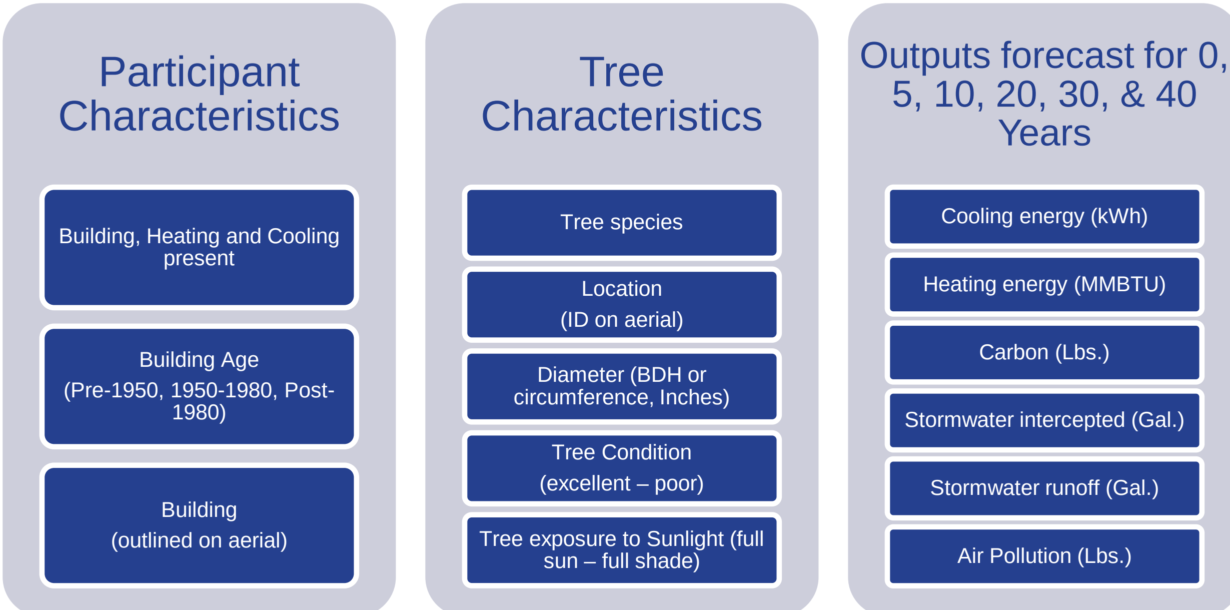
Our target number of audited trees was 270, and between the screener calls and field visits, we covered 319 trees at 182 households. Screening and audit data were compiled into various analysis tables and presented in the Audit Results section of this report. Tree measurement data were used as inputs into i-Trees analysis.

Impact Analysis

The impact evaluation used the data from the audit to complete an impact analysis of energy savings at the residence, non-energy benefits, and identify future growth of the energy savings. The evaluation of the energy impact of the trees was determined using the i-Tree[6] suite of tools, specifically, the online version of i-Tree Design, Version 7.0. Additional details on the tool can be found in Appendix C.

[6] https://www.itreetools.org/tools

Figure 5. i-Tree Design, V7.0 Model Input and Outputs



The i-Tree modeled results for the current year were averaged to develop a model output per stratum. Each stratum average was adjusted for electric heat percentage. This value was multiplied by the number of trees expected to be alive from the stratum to determine the verified savings.

Because the i-Tree model does not account for heating fuel type, the impact evaluation then applied an adjustment to convert heating savings in MMBTU to electric savings for homes that were heated with electric resistance or a heat pump, and adjusted the number of trees alive in 2023 to match the mortality rate found through the audit.

Calculate Program Savings

The average tree savings with the adjustments for heating type was multiplied by the adjusted number of trees alive based on the audit results to determine the annual kWh and MMBTU savings in 2022 for each sampled stratum. The realization rate was determined for each stratum and for the sample as a whole. These realization rates were applied to the Shade Tree Project claimed savings for 2022 based on the calculator.

Similarly, the non-energy benefits were determined for each stratum and compared to the claimed benefits for carbon, stormwater, and air pollution. However, the model output the pounds of carbon and air pollution and the gallons of stormwater. These values were converted to dollars using the conversion rate inferred in the calculator, so the non-energy benefits realization rate compared the dollar value of the non-energy benefits.

Savings Analysis

The measurements for the trees were taken at the end of the 2023 growing season; therefore, the tree measurements and analysis were equal to the PY2023 savings. Although this number was adjusted to determine the PY2022 evaluated savings, the savings analysis and evaluation was completed on the trees measured in 2023. The savings analysis is completed using these values which vary from the evaluated savings for PY2022.

3.0 AUDIT RESULTS

This section outlines results from the screener calls and field audits. We look at mortality rates and other metrics to understand more about how the program is operating and what is happening to the trees provided through the Shade Tree Project. These findings support the Audit Recommendations in Section 1.3.1.

3.1 AUDIT OUTCOMES

We sampled 270 households that received a total of 492 trees and were able to complete screener calls and field audits with 182 households covering 319 trees. Table 4 shows a breakdown of the audit status for the 492 trees.

Overall, 22 percent were confirmed to be deceased, and another 26 percent were not on property. Most of those not on properties were likely deceased, and a few were given to others. Seventeen percent of the trees were observed and measured, with data used in the impact evaluation. Households responsible for 17 percent of the trees did not respond to the screener calls or field audits. Another 12 percent of the trees were inaccessible for measurement.

Table 4. Audit Status for Sampled Trees

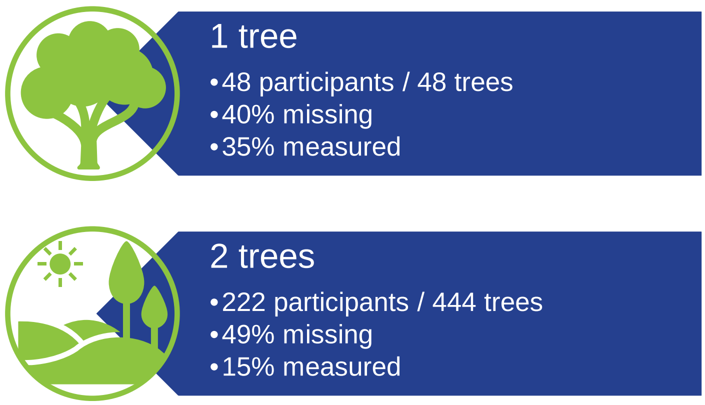
Audit Status	2014	2018-19	2021	Total	Percent
Sampled Trees	75	226	191	492	
Audited Trees (Field audits and Screener calls)	**57**	**144**	**118**	**319**	**65%**
Confirmed deceased	17	40	50	107	22%
Not on Property per field audit	9	51	33	93	19%
Not on property per screener	1	25	10	36	7%
Tree Measured	30	28	25	83	17%
Unresolved Cases	**18**	**82**	**73**	**173**	**35%**
No response to screener or audit	5	43	37	85	17%
No access for field survey	12	22	24	58	12%
Alive per screener	1	11	8	20	4%
Customer refused field survey	0	6	4	10	2%

3.2 TWO TREE OUTCOMES

To understand more about potential differences in planting rates between participants who received one tree and those who received two trees, we looked at measure rates and missing tree rates for each group.

About 18 percent of our sampled participants received one tree through the program. Rates of missing trees were not much lower for the participants receiving one tree, but the rate of measured trees was much higher. Just over half of the sampled participants with one tree received their tree in 2014 and were confirmed to be alive during the previous audit.

Figure 6. One Versus Two Trees



When we look more closely at the households with two trees, we see a good deal of consistency in the status of both trees. Seventy-seven percent of the audited participants had the same audit status for both trees. For instance, both trees were alive and measured (13%), both trees were confirmed deceased (26%), or both trees were missing from the property (38%). Thirty-four participants (23%) had one living tree and one missing tree reported through the audit or screener call.

Table 5. Audit Status of Two Trees

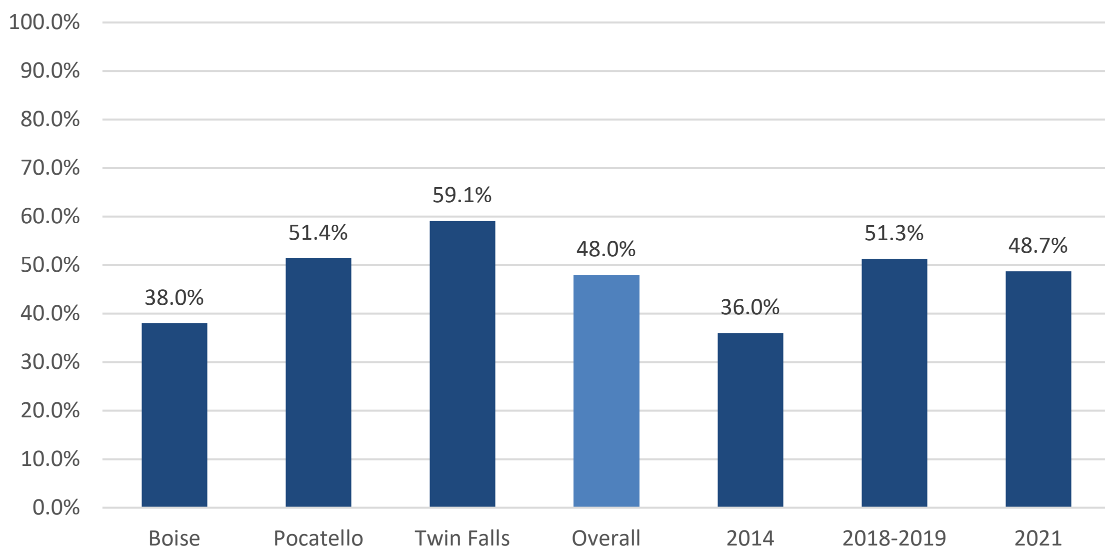
Tree Audit Status	Count of Participants	Percent of Audited	Percent Overall
Both trees measured	19	13.0%	8.6%
Both trees confirmed deceased	38	26.0%	17.1%
Both trees missing	55	37.6%	24.8%
1 measured & 1 missing	25	17.1%	11.3%
1 measured & 1 no access	3	2.1%	1.4%
1 alive & 1 missing per screener	6	4.1%	2.7%
Both alive per screener - unconfirmed	7		3.2%
Customer refused audit	5		2.3%
No access to property	24		10.8%
No response to screener or audit	40		18.0%
Total households	**222**	**146**	**222**

3.3 MISSING TREES

If we add together the confirmed deceased trees and those that were not present, we can review the trees that are no longer on the property or missing.

With some of the oldest trees, Boise showed the lowest missing rate of the three geographies. The missing rate for the 2014 trees was also lower than that of more recent program participants. However, given that the sample for 2014 was all previously confirmed living trees, the 36 percent missing is higher than expected.

Figure 7. Proportion of Missing Trees by Geography and Strata



Anecdotally, we heard during the audits that a few homeowners had trouble with goats and deer eating the trees. Field auditors also noticed more landscaping and fencing around vegetation to deter animals south of Pocatello.

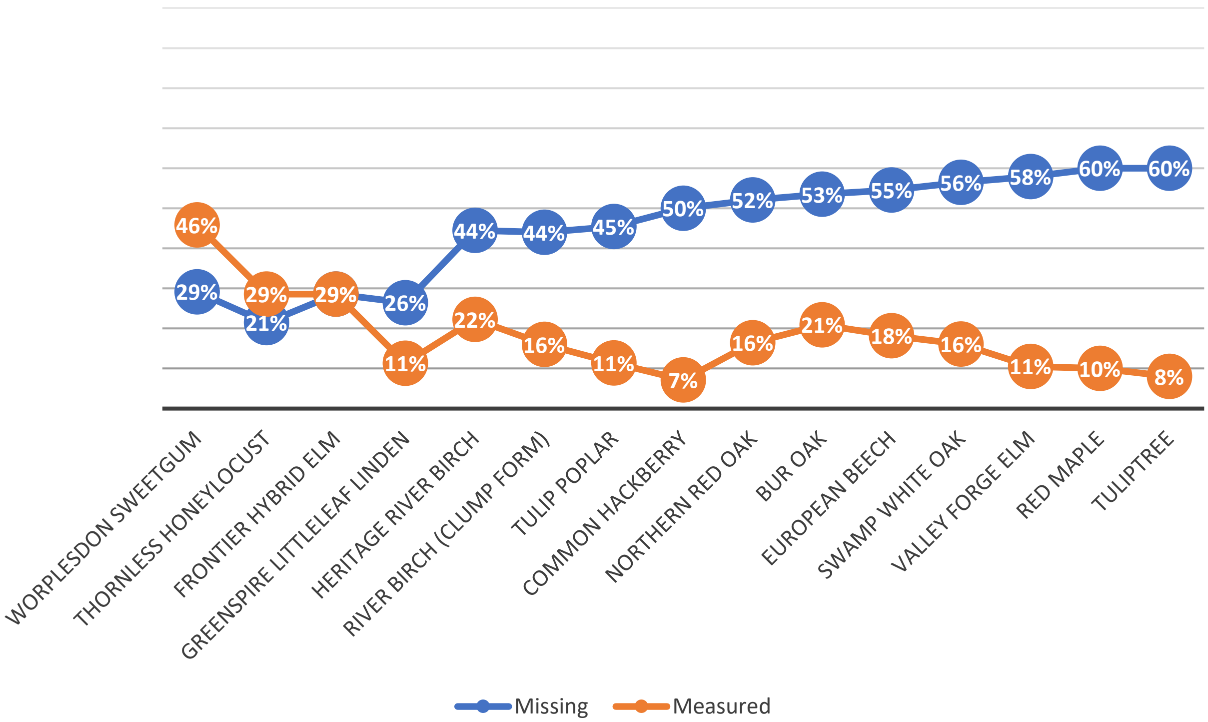
Although we hypothesized that planting in the spring, with dry summers, compared with planting in the fall may lead to higher mortality rates, a review of the audit results was inconclusive. That may be due to events held in different geographies during the Spring and fall, affecting any mortality patterns.

3.4 TREE SPECIES

Idaho Power works closely with arborists in the areas where they provide program trees to understand the best options for specific geographies. We compared the audit results by tree species to see if certain species had higher mortality rates.

The graphic below is informative only; we can draw no conclusions from the missing or measured rates since species are not consistently available across geographies. However, it does highlight that measurement rates were highest for Worplesdon Sweetgums, followed by Honeylocust and Frontier Elm. Common Hackberry and Tuliptree had wide variations between their mortality and measure rates.

Figure 8. Measurement and Mortality Rates by Species*



*Sampled counts per species in the figure ranged from 74 for Northern Red Oak to 11 for European Beech.

4.0 IMPACT EVALUATION RESULTS

This section outlines results from the impact analysis using the data collected in the audit. We reviewed mortality rate and tree growth and how it impacts the energy efficiency of the associated residence as measured at the end of the growing season in 2023. These findings were adjusted to determine the PY2022 evaluated savings in the Impact Recommendations in Section 1.3.2. The analysis of the savings generation in this section is based on the measurements taken for PY2023.

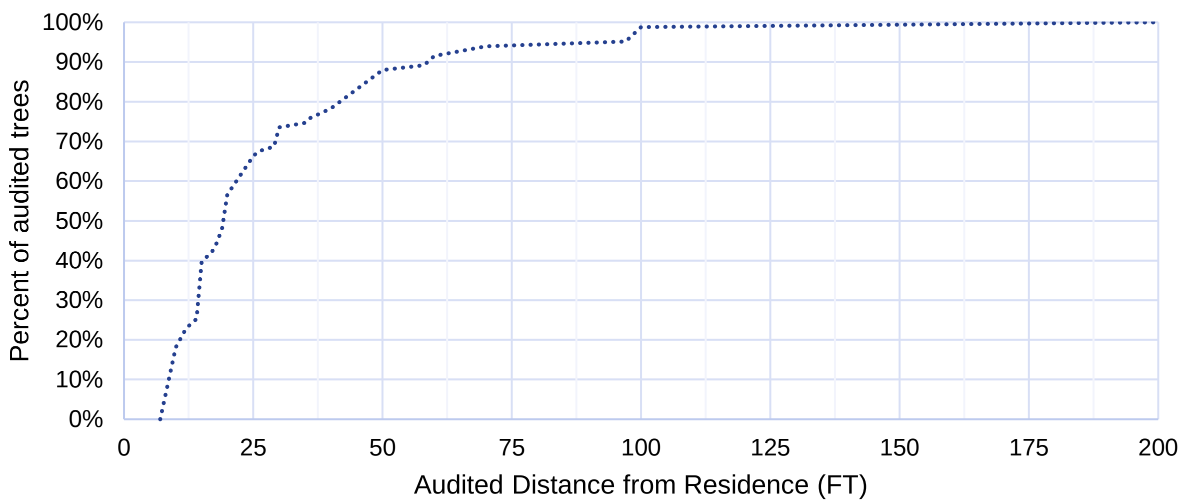
4.1 FACTORS IMPACTING VERIFIED SAVINGS

The Shade Tree Project participants typically pick up trees and return to their property to plant them. The program provides guidance to increase the energy savings of each tree, although the participant is not required to follow the guidance. When a tree is planted, the direction and distance from the home impact energy savings available from the growth of the tree. In addition, the region where the tree is planted also impacts the energy savings potential. The following sections identify the potential impact at Year 40.

4.1.1 Distance from Residence

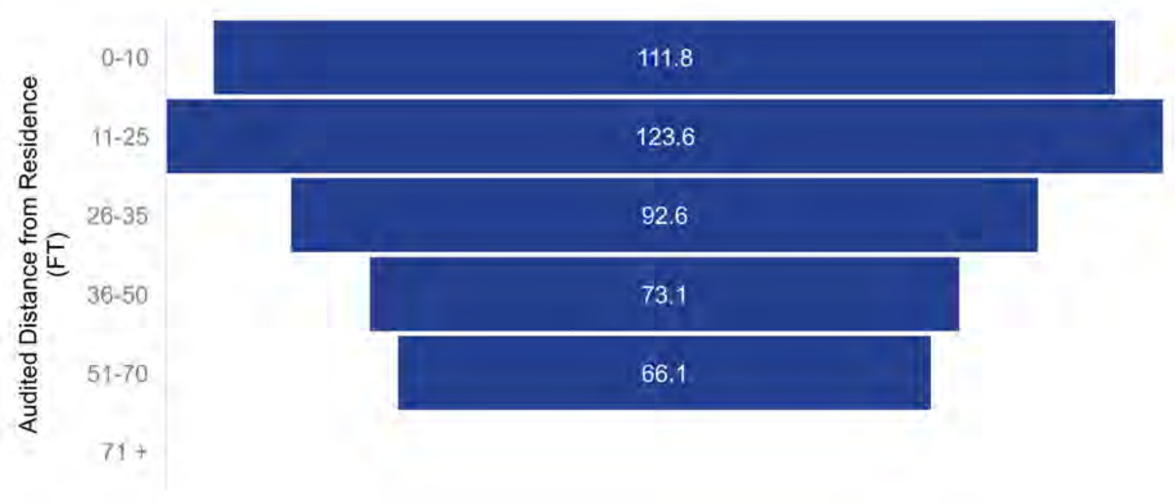
The tree's distance from the residence impacts the amount of potential energy savings the tree can prove from summer cooling. The audit identified the tree's distance from the residence and found that 66 percent of the trees identified were within 25 feet, and 94 percent were within 70 feet. Figure 7 shows the cumulative percentage of audited trees and the distance from the residence. The farthest tree identified still on premises was approximately 200 feet from the residence. Overall, the result shows that the trees are typically planted within an appropriate distance of the residence to reduce the cooling load of the residence.

Figure 9. Cumulative Percent of Audited Tree Distance from Residence



The mature tree height and canopy size of the planted tree series impact the potential for each tree, for example, large trees like River Birch and Elm have a much larger distance from the residence that impacts the cooling load where smaller trees must be closer. However, the impact evaluation used the sampled audit results to provide an average cooling savings reduction based on the distance planted from the residence. Figure 8 shows the average modeled cooling energy reduced for fully grown trees in the audit regardless of species and region within groupings.

Figure 10. Average Annual Cooling Energy (kWh) Reduced by Distance from Residence

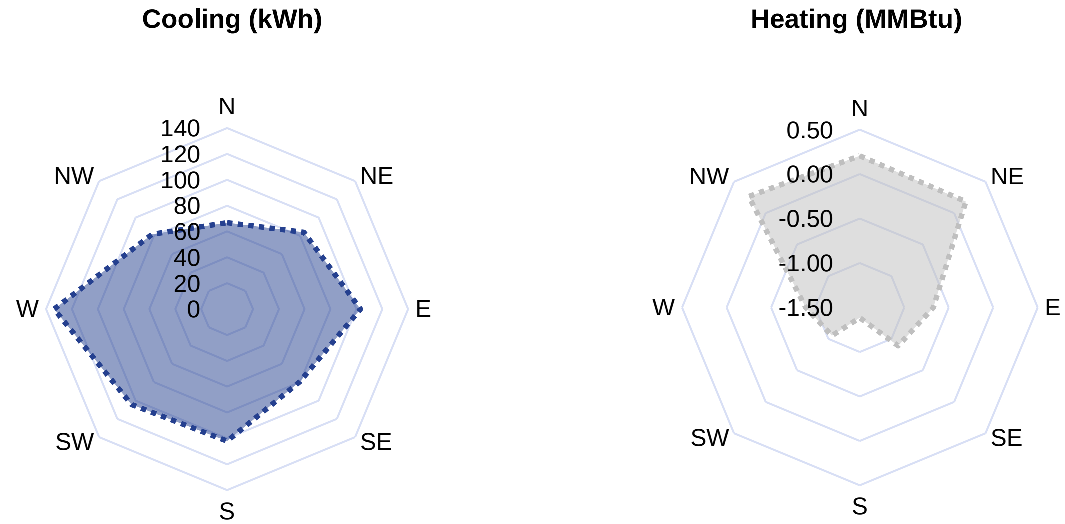


The trees within 25 feet of the residence provide the most cooling savings, and then the savings potential drops off beyond 25 feet. Trees between 35 and 70 feet provide about half of the potential cooling load savings of trees that are closer to residences. Trees beyond 70 feet provide zero potential benefits to reduce the residence cooling load.

4.1.2 Direction from Residence

The direction of the tree from the residence impacts the potential energy savings provided by the tree. Trees on the south and west provide the most cooling load reduction and the greatest heat load increase, while trees on the north side provide a slightly positive heating load reduction and minimal cooling load reduction. Figure 9 shows the average annual energy efficiency potential for mature trees based on the direction the tree is from the residence regardless of species, region, or distance.

Figure 11. Average Annual Potential Cooling and Heating Savings[7]

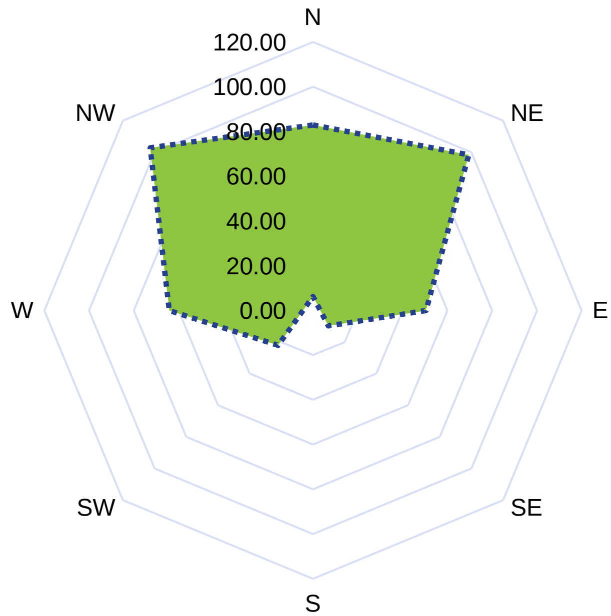


Over half of the audited trees were planted to the south, southwest, or west directions from the residence. Another quarter of the trees were planted between the northwest and northeast, and the final quarter of trees were planted east or southeast of the residence.

The increase in heating load and associated heating energy consumption becomes a critical component of energy savings as heat pumps become more prevalent and the heating load is provided from electricity. Figure 10 shows the combined average heating and cooling energy reduction, assuming a heat pump is used to meet both the heating and cooling load. Overall, the cooling energy savings provided by the trees in the south and west directions are nearly offset by the winter heating electricity consumption increase from the heat pump. The ideal location to increase the energy efficiency for a residence with a heat pump is on the north side.

[7] The center of the heating graphic is a negative heating load reduction (increase) and no impact is near the edge.

Figure 12. Average Evaluated kWh Savings Assuming Heat Pump for HVAC



The above results are based on the evaluated trees and the average savings for the current year. The results in Table 6 show the impact of identical Red Maple trees[8] and their i-Trees modeled 40-year cumulative savings. The results in this test are valid to identify variations in region and direction, but do not incorporate all the variables incorporated into the program evaluated results.

Table 6. Cumulative kWh Savings for Identical Modeled Trees with Varied Heat Type

Region	North		East		South		West	
	Cooling kWh	Heat Pump kWh	Cooling kWh	Heat Pump kWh	Cooling kWh	Heat Pump kWh	Cooling kWh	Heat Pump kWh
Treasure Valley	1,465	2,115	2,646	409	1,642	-1,448	3,696	2,132
Twin Falls	1,465	2,115	2,646	409	1,642	-1,448	3,696	2,132
Pocatello	1,291	1,863	2,328	253	1,413	-1,346	3,316	1,837

For all tree locations, except the north side of the residence, the savings with a heat pump are less than the cooling savings. The tree on the north side is the only one that reduces the heating load, and therefore is the only tree that increases energy savings when the heating is switched to electric heat pump. The other locations increase the heating load and therefore decrease the energy savings with an electric heat pump heating, including the tree on the south side which has a negative electricity savings over the 40-year life.

[8] Three-inch diameter in 2023, located 25 feet from the edge of a standard rectangular residence with the long side on the east and west sides. The tree condition is set to excellent, and exposure is full sun.

4.1.3 Regional Impact Results

The i-Tree model provides the same energy savings for trees in the Boise and Twin Falls area when they start at identical locations and diameters. Table 6, above, shows the results of a standard residence in both locations and the results are identical. However, the Pocatello region results vary between 86 percent to 90 percent of the cooling value in other regions. The heat pump savings varies more when trees are planted on the east and west sides. The evaluation recommends using 88 percent of the saving value for trees located in the Pocatello region, given that few trees are currently planted on the east side of homes.

4.2 SAVINGS ADJUSTMENTS

Based on the findings from the tree audits, the evaluation assessed potential adjustments to energy savings in three areas: mortality, electric heat, and tree growth.

4.2.1 Mortality

The mortality of a shade tree includes trees that were planted and are no longer alive and those not planted on the participant's property. The impact evaluation used the findings from the audit to estimate the number of trees alive during 2023 and to project the energy savings over the 40-year life of the tree. The impact evaluation split the mortality rate into two parts: the initial mortality rate and the annual mortality rate after Year 1. For the 2014 stratum, we are measuring the 10-year mortality rate at the end of Year 9.

The current calculation methodology assigns an initial mortality rate of 29 percent for participants who received one tree and 38 percent for participants who received two trees, which is applied at the beginning of Year 5 (end of Year 4). An additional 1 percent mortality rate is applied annually starting in Year 5. Table 7 shows the current estimate of the annual mortality rate for the first ten years, which creates a cumulative 10-year mortality between 34 percent and 43 percent at the end of Year 9. The combined estimated 10-year mortality for the 2014 stratum is 41 percent.

Table 7. Calculated 10-Year Mortality Rate (2014 participants)

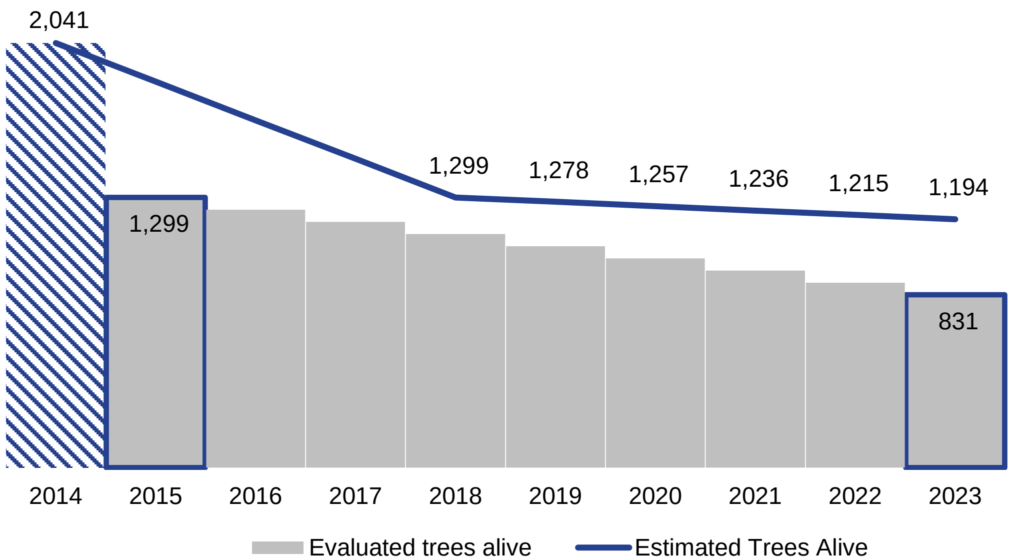
Tree Age	0	1	2	3	4	5	6	7	8	9	Cumm. 10-year mortality
Year	2014[9]	2015	2016	2017	2018	2019	2020	2021	2022	2023	
Annual Mortality Rate					29%	1%	1%	1%	1%	1%	
1 Tree Received	379				269	265	261	257	253	249	34%
Annual Mortality Rate					38%	1%	1%	1%	1%	1%	
2 Trees Received	1,662				1,030	1,013	996	979	962	945	43%

[9] 2014 tree quantity is collected from the calculator provided to the evaluation team.

The evaluation completed an audit of the sample of 2014 trees identified as planted and alive in the 2015 audit. The current evaluation completed in the Fall of 2023 represented the identified mortality rate of these trees at the end of Year 9.

The impact evaluation used the results from the previous 2015 audit and measured the trees identified as alive from that audit in 2023. The 2015 audit identified that 36 percent of the trees (1,299 trees) were planted on participant properties and alive in 2015. The 2023 audit identified that 36 percent of those previously audited trees (831 trees) were confirmed dead or not located. Figure 11 identifies the evaluated trees alive with the audited years outlined for 2015 and 2023. The remaining bars between 2015 and 2023 are estimated and represent a 5.4 percent annual mortality rate in Years 2 through 9. The line above represents the estimated mortality in the current calculation shown in Table 7.

Figure 13. Evaluated and Estimated Mortality of 2014 Trees



The evaluated 10-year mortality is 59 percent (831 remain from 2,041 distributed). This exceeds the combined 41 percent mortality estimated in the current calculator. The evaluation recommends adjusting the annual mortality rate schedule for trees in the 2013 to 2019 program years. This approach eliminates the differences for participants who received one or two trees and starts the mortality in Year 1.

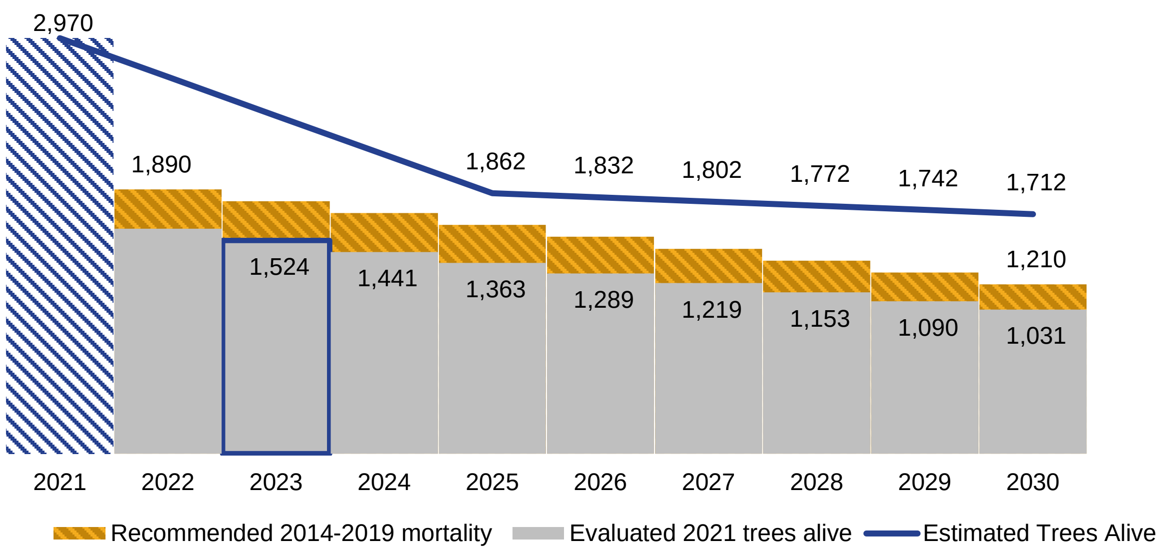
1. Year 1 mortality rate = 36%
2. Year 2 through Year 9 annual mortality rate = 5.4%
3. Year 10 through Year 40 annual mortality rate = 1.0%

The previous evaluation identified that mature trees have a limited mortality rate. The evaluation agrees with that assessment after ten growing seasons and recommends that the 1 percent annual mortality rate remain unchanged until further data is collected.

4.2.1.1 Mortality of 2021 Participant trees

The 2021 participants received trees that were delivered instead of picked up at an event. These trees are smaller than those typically given to participants at event pick-up in other years. This audit was completed two years after the initial delivery and there are differences in tree mortality to incorporate into the future expected calculations. The audit estimates that the 2021 tree mortality rate is 49 percent (1,524 trees). This data point is one year beyond the initial data point of the recommended mortality pattern, so it is expected to be slightly higher than the actual initial mortality rate. Figure 12 shows the variation for the 2021 program from the recommended mortality rate for the 2014-2019 trees. The line above compares the current calculator's estimated mortality schedule.

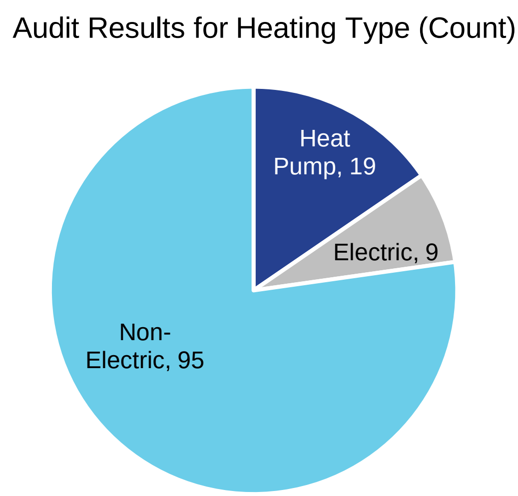
Figure 14. Evaluated and Estimated Mortality of 2021 trees



The annual mortality rate was applied to Years 3 through 9 and used to estimate the Year 1 mortality to account for the audit being completed in Year 2. The estimated 10-year mortality for the 2021 trees is 65 percent (1,031 remain from 2,970 distributed), compared to the 59 percent mortality rate for the evaluated schedule. It is important to note that the mortality of the 2021 trees may be significantly different than the evaluated schedule in Year 3 through 9. A further study, which audits the 2021 trees identified as alive in 2028 or later will help determine the remainder of the 10-year mortality.

4.2.2 Electric Heat

The audit gathered information about the HVAC equipment for the participants. The impact evaluation used this data to adjust the heating and cooling savings accrued to each tree modeled. The i-Trees model determined cooling savings in kWh and heating savings in MMBTU (converted from therms reported). However, when residences do not have cooling, there is no kWh savings, and when the residences have a heat pump or electric heat, the heating MMBTU accrues to electric kWh. Residences heated with gas or other fuels accrue the savings attributed to the remaining MMBTU.



Although electric heat is only a minority portion of the HVAC systems in residences in the Idaho Power region, heat pumps are being used as the primary heating source more often. The evaluation found that approximately 20 percent of the homes confirmed to have electric heat; with two-thirds heat pumps and the remainder electric resistance. The 20 percent overall electric heat percentage matches a previous survey of participants in the Treasure Valley region. This evaluation found that 31 percent of the participants in the Twin Falls region had heat pumps while the percent of electric resistance heat remained at 8 percent; for a total of 39 percent electric heat. Pocatello had just one electric heat participant in the audit. The variation in heating fuel will drive significant differences in the benefits of trees to the electric grid. Table 8 shows the variation in heating types per region in the evaluated sample.

Table 8. Evaluated Heating Type by Region

Region	Heat Pump	Electric Resistance	Non-Electric
Treasure Valley	10%	9%	81%
Twin Falls	31%	8%	61%
Pocatello	6%	0%	94%
Total	**15%**	**7%**	**77%**

The evaluation found many trees planted in Idaho Power territory have a heating penalty, meaning that the trees increased the heating load of the residence. The heating penalty converts to additional winter heating load for participants with electric heat, which reduces the electricity benefit associated with the trees. Overall, the evaluation determined that 77 percent of the surveyed properties (95 of 123) had heat provided by sources other than electricity[10]. The remaining 23 percent of participants were split with one-third having electric resistance and two-thirds with an electric heat pump. The impact evaluation converted heating savings overall based on these fractions, using assumptions that the electric resistance was 99% efficient, the heat pump overall COP was 3.0, and the gas heating efficiency was 80%. The resulting

[10] There were wood and biomass heated homes identified in the audit.

reduction in evaluated kWh savings per tree in 2023 was 32 percent for 2014 trees and 26 percent for 2018-2019 trees.

Cooling is a critical component of savings. The evaluation identified two residences with no cooling equipment. The remainder had either window units, mini-split heat pumps, central conventional air conditioning, or central heat pump systems. The assumption could be made to slightly adjust the savings per residence based on the equipment identified, but further data collection would be necessary to determine the impact of varied cooling equipment.

Based on the heating type findings, the evaluation recommends that the Shade Tree Project adjust energy savings based on the HVAC types. The program may collect individual participant HVAC types or develop a deemed assumption of the percentage of HVAC types to apply across the annual savings. The option to collect participant data can then be applied to each tree and will provide a better estimation of energy savings per participant. However, an assumption would simplify planning and projections for the program based on consistent participation across Idaho Power residential customers. The deemed assumption should use the information in this report as a data point but should incorporate additional data sources across the Idaho Power DSM residential portfolio.

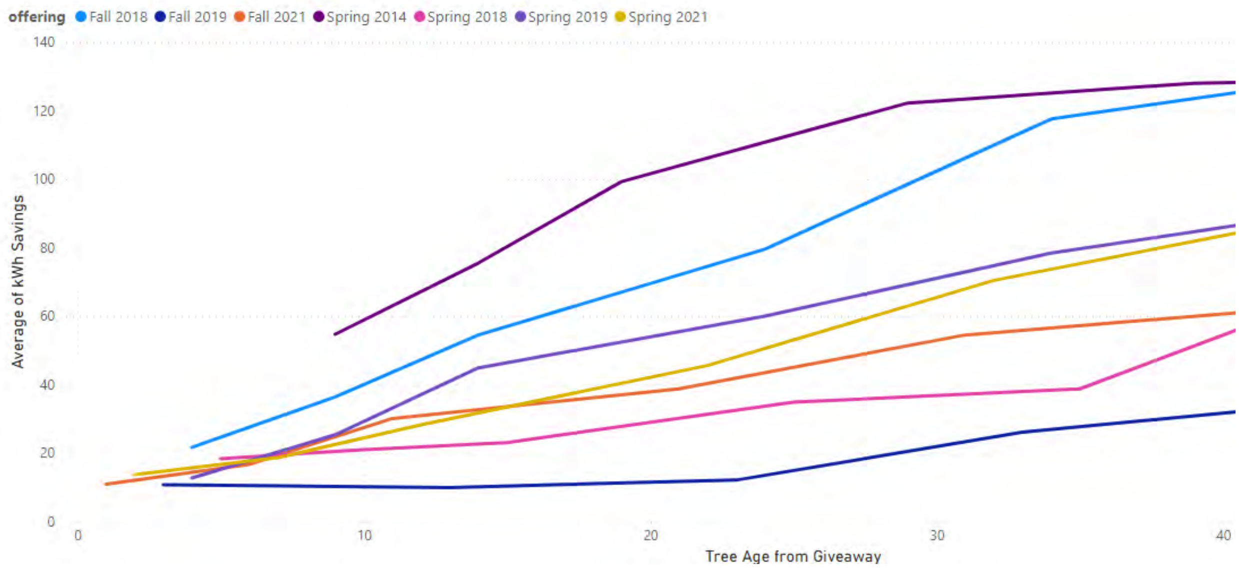
4.2.3 Tree Growth

The impact evaluation reviewed the modeled cooling electric efficiency based on the growing seasons since the tree was planted[11]. For example, the Spring 2018 participants are in Year 5, but the Fall 2018 and Spring 2019 participants are in Year 4. This was completed to evaluate the i-Tree model against the actual growth of trees that were planted 5 to 10 years ago and the forecasted cooling electricity savings.

The graphic below shows each participant event with the line starting with the number of growing seasons completed in Fall 2023. Beyond this initial point, all the impact is modeled by the i-Trees software. The expectation is that the modeled average kWh per participant group should follow a similar trajectory over the 40-year life with slight variations depending on planting location and species of the trees in the audit. This is evident in Figure 13, the Spring and Fall 2021 modeled kWh is similar for the first 20 years, then there is a slight separation, which is based on variations as trees mature.

[11] The Shade Tree Project reporting is completed based on calendar year.

Figure 15. Modeled kWh Savings per Event Based on Growing Seasons



The evaluation noted the difference in the impact of trees from Treasure Valley (Ada, Canyon, and Gem counties) events compared to other event locations. The trees in the Treasure Valley are in the Spring 2014, Fall 2018, and Spring 2021 events. The Spring 2014 and Fall 2018 trees, in particular, are modeled to provide much more electricity reduction compared to all other groups. The model predicts that the trees planted in Treasure Valley impact energy efficiency more than the other regions.

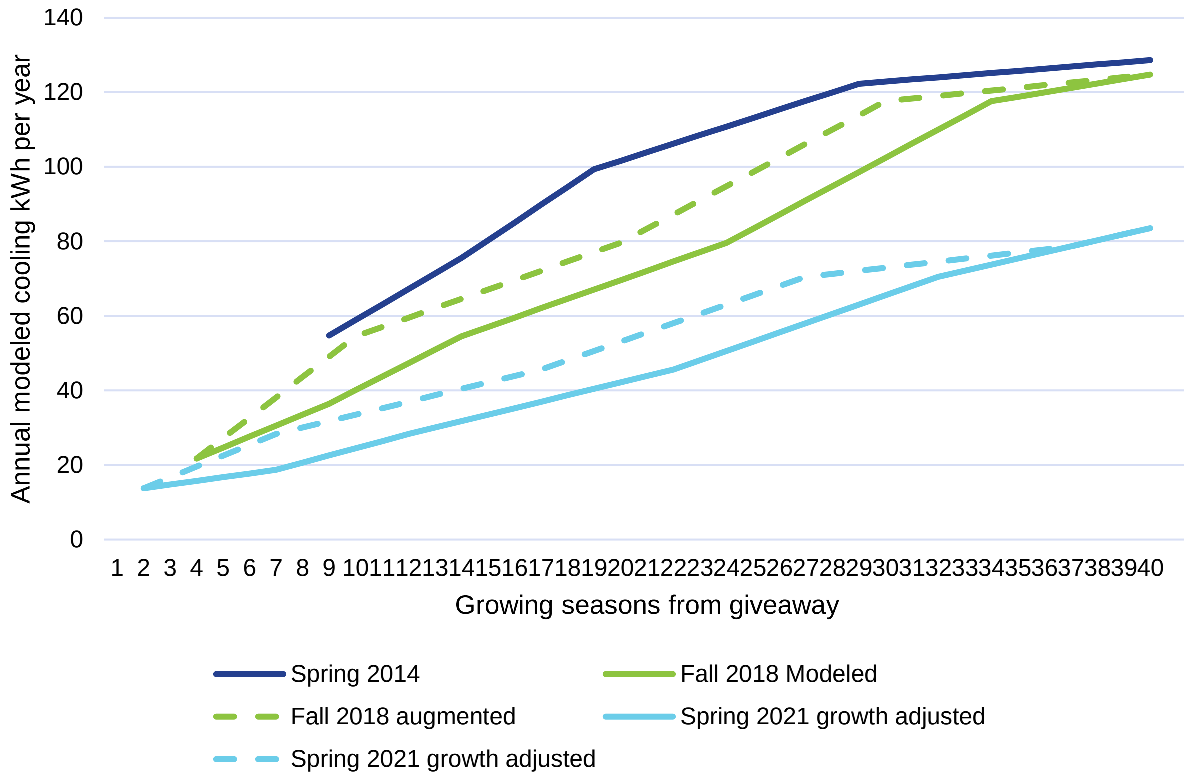
In the other participant groups, the Fall 2019 group has barely any impact until after Year 20. This is the only group that includes participants from Bannock County, indicating that the trees in Bannock County do not provide as much cooling energy value. The participants in the Twin Falls area in the Spring 2018, Spring 2019, and Fall 2021 participant groups have a slow and steady growth of impact, but they will grow at a slower rate and have a lower 40-year maximum impact than the Treasure Valley event trees. The i-Trees model does not identify a specific reason for the variation. However, the growth and impact of trees are impacted by local climate forecasts, which are the basis for the model.

In addition to the impact variation by event region, the measured 2023 starting point for each tree participant group is greater than the modeled savings from trees planted later. This is apparent by looking at the three event groups from the Treasure Valley: Spring 2014, Fall 2018, and Spring 2021. Figure 14 shows the forecasted modeled cooling kWh for Treasure Valley participants in these event groups in the solid lines. The start of each line is the impact from the audit data in 2023.

Comparing the average Year 9 impact of all three event groups (not including mortality or electric heat adjustments), the measured start of the 2014 stratum is approximately 55 kWh per year. The modeled 2018 offering in Year 9 is 37 kWh per year, 33 percent lower.[12] Based on calculations, this variation should be approximately 12 percent. Assuming the growth of the cooling savings should be similar in the same climate, there is a variation in the growth of the trees in the model compared to the actual growth identified in the audit.

[12] The 2021 trees had a different baseline delivered tree, so that is expected to be lower in Year 9.

Figure 16. Modeled Annual Average Cooling Energy Impact for Treasure Valley Trees



The evaluation recommends accelerating the growth and associated energy impacts for the years between Year 9 and Year 35 by four years to address this variation between modeled and actual growth. The Year 5 and Year 40 impact results should remain as modeled. This increases how quickly the percent of maximum impact is achieved, but the maximum impact of the tree remains the same as modeled.

The impact evaluation recommends the following items for consideration in future forecasting of energy impacts.

- The smaller trees in the 2021 participant groups full maturity energy impacts will lag the larger trees from the other program years.
- The region where the shade tree is planted impacts the maximum potential for energy savings. See Section 4.1.3.
- Trees are growing faster than modeled, and the accelerated growth will increase energy savings to match the impact energy savings of a tree that is four years older between Years 9 and 35.

4.3 IMPACT EVALUATION RESULTS

The impact evaluation measured the annual savings associated with the trees from various project years for PY2023 and adjusted the savings for the trees to determine the evaluated savings for PY2022. The executive summary presents only the PY2022 savings; however, this more detailed section identifies both the evaluated savings for PY2022 and the measured savings from PY2023. The evaluation found that the kWh reduction for the trees in the sample was overestimated. It also found that the negative value of heating MMBTU are overstated, meaning that the increased heating by fuels other than electricity required by residences as the tree grows is less than estimated. Table 9 shows the realization rate by stratum for the evaluated savings calculated in PY2022 from previously planted trees.

Table 9. PY2022 Shade Tree Realization Rates by Sampling Stratum

Sampling stratum	Trees	Total Annual kWh (Incremental kWh)[13]			Total Annual MMBTU (Incremental MMBTU)		
		Calculated	Evaluated	Realization rate (%)	Calculated	Evaluated	Realization rate (%)
2014 participants	379	41,065 (-45)	32,677	80	-450 (-4)	-411	109
2018 participants	2,092	32,554 (32,554)	18,926	58	-282 (-282)	-171	139
2019 participants	2,063	0	0	NA	0	0	NA
2021 participants	2,970	0	0	NA	0	0	NA
Total	**5,441**	**73,620 (32,509)**	**51,604**	**70**	**-732 (-286)**	**-583**	**120**

Table 10 shows the realization rate by stratum for the measured savings associated with PY2023. PY2023 will be the first year of savings for the trees distributed in 2019. The table does not show the incremental savings.

Table 10. PY2023 Shade Tree Measured Savings by Sampling Stratum

Sampling stratum	Trees	Total Annual kWh			Total Annual MMBTU		
		Planned Savings	Measured Savings	Realization rate (%)	Planned Savings	Measured Savings	Realization rate (%)
2014 participants	379	64,218	30,938	48	-614	-390	137
2018 participants	2,092	32,051	17,020	53	-278	-118	157
2019 participants	2,063	18,566	11,199	60	-159	-38	176
2021 participants	2,970	0		0	0		0
Total	**7,504**	**114,835**	**59,158**	**52**	**-1,051**	**-546**	**148**

[13] The program claims incremental saving each year. The past years claimed savings have a 40-year life. The majority of the claimed savings each year is the first claimed savings from the trees that were planted five years ago. The annual savings in this table are the cumulative value of the trees from each event.

4.3.1 Energy Calculation

The impact evaluation approached the savings calculation to develop a simplified calculation for the trees distributed. The evaluation first modeled each tree's energy impacts using the location, dimension, and characteristics of the shade tree and the participant's residence. The evaluation team found that modeled savings (verified savings) for the measured trees in PY2023 were closely aligned with the calculated savings: 105 percent for the 2014 trees and 85 percent for the combined 2018-2019 trees.

The verified savings per tree assume that the buildings are air conditioned and heated with gas heat, both with standard efficiency. The model did not incorporate adjustments to the heating fuel type. The impact evaluation adjusted the verified savings to account for the increasing number of fully electric homes with either electric resistance or a heat pump to meet the heating load.

The per-tree average savings from the sample were multiplied by the number of trees living in each stratum. The mortality rate identified in the audit was applied to the initial number of trees in each stratum to determine the impact of evaluated savings for the program.

Figure 15 and Figure 16 display the effect of the various components of the impact evaluation savings for the 2014 and 2018-2019 trees based on the measurement and modeled savings for PY2023. Each graphic has three separate components.

1. **Verified calculated savings:** The verified savings are based on the modeled results of electricity impacts of the average measured tree multiplied by the expected number of trees alive in 2023 for each stratum.

2. **Mortality**: The number of trees expected to be alive in each stratum was adjusted to match the mortality rates from the audit.

3. **Electric heat:** The electric heat adjustment attributed some of the identified heating MMBTU and converted it to electricity savings because of electric heat. Because the shade trees increased the heating load, the electricity savings decreased.

Figure 17. 2014 Strata Evaluated Measured Savings Adjustments

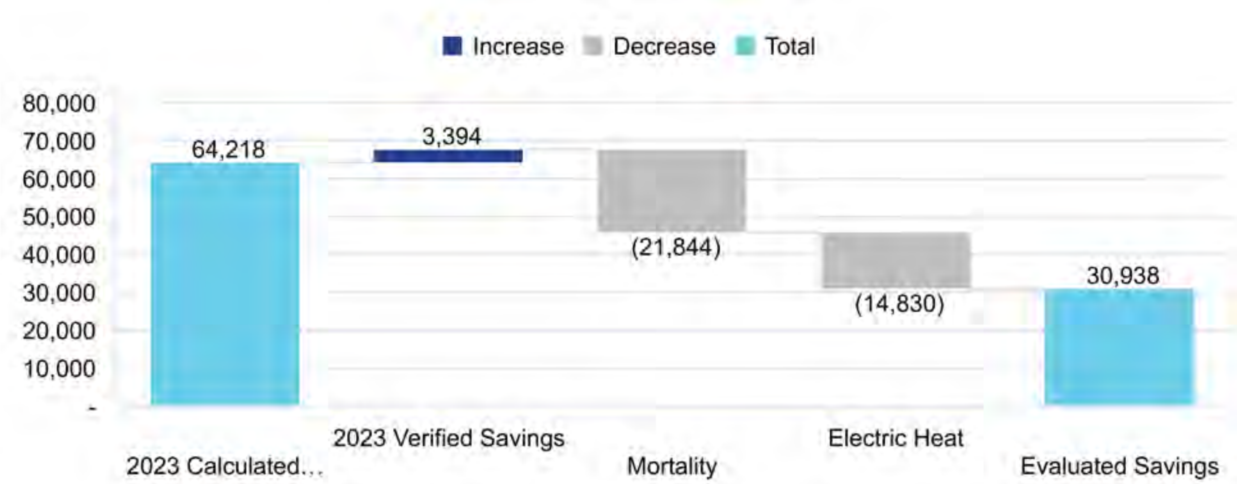
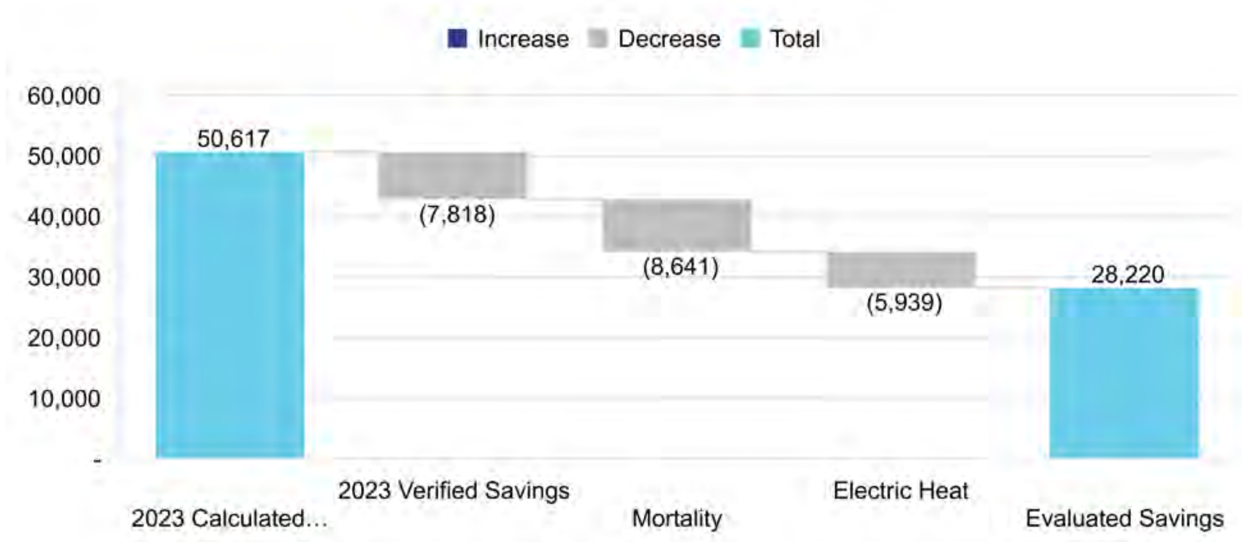
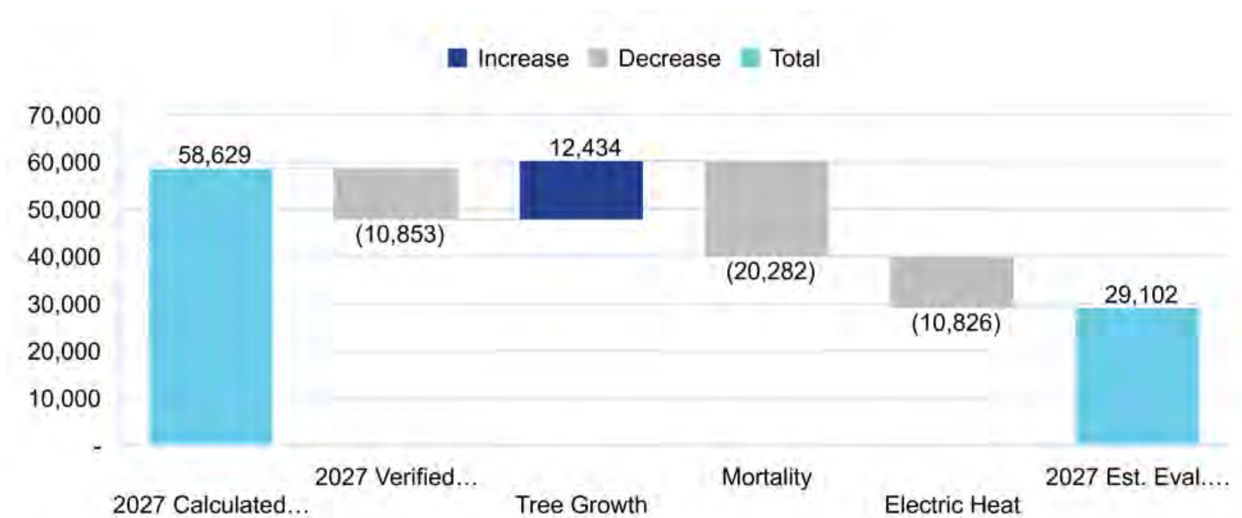


Figure 18. 2018-2019 Strata Evaluated Measured Savings Adjustments



In addition to the current year's savings, the impact evaluation found that the growth rate of the 2014 trees exceeded estimates at the 10-year mark in the model. This result is why the verified savings exceed the 2023 calculated savings. The approximate 10-year growth projected from the 2018-2019 trees planted in the same region showed that the 10-year expected growth is projected to equal the savings estimate for Year 14. The evaluation recommends using the Year 13 energy savings estimate for Year 9 (10th growing season), to account for the accelerated growth in future estimating. Figure 17 shows the Year 9 estimated savings with the verified savings and adjustments for the augmented growth, mortality, and electric heat for the 2018 trees. If an evaluation is completed in 2028, the growth adjustment is expected to be part of the verified savings result.

Figure 19. 2018 Trees Evaluated Savings Adjustments in 2027



The Shade Tree Project can adjust implementation of the program to impact mortality and tree placement for new trees distributed, but that will not impact the energy savings for several years. The evaluation recommends further discussion to coordinate the calculator with implementation and the application of the growth, regional variation, mortality, and electric heat factors.

4.3.2 Non-Energy Benefits

The evaluation found that the calculated non-energy benefits associated with the shade trees installed are conservative. The non-energy benefits appear to be calculated by the current calculation tool in annual dollars for carbon, stormwater runoff, and air pollution. The evaluation found that the carbon value is slightly more than calculated, the stormwater benefit is slightly lower than calculated, and the air pollution benefit is much higher than calculated.

Table 11. 2023 Non-Energy Benefit Realization Rate

Program Years	Trees	Total Non-Energy Benefits		
		Planned	Verified	Realization Rate
2013-2019	13,122	$8,522	$12,005	141

Table 12. Shade Tree Non-Energy Realization Rates by Sampling Stratum

Sampling stratum	Carbon $ (2023)			Stormwater $ (2023)			Air Pollution $ (2023)		
	Planned	Evaluated	RR (%)	Planned	Evaluated	RR (%)	Planned	Evaluated	RR (%)
2014 participant	$1,091	-$264	-24	$712	$167	23	$82	$14	17
2018-2019 participant	$1,162	$2,904	250	$761	$630	83	$113	$1,628	1445
2021 participant	$0	$128	NA	$0	$285	NA	$0	$164	NA
TOTAL	$2,252	$2,768	123	$1,474	$1,082	73	$195	$1,806	926

The evaluation used the i-Trees Design V7.0 to gain a measurement of the current year's pounds of carbon, pounds of air pollution, gallons of stormwater intercepted, and gallons of stormwater runoff avoided for each tree modeled. These values were aggregated to determine the average value of a tree from each stratum. The conversion from the benefit to dollars used the average price value in the existing tool, shown in Table 12. Table 13 shows the units of non-energy benefit components attributed to each sampling stratum.

Table 13. Average Price for Non-Energy Benefit

	Carbon $/LB	SW Runoff $/Gal	Air Pollution $/LB
Average	0.08522	0.00123	0.79349

Table 14. 2023 Non-Energy Benefit Units

Sampling stratum	Trees	Total Non-Energy Benefits (2023)			
		Carbon (Lbs.)	Stormwater Intercepted (Gal.)	Stormwater Runoff (Gal.)	Air Pollution (Lbs.)
2014 participants	379	-3,094	122,354	14,187	18
2018-2019 participants	4,155	34,075	480,045	33,790	2,052
2021 participants	2,970	1,499	215,294	17,057	207
TOTAL	**7,504**	**32,480**	**817,693**	**65,034**	**2,276**

APPENDIX A: SHADE TREE AUDIT SCREENER TEXT

Idaho Power Shade Trees Audit Screener

New and Existing Homeowners

Key screener objectives:

- Alert customers of upcoming audits
- Screen for deceased trees
- Gather preliminary information on home
- Determine tree location for auditors

Section	**Items**		**Completes**
Introduction	INTRO – I1		Full
Tree Confirmation	Tintro – T4		Not on property (M1=2, T0=3,4)
Housing Characteristics	HC1 – HC3		
Visit Details	V1 – V2		Refused visit (V1/V2 = 99)

Sample information

CASEID **TT assigned identification number**

TreeID1 IPC unique Tree identification number for first tree

TreeID2 IPC unique Tree identification number for second tree

VISIT_DATES "in October"

OrderID IPC unique Participant identification number

Contact_Name Name of participating customer

Address Address where equipment was installed or service was performed

City City where equipment was installed or service was performed

State State where equipment was installed or service was performed

Zip Zip where equipment was installed or service was performed

Phone_Num Phone number of participating customer
EMAIL Email address for customer

C_EMALFILLD
0 No
1 Yes

MOVED_FLAG		Flag indicating if customer in home received tree or customer moved into home	
	0	Original customer who received tree(s)	
	1	Customer moved into home with program tree(s)	

QUOTA Numerical identifier of the quota the case is assigned to during sampling.

1	2014 audited trees	Complete target = 50
2	2018-2019 event trees	Complete target = 120
3	2021 delivered trees	Complete target = 100

GROUP Geographic areas determined by zip codes

10	Boise area
11	Boise area
12	Boise area
13	Nampa
14	Emmett area
15	Kuna area
20	Pocatello
21	Blackfoot
22	Inkom
30	Twin Falls area
31	Gooding/Shoshone
32	Rupert
33	Oakley
34	Buhl area
35	Mountain Home

OFFERING Year and season customer received the tree(s)

Count Number of trees the customer received

1	one tree
2	two trees

Type1 First tree variety (Treepickedup)

LOC1 Direction from house to first tree

(opposite EnrollmentTreeOrientation or AuditTreeOrientation)

FEET1 Number of feet first tree planted from house (AuditDistanceFromHome)

Type2 Second tree variety (Treepickedup)

LOC2 Direction from house to second tree

(opposite EnrollmentTreeOrientation or AuditTreeOrientation)

FEET2 Number of feet second tree planted from house (AuditDistanceFromHome)

C_UTIL_CONT Mindi Shodeen at 208-388-5648

Introduction

VM MESSAGE Hello, we are calling to follow up on the <TYPE1> [IF COUNT=2 show " and <TYPE2>] that [IF MOVED_FLAG=1 show “the previous homeowner" ELSE show "you"] received from Idaho Power in <OFFERING>

Idaho Power has hired us to check the growth of trees provided through their Shade Tree program. We will have staff in your area and would like to ask a few questions before stopping by to evaluate the tree(s). If you have a few minutes this week, please call us back at our toll-free number 1-800-454-5070. Having the case ID <CASEID> available when you call will make the study more efficient.

Again, our number is 1-800-454-5070, and your ID number is <CASEID>.

Thank you for your help and have a wonderful day.

INTRO [INTERVIEWER INSTRUCTION: Please dial the phone number <PHONE> and enter the call result.]

Hello, my name is ___________ and I'm calling from Tetra Tech. We are calling to follow up on the tree(s) that [IF MOVED_FLAG=1 show "the previous homeowner" ELSE show "you"] received from Idaho Power in <OFFERING>.

Idaho Power has hired us to check the growth of trees provided through their Shade Tree project. We will have staff in your area and would like to ask a few questions prior to stopping by to evaluate the tree(s).

[IF MOVED_FLAG=0 SHOW "May I speak with <CONTACT_NAME> or the person who is familiar with your household's participation with the Idaho Power Shade Trees program?"]

[IF MOVED_FLAG=1 SHOW "The name I have on record is <CONTACT_NAME>. Or may I speak with a person familiar about the trees on your property?"

01	Continue	[SKIP TO SCREENER1]
02	I'm not knowledgeable about this	[SKIP TO OTHER_R]

SCREENER1 Our records show [IF MOVED_FLAG=1 show "the previous homeowner" ELSE show "you"] received <COUNT> in <OFFERING> through the Idaho Power Shade Trees program.

The tree(s) received was/were a <TYPE1> [IF COUNT=2 show " and a <TYPE2>"].

Are you familiar with this/these tree(s)?

01	Yes	[SKIP TO NEXT SECTION]
02	Yes, but R had comment [SPECIFY: what's incorrect?]	[SKIP TO NEXT SECTION]
88	I'm not knowledgeable about these tree(s)	[SKIP TO OTHER_R]
99	Refused	[SKIP TO OTHER_R]

OTHER_R Is it possible that someone else in your household would be more familiar with the program?

[IF NEEDED: Our records show [IF MOVED_FLAG=1 show “the previous homeowner" ELSE show "you"] received <COUNT> in <OFFERING> through the Idaho Power Shade Trees program.

The tree(s) received was a <TYPE1> [IF COUNT=2 show " and a <TYPE2>"].]

01	Yes, there is somebody else	[RECORD CONTACT INFO]
02	No, nobody knowledgeable	[DOES NOT QUALIFY 81]
03	No, we’ve never participated	[DOES NOT QUALIFY 82]
88	Don’t know	[DOES NOT QUALIFY 81]
99	Refused	[REFUSAL 91]

AVAILABLE_R May I please speak with that person?

01	Yes, R is available	[INT01 WITH NEW R]
02	Yes, R is not currently available	[SCHEDULE CALLBACK]
03	No	[REFUSAL]
88	Don’t know	[DOES NOT QUALIFY 81]
99	Refused	[REFUSAL 91]

Tree confirmation

[LOOP SECTION FOR THE TWO TREES]

R1 questions refer to TYPE1, LOC1, FEET1

R2 questions refer to TYPE2, LOC2, FEET2

M1 [ASK IF MOVED_FLAG = 1] To confirm, **i**s there a <TYPE> tree planted on your property?

Our records show, it may be located on the <LOC> side of your home[IF QUOTA = 1 show " approximately <FEET> feet away"].

01	Yes	
02	No	[SKIP TO NEXT LOOP]
88	Don't know	[SKIP TO NEXT LOOP]

T0 [ASK IF MOVED_FLAG = 0 AND QUOTA = 2, 3] Was this <TYPE> planted in the ground on your property, planted in a pot, given to a neighbor or family member to plant, or not planted anywhere?

01	Planted in the ground	
02	Planted in a pot	
03	Given to a neighbor / friend / family	[SKIP TO NEXT LOOP]
04	Not planted anywhere	[SKIP TO NEXT LOOP]
88	Don't know	[SKIP TO NEXT LOOP]

T1 Is the <TYPE> still alive?

01	Yes	
02	No	[SKIP TO NEXT LOOP]
88	Don't know	[SKIP TO NEXT LOOP]

T4 Is the tree located near any other trees, a fence, or any other markers?

01	Yes [SPECIFY]
02	No
88	Don't know

T2 Where is the tree located in relation to your house?

Is it…. [READ LIST]

[INTERVIEWER NOTE: The goal is to have the auditors looking at the right tree when on-site.]

01 In front of the house

02 In back of the house

03 To the left of the house when looking at the house

04 To the right of the house when looking at the house

05 Some other detail [SPECIFY]

88 [DO NOT READ] Don't know

T3 Approximately how many feet from the house is it located?

Is it… [READ LIST]

01 0 to 10 feet

02 11 to 20 feet

03 21 to 50 feet

04 51 to 100 feet

05 More than 100 feet

88 [DO NOT READ] Don't know

[END QUESTION LOOP]

Household Characteristics

HC1 Now just a few questions about your house. Was your home built before 1950, between 1950 and 1980, or after 1980?

01 Before 1950

02 1950-1980

03 After 1980

88 Don't know

HC2 What type of heating does your home have? [READ LIST UNTIL R ANSWERS] (select all that apply)

01 Gas furnace

02 Electric resistance

03 Electric heat pump

04 Passive heat option

05 Something else [SPECIFY]

77 None

88 Don't know

HC3 What type of air conditioning does your home have? [READ LIST UNTIL R ANSWERS] (select all that apply)

01 Central AC

02 Central heat pump

03 Ductless mini split

04 Window AC

05 Something else [SPECIFY]

77 None

88 Don't know

Visit Details

[SKIP TO INT99 IF ALL TREES TRIGGER M1=2 or T0=3,4,88 or T1=2) (NO_TREES=1)]

V1 Our staff will be in your area <VISIT_DATES> to review a sample of trees provided through the program. They will be looking at tree growth and overall health.

Our staff will not require your presence to review the trees.

Are there any access restrictions to the trees we would like to view?

01 No

02 Yes [SPECIFY]

99 R does not want a visit

V2 [SKIP IF V1=99] Are there any other issues to be aware of as our staff visit your property?

01 No

02 Yes [SPECIFY]

99 R does not want a visit

INT99 Thank you for your time.

[IF V1≠99 AND V2≠99 SHOW: "Again, our staff will be in your area <VISIT_DATES>. After the visit, they will leave a door hanger behind to let you know they were at your home."]

Have a nice day.

CP Completed.

APPENDIX B: SHADE TREE FIELD AUDIT QUESTIONS

Heading	Responses		
Tree Count (fill from sample)	**1**	**2**	**Use for loops through data collection**
Type 1 / Species / Direction / Distance/ (fill from sample)			
Type 2 / Species / Direction / Distance/ (fill from sample)			
For each tree			
Verification of Previous Collected Info			
Is the tree present/identifiable	Yes	No	
o Tree Species	Verify	Enter if incorrect	If incorrect, indicate species and quantity
o Tree Location - Direction	Verify	Enter if incorrect	If incorrect, provide tree location (N,S,E,W, NW, NE, SE, SW of home)
o Tree Location - Distance	Verify	Enter if incorrect	If incorrect, provide tree location (distance in whole feet)
Tree GIS location			Capture spatial location with GPS.
Tree Characteristics			
o Diameter or circumference	Numeric		Round to the nearest inch
o Height (approximate)	Numeric		Round to nearest foot under 15 feet, or nearest 5' increment.
o Dripline diameter (approximate)	Numeric		Round to nearest foot under 15 feet, or nearest 5' increment.
o Relative condition (excellent/good/poor/dying)	Select		Excellent, Good, Poor, Dead, Unsure
o Exposure to sunlight (full/partial/shade)	Select		Full, Partial, Shade
Planting Characteristics			
o Photos	Taken	Not	*Verification of tree general size, condition and distance to house*
o Tree ring present	Yes	No	
o Surrounding vegetation (in drip ring)	Select		Grass, ground plants, shrubs, other trees, none
o Tree stake present	Yes	No	
o Planting depth	Select		Correct, Too shallow, Too deep
o Under a Power Line	Yes	No	
o Additional notes about planting *Assessment of anything that doesn't match condition as entered above.*			*For example, Damage to trunk, tree trimmed to one side, etc.*
For each property			
Household Characteristics (just once)			
o House age	Verify		If incorrect, pick age category
o Heating type	Verify		Identify gas exhaust, heat pump exterior unit, or other indicator.
o Cooling type	Verify		Identify AC exterior unit, heat pump exterior unit for Central, heat pump wall mounted unit, or window unit
o Was the Customer Present	Yes	No	

APPENDIX C: IMPACT EVALUATION MODELING REVIEW

The impact evaluation used the data from the audit to complete an impact analysis of the 2023 energy savings and identify future growth of the energy savings. The energy impact of the trees was evaluated using the i-Tree[14] suite of tools. One method completed a current year analysis using a downloaded iTree Eco Version 6; the second used the online version of i-Tree Design, Version 7.0. Table 15 provides an overview of the requirements and outputs of each tool.

Table 15. Impact Evaluation Tool Comparison

i-Tree tool	Eco V6.0	Design V7.0
Program location	Downloaded to Desktop	Online
Energy Savings Estimates	Current Year	Current year and forecasting
Tree Input Data	Tree species Diameter (BDH - Inches) Height (ft) Crown Width, North-South (Ft) Crown Width, East-West (Ft) Crown Health, percent dieback Crown Health, percent missing	Tree species Location (Tree identified on aerial) Diameter (BDH or circumference - Inches) Tree Condition (excellent – poor) Tree exposure to Sunlight (full sun – full shade)
Other input data	Building Direction Building Distance City and County	Building, Heating and Cooling present Building Age (Pre-1950, 1950-1980, Post-1980) Building (outlined on aerial) Benefits estimate - forecast year
Input Data template provided	https://www.itreetools.org/documents/754/Eco_Complete_Inventory_TREE_DataSheet_Full.2021.10.28.xlsx	None
Data input	Upload template by county	Locate each tree/building in an online interface

The i-Tree Eco tool was used to identify the 2023 energy savings estimate. The evaluation team felt it was a conservative estimate compared to the analysis with the i-Tree Design tool. Table 16 shows the unadjusted model results from the 83 measured trees in the audit.

Table 16. Unadjusted 2023 Annual Energy Savings Result

Program	kWh	MMBTU
i-Tree Eco result	638	-12
i-Tree Design result	2,445	-22

The i-Tree Design result was selected for the impact analysis because the input information was more detailed for both tree and structure locations. I-Tree Design was also able to forecast the growth of trees and estimate the impacts beyond 2023, which was critical to evaluating results.

The impact evaluation identified each tree and structure in the online i-Tree tool and logged the results for the current year and the forecast results for 5, 10, 20, 30, and 40 years in the future.

[14] https://www.itreetools.org/tools

OTHER REPORTS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2023 A/C Cool Credit Program End-of-Season Report	Residential	Idaho Power	Idaho Power	Other
2023 Flex Peak Program End-of-Season Annual Report	Commercial/Industrial	Idaho Power	Idaho Power	Other
2023 Irrigation Peak Rewards Program Report	Irrigation	Idaho Power	Idaho Power	Other
Historical DSM Expense and Performance, 2002–2023	Residential, Commercial/Industrial, Irrigation	Idaho Power	Idaho Power	Other
Idaho Power Corporation Home Energy Report 2023 Final Program Summary	Residential	Harris	Harris	Other
Multifamily Technical Reference Manual (online)	Residential/Commercial	ADM	ADM	Other
Student Energy Efficiency Kit Program—School Year 2022–2023 Annual Report	Residential	Tinker LLC	Tinker LLC	Other

* Titles appearing in blue are links to the online versions of the reports.

2023 A/C COOL CREDIT ANALYSIS

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SUMMARY

This report presents an analysis of the demand response events called by Idaho Power's A/C Cool Credit program during the summer of 2023. The program called a total of 4 demand response events that included 18,714 households. The peak realized reduction at the generator level during this period occurred on August 16th, with a reduction of 1.07 kW per participant and a total system curtailment of 19.6 MW. In comparison, the maximum potential reduction for the season was 25.3 MW, based on a generator level reduction of 1.37 kW per participant at a cycling rate of 65%.

Region	Participant Count	Peak Realized Curtailment	Peak Potential Curtailment
Idaho	18,501	19.4 MW	25.0 MW
Oregon	213	0.2 MW	0.3 MW
Total	18,714	19.6 MW	25.3 MW

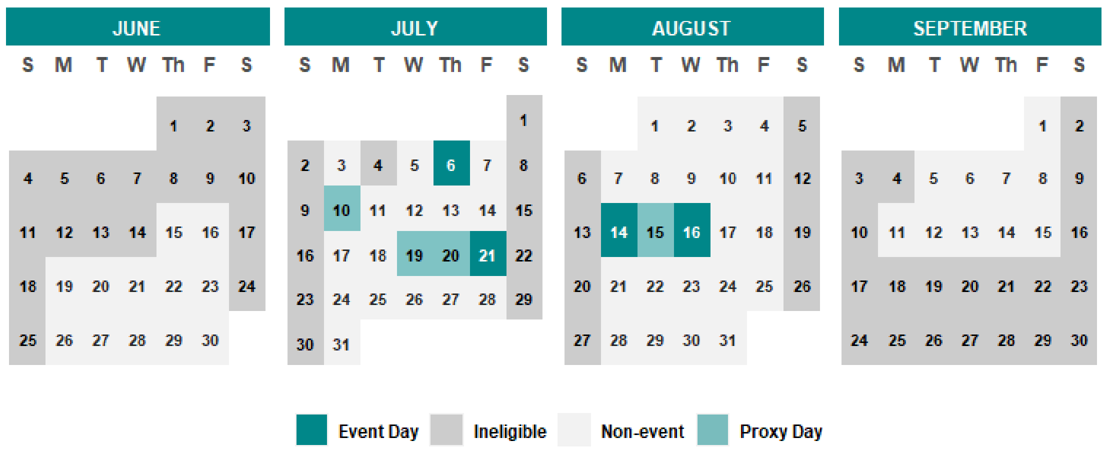
PROGRAM OVERVIEW

The A/C Cool Credit program season extends from June 15th to September 15th. Program event guidelines allow for event duration of up to four hours. In 2023, two of the four events called spanned four hours, and two events spanned three hours.

Starting in the 2022 season and continuing through the 2023 season, the program enacted a more flexible approach to event cycling rates. In 2023, two of the four events called were cycled at 50%—meaning participating A/C units were switched off for 30 minutes out of an hour—and two of the events were cycled at 55%.

Overall, the changes made to the program have significantly improved its potential effectiveness for Idaho Power. The extension of the cycling season and incorporation of longer event spans have allowed the program to respond to a wider range of high-temperature days and better meet system needs. The more flexible approach to cycling rates has also given the program greater control over the size and timing of demand reductions, ensuring that it can effectively reduce energy demand while still maintaining participant comfort. These operational changes make the program a more reliable and effective tool for managing energy demand and helping to reduce strain on the power grid.

2023 Cycling Season



METHODOLOGY

Idaho Power continues to calculate A/C Cool Credit program savings using the evaluation framework created by ADM consultants as part of the 2021 impact evaluation. This tool models demand reductions by using a variety of statistical methods to determine each participant's hypothetical usage if there had not been a demand response event that day. Additionally, the tool evaluates the number of households who did not contribute a statistically significant demand reduction to each event. This section provides an overview of the model steps; a more detailed discussion can be found in ADM's 2021 program impact evaluation in *Supplement 2* of Idaho Power's *2021 DSM Annual Report*.

Baseline Usage Calculation

To model participant energy usage at the household level, the evaluation tool requires four primary data inputs: a list of participating demand response switches, hourly meter reads for all participants for the cycling season, hourly weather reads for the service territory, and the date and time of all demand response events. By integrating these inputs, the tool is able to take into account the unique energy usage patterns of each household.

Since each household is unique and may exhibit vastly different energy usage patterns, there is no single statistical model that will perfectly fit every participant. Instead, the evaluation tool tests five possible models to find the best fit for each household. These models fall into two categories:

1. A weather-adjusted Linear Fixed Effect Regression (LFER) model. This is a regression model that controls for variables including Cooling Degree Days, Heating Degree Days, and hour of the day, and treats each household as an individual fixed effect.

2. A Customer Baseline (CBL) model tuned with various eligibility periods and offset methods. The possible eligibility periods are 3-of-5 and 3-of-10, the latter of which would mean that the model looks at the three highest usage days of the last 10 eligible days. The offset factor determines how the model scales usage based on usage prior to the event start. The possible methods are additive and multiplicative.

Model performance was assessed based on how well the model predicted the household's energy consumption across four proxy days, which represent the hottest non-event days in the season. Consumption during both proxy days and event days are excluded from the data set used to train the household models.

The LFER model was the best fit for the largest number of participants. The final reported savings are derived from a mixed model, which incorporates household level results based on the best fitting of the five models for each participant. This approach ensures that baseline estimates are robust to variance in household behavior.

Non-Contributing Households

A separate calculation within the ADM model provides an estimate of Non-Contributing Households (NCH), or the number of households during each event that did not produce a statistically noticeable demand reduction. This is an important metric for understanding overall impacts of demand response efforts and for identifying characteristics of event days and households that may prompt non-responsiveness. Importantly, NCH is calculated for informational purposes and is independent of overall savings results, which include all program participants whether responsive or not.

In some cases, a statistically non-responsive household may indicate a communication, switch, or A/C unit failure, however there are other factors to consider. For example, occupants may be away during an event or have temporarily changed the household's temperature set point. On event days with cooler weather or lower cycling rates, it is harder for the model to confidently identify a demand reduction, as a result the NCH rate tends to be higher.

The model utilizes a three step calculation process to identify NCHs:

1. The first calculation is a Cumulative Sum (CSUM) analysis, which is a technique that evaluates the slope of a smoothed curve of energy usage data for the hours before and during the event, and comparing the ratios of these slopes to determine if there is a significant change in demand due to the event. Devices with a slope ratio less than one are considered contributing devices.
2. The second calculation is the linear decrease analysis, which involves comparing the consumption for the hour prior to the event to the consumption during the first hour of

the event. Devices that do not see a 10% reduction in this step are considered non-contributing devices.

3. Finally, the model performs a check for signs of a snapback effect, which is the increase above baseline usage that frequently occurs at the conclusion of a demand response event as an A/C unit works to return the household to normal set temperature. Households that were labeled as non-contributing by the first two tests, but show signs of a snapback effect are reclassified as contributing households.

RESULTS

The following tables and charts display the outputs of the evaluation models. All demand reduction numbers presented in the text and figures of this report are calculated at the generator level.

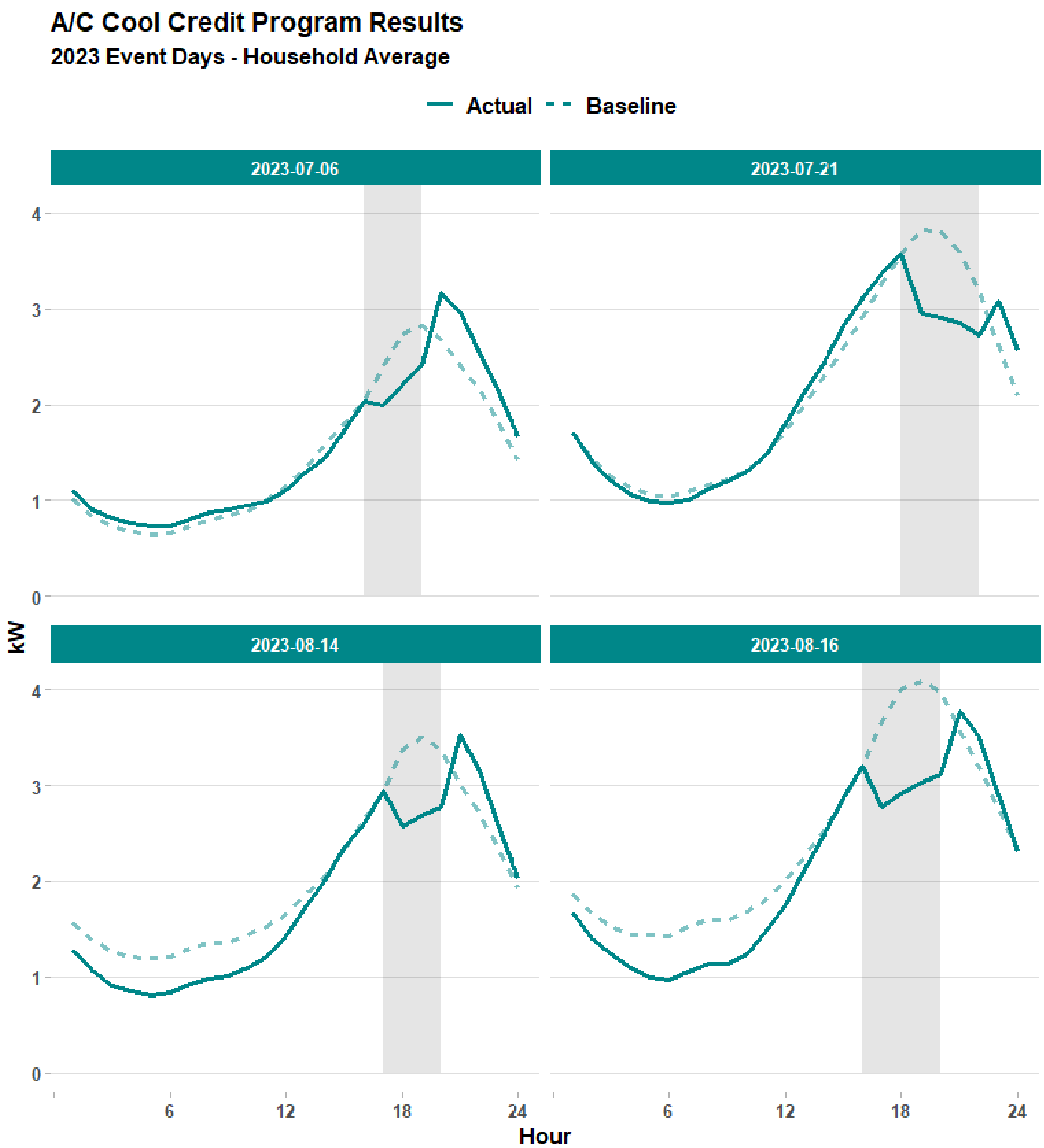
For simplicity, only Treasure Valley temperature data is shown in the charts below. However, the underlying baseline evaluation model utilizes weather reads from both the treasure valley region and the Twin Falls / Pocatello region.

Tables

Event Date	Event Time	Peak Temperature	Cycle Rate	Average Reduction	Total Reduction
Jul 6	4-7 p.m.	96°F	55%	0.52 kW	9.5 MW
Jul 21	6-10 p.m.	104°F	50%	0.90 kW	16.6 MW
Aug 14	5-8 p.m.	99°F	55%	0.81 kW	14.9 MW
Aug 16	4-8 p.m.	105°F	50%	1.07 kW	19.6 MW

Event Date	Non-Contribution Ratio
Jul 6	19.7%
Jul 21	13.4%
Aug 14	19.7%
Aug 16	21.3%

Charts



A/C Cool Credit Program Results
2023 Event Days - Household Average
Actual
Baseline
2023-07-06
2023-07-21
2023-08-14
2023-08-16
kW
0
1
2
3
4
6
12
18
24
Hour

2023 Flex Peak Program
End-of-Season Annual Report

March 6, 2024

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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 commercial and industrial customers that can reduce their electrical energy loads for short periods during summer peak days. 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 for new supply-side resources.

An overview of program costs, marketing, and operations in 2023 can be found in the Company's 2023 Annual DSM Report. This report provides a supplemental analysis on program results and load reduction calculations.

BACKGROUND

In 2015, the company requested approval to implement the Flex Peak Program as an Idaho Power operated program. The Idaho Public Utilities Commission (IPUC) approved the company's request in Order No. 33292,[1] and the Public Utility Commission of Oregon (OPUC) accepted the proposal from Advice No. 15-03.[2] Prior to 2015, a similar DR program for commercial and industrial customers was operated by a third-party vendor.

As part of Advice No. 15-03, the OPUC adopted Staff's recommendation that the company file an annual end-of-season report with information regarding the program. The company was also directed by the IPUC in Order No. 33292 to file an annual end-of-season report detailing the results of the program. In compliance with the reporting requirements, the annual end-of-season report includes the following:

- Number of participating customers
- Number of participating sites
- MW of demand response under contract
- MW of demand response realized and incented per dispatch
- Percent of nominated MW achieved in each dispatch event by participant
- Number of events called
- Total load dropped for each event
- Event duration

---

[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).

- Number of customers who failed to meet their load
- Participant attrition
- Changes in baseline methodology taken or anticipated

Program Parameters

The program pays participants a financial incentive for reducing load within their facility and is active June 15 to September 15, between the hours of 3 p.m. and 10 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 parameters of the program are in Schedule 763 in Oregon and Schedule 824 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 and Labor Day) between the hours of 3 p.m. and 10 p.m. and last between two to four hours
- Events can occur up to four hours per day and up to 16 hours per week, but no more than 60 hours per program season
- Idaho Power will provide notification to participants four 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 RESULTS

Overview

The results presented throughout this report are at the generation level and line losses of 7.6% have been considered. Idaho Power called three load reduction events in 2023. The maximum realization rate achieved during the season was 86% during the event on August 1st and the average for all three events combined was 69%. 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 32.9 MW during the August 1st event.

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[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.

Table 1. 2023 Event Summary Results

Curtailment Event	Event Timeframe	Nominated Demand Reduction (MW)	Average Demand Reduction (MW)	Max Demand Reduction (MW)	Realization Rate*
Aug 1	3-7 p.m.	38.1	32.6	32.9	86%
Aug 15	4-8 p.m.	37.6	20.4	21.2	54%
Aug 17	5-9 p.m.	37.6	25.0	26.3	66%
Average		37.8	26.0	28.8	69%

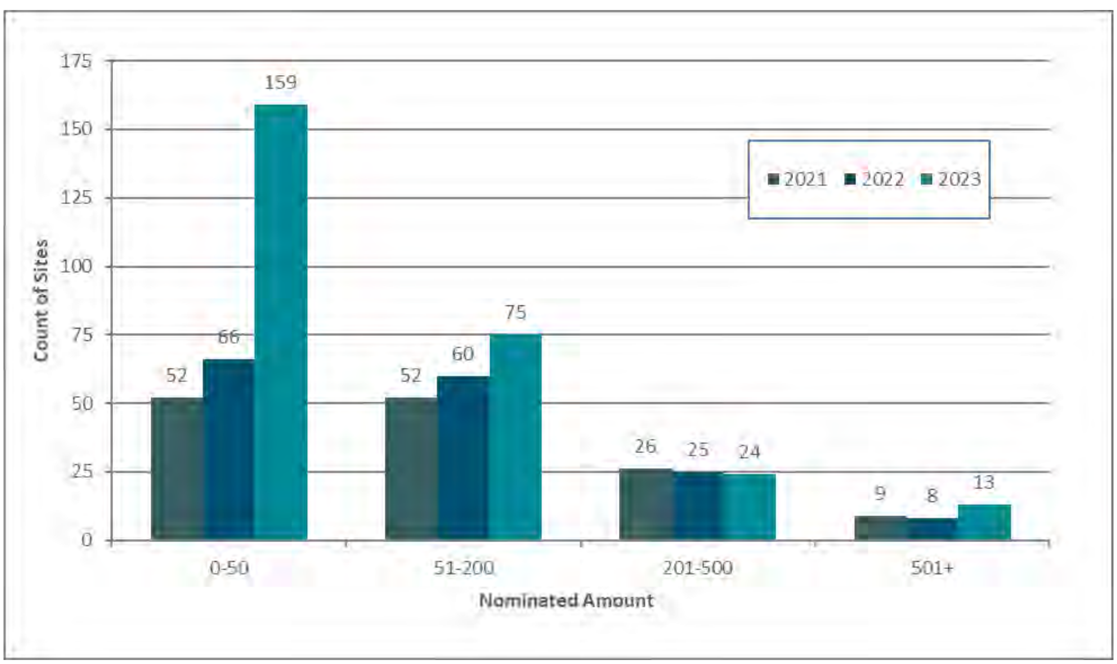
* Based on average reduction

Committed Load

Program participants are incented based on their committed load nomination and are expected to meet this reduction whenever an event is called. Program participants are allowed to update their nomination before each week of the season based on their facility needs and availability. The program had a total committed load reduction of 31.4 MW in the first week of the program season and increased to 37.0 MW by the final week of the season. The maximum available capacity of the program came from a nominated amount in week nine at 38.8 MW.

The program encourages a diverse range of facility types to enroll, so participant loads range from less than 20 kW to over 1 MW. In 2023, 108 customers participated across 271 sites. These customers are broken down by nomination range in Figure 1.

Figure 1. 2021-2023 Program Participant Counts by Nomination Size



Meter Data

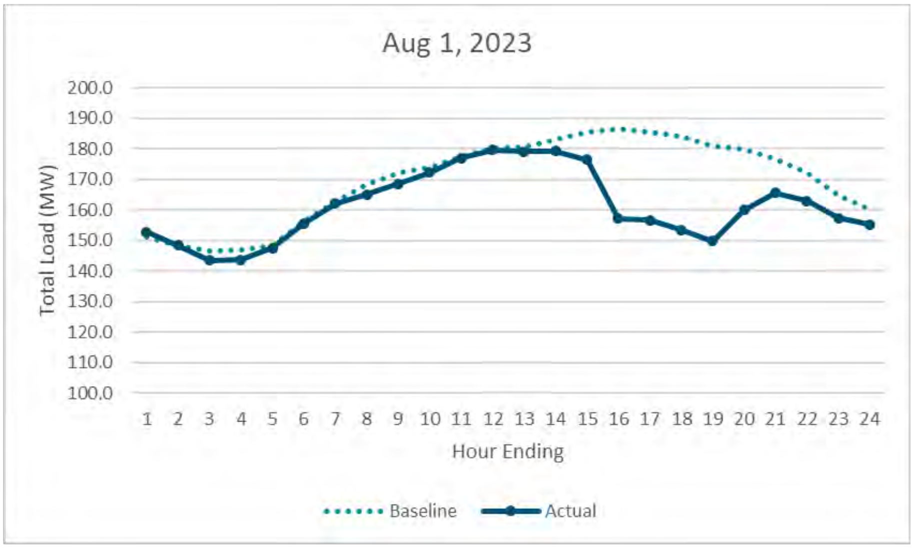
After an event, interval metering data provides Idaho Power the ability to view a history of each participant's load before, during, and after events. The metering data was used to calculate the reduction achieved per site for each event, allowing Idaho Power to provide participants with a report that showed their hourly baseline, actual usage, and reduction for each event.

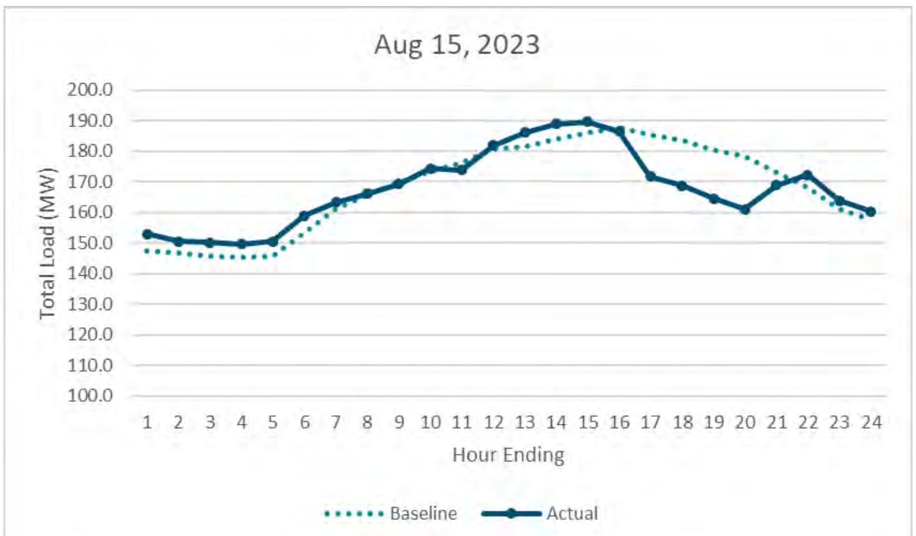
Load Reduction Analysis

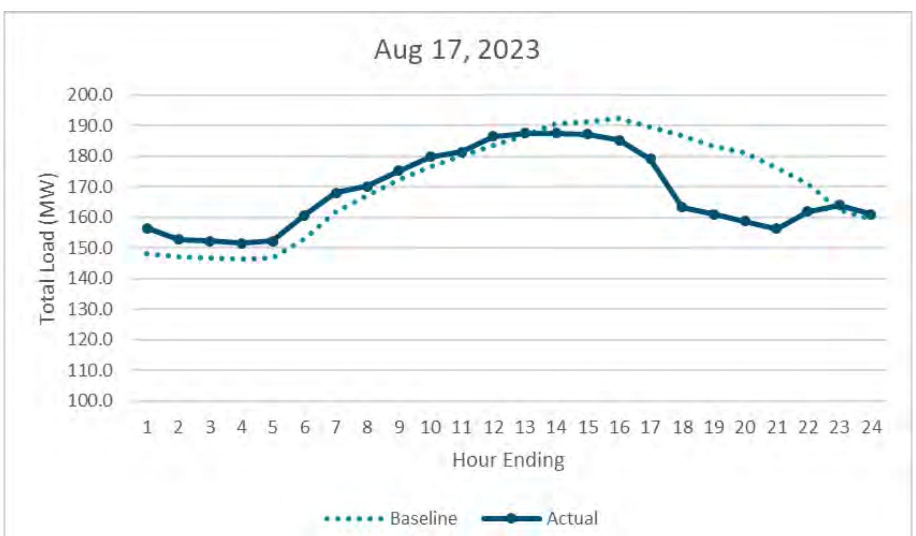
Participants are incented primarily based on how their actual usage during an event compares to a calculated baseline usage. The baseline usage is calculated according to a specific methodology detailed at the end of this report. The program measures its overall event performance using the same participant-level baseline calculations, aggregated across all participating sites.

The aggregated program actual and baseline loads during each event in 2023 are displayed in Figure 2.

Figure 2. 2023 Event Day Actual and Baseline Loads

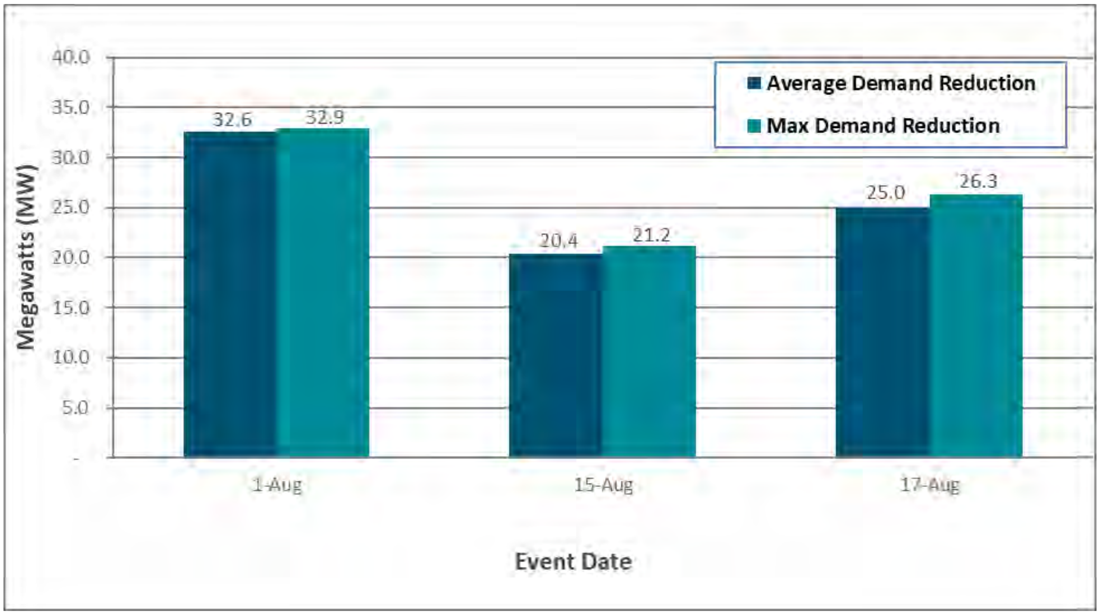






The total reduction achieved for the event is calculated as the difference between the total baseline usage and total actual usage among program participants. Reductions may vary for each hour of the event, so the program reports the average reduction across all event hours as well as the maximum hourly reduction during the event. Curtailment tends to remain steady through the duration of events (Figure 3).

Figure 3. 2023 Average and Maximum Reduction Achieved per Event (MW)



Realization Rate

The realization rate is the ratio of achieved reduction versus expected or nominated reduction. The program-level realization rate in 2023 was 69%, with a peak realization rate of 86% occurring on the August 1st event.

Figure 4 represents the realization rate achieved by each nomination group, averaged across all three events. To calculate the results, each site's average load reduction (across three events) was divided by its average nomination across the three events and then grouped by size.

Figure 4. 2023 Average Realization Rate by Nomination Size Class

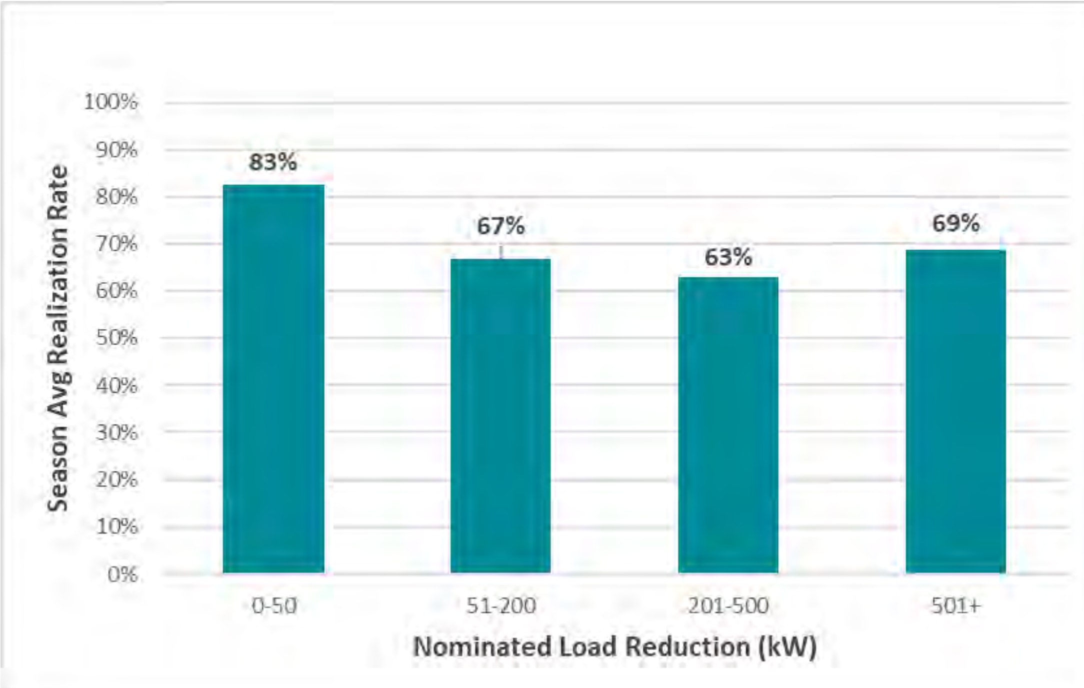


Table 2 shows the participant-level program realization rates for 2023 based on average demand reduction per event. Participants are anonymous and presented in no specific order. Note that some participants have multiple participating sites. Realization rates are capped at 120% in this calculation.

Table 2. 2023 Participant-Level Realization Rates by Event

Participant Number	August 1 Event Realization	August 15 Event Realization	August 17 Event Realization
1	2%	6%	0%
2	56%	0%	0%
3	68%	30%	83%
4	120%	113%	120%
5	28%	9%	0%
6	18%	63%	81%
7	52%	28%	55%
8	95%	9%	0%
9	14%	45%	0%
10	0%	120%	25%

11	39%	103%	42%
12	23%	14%	32%
13	120%	120%	120%
14	21%	4%	21%
15	11%	1%	0%
16	1%	1%	0%
17	6%	2%	4%
18	120%	120%	120%
19	49%	83%	94%
20	37%	0%	10%
21	39%	76%	98%
22	51%	41%	84%
23	10%	11%	9%
24	41%	99%	1%
25	119%	47%	19%
26	18%	19%	36%
27	107%	96%	44%
28	120%	120%	120%
29	4%	N/A	N/A
30	103%	34%	70%
31	13%	120%	78%
32	0%	6%	93%
33	120%	120%	120%
34	0%	0%	120%
35	120%	120%	0%
36	15%	1%	31%
37	50%	2%	45%
38	51%	26%	55%
39	20%	15%	45%
40	0%	56%	5%
41	12%	0%	0%
42	N/A	N/A	N/A
43	0%	0%	0%
44	120%	120%	120%
45	2%	0%	0%
46	35%	120%	22%
47	67%	41%	101%
48	3%	41%	16%

49	60%	105%	105%
50	115%	66%	109%
51	120%	120%	120%
52	99%	0%	120%
53	120%	64%	101%
54	45%	44%	15%
55	120%	120%	120%
56	0%	0%	0%
57	85%	120%	94%
58	87%	120%	108%
59	1%	74%	16%
60	52%	18%	0%
61	N/A	N/A	N/A
62	12%	0%	64%
63	11%	0%	33%
64	4%	3%	73%
65	120%	120%	105%
66	67%	7%	0%
67	102%	0%	87%
68	0%	0%	0%
69	117%	89%	120%
70	24%	3%	34%
71	120%	5%	7%
72	32%	58%	75%
73	120%	120%	120%
74	1%	0%	0%
75	120%	28%	14%
76	74%	120%	24%
77	111%	84%	56%
78	97%	54%	0%
79	120%	0%	120%
80	27%	4%	0%
81	23%	0%	13%
82	120%	120%	120%
83	42%	120%	120%
84	69%	97%	68%
85	12%	32%	0%

86	95%	48%	11%
87	40%	56%	120%
88	95%	120%	120%
89	10%	1%	20%
90	0%	0%	0%
91	120%	120%	120%
92	2%	1%	4%
93	0%	0%	0%
94	120%	0%	120%
95	65%	2%	62%
96	11%	9%	11%
97	33%	31%	101%
98	120%	120%	120%
99	120%	N/A	N/A
100	94%	102%	77%
101	0%	29%	0%
102	34%	10%	6%
103	59%	113%	120%
104	53%	120%	104%
105	120%	98%	120%
106	0%	8%	18%
107	N/A	N/A	N/A
108	101%	120%	57%

Flex Peak Load Reduction Calculation Definitions

1. Event Day:
The specific day a Flex Peak event is initiated.

2. Eligible Baseline Days:
The sequence of 10 weekdays immediately preceding the Event Day. This excludes holidays and any days on which other Flex Peak events occur.

3. Eligible Event Hours:
The designated time window during which an event can be initiated, spanning from 3pm to 10pm, as stipulated by the current tariff.

4. Select Baseline Days:
Among the Eligible Baseline Days, these are the three days that register the highest total usage within the Eligible Event Hours.

5. Unadjusted Baseline:
An average of the load, calculated hourly, derived from the three Select Baseline Days.

6. Adjustment Hour:
The specific hour earmarked for determining day-of adjustments. This is the hour immediately preceding the hour that the participant received notice of the upcoming event.

7. Adjustment Ratio:
The ratio used to perform a Day-of Adjustment. Calculated individually for each participant and Event Day. Defined as the Actual kW during the Adjustment Hour divided by the Unadjusted Baseline kW during the Adjustment Hour.

8. Adjusted Baseline:
This is derived by multiplying the Unadjusted Baseline on the Event Day by the Adjustment Ratio. This value is applied uniformly across all 24 hours of the Event Day.

9. Capped Baseline:
A modified version of the Adjusted Baseline where value for any hour cannot exceed the peak observed Actual kW within the Select Baseline Days or within the hours on the Event Day prior to notification.

10. Incented Reduction

The kW reduction that will be used to determine participant incentives, and for calculating program load reductions. Calculated for each hour of an event as the Capped Baseline minus Actual kW.

2023 Irrigation Peak Rewards Program Report

January 2024

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INTRODUCTION

The Irrigation Peak Rewards Program (IPR) 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 on high energy use days. Idaho Power estimates future capacity needs through the Integrated Resource Plan and then plans resources to mitigate shortfalls. IPR is a result of this planning process and the success of the program is measured by the amount of demand reduction available to Idaho Power during during periods of high energy demand or for other system needs.

During the 2023 season (June 15 through September 15) events were called on seven different days spanning a total of 39 hours. Table 1 summarizes the high level results from the season.

Table 1. 2023 Season Summary Results

Region	# Enrolled Sites	Total Enrolled (MW)	Peak Potential Curtailment (MW)	Peak Realized Curtailment (MW)
Idaho	2,380	366.3	246.4	183.5
Oregon	59	10.9	5.7	4.2
Total	**2,439**	**377.2**	**252.1**	**187.7**

PROGRAM DESCRIPTION

Interruption Options

IPR is available to all Idaho Power irrigation customers. There are two options for shut off: an automatic dispatch option and a manual dispatch option. The program is limited to four hours per service location from 3-10 p.m. (standard option) or for four hours during the period from 3-11 p.m. (extended option). The program is limited to 16 hours per week and 60 hours per season.

Automatic Dispatch Option

The majority of pumps enrolled in the program participate via the automatic dispatch option, where the shutoff signal is sent by Idaho Power at the start of an event and minimal engagement is required by the participant. Sites that participate under this option are expected to reduce demand to zero for the duration of an event. There are three ways a pump may participate automatically:

- Demand Response Unit (DRU). In this option, a DRU is physically installed on the pump and then activated by sending a signal through the power line at the start of each demand response event.
- Cellular Device (cell). In cases where a participant is unable to have a DRU installed, or has a specific circumstance that would prevent a DRU from receiving a signal, a cell device is instead installed to the pump.

- No Device. In cases where a pump is downstream of another pump that has a DRU or cell device, it would be redundant to attach another device, so these pumps may participate without the installation of any additional program hardware.

Manual Dispatch Option

Under the manual dispatch option, participants manually control how their pumps are turned off during a load control event. Manual participants are required to nominate a kW reduction at the beginning of the season and are expected to meet that nomination when an event is called. Table 2 provides a summary of participation type for the 2023 season.

Table 2. 2023 Enrolled MW and Participants by Participation Type

Dispatch Option	Participation Type	Total MW Enrolled	# Enrolled Sites
Automatic	Cell Device	6.3	34
Automatic	DRU	301.4	2,290
Automatic	No Device	3.6	81
Manual	Manual Shutoff	65.9	34
Total		**377.2**	**2,439**

Dispatch Groups

Upon enrollment, a participant is placed into one of four dispatch groups: A, B, C or D. When an event is called, a dispatch signal is sent to all participants of one or more dispatch groups. Event start times may differ between groups.

Group D consists entirely of late shut-off participants. Most Manual Dispatch Option participants are placed in dispatch group C. Otherwise, participants are placed into groups in a way that aims to balance available load reduction. A small number of participants within group C are expected to manually shut off one hour before the rest of the group (Group C1) or two hours before the rest of the group (Group C2).

Table 3 displays the size and participant count of each dispatch group. Enrolled kW is displayed at the meter level.

Table 3. 2023 Enrolled MW and Participants by Dispatch Group

Dispatch Group	Total MW Enrolled	# Enrolled Sites
A	97.5	773
B	87.9	536
C	95.8	339
D	96.1	791
Total	**377.2**	**2,439**

LOAD REDUCTION ANALYSIS

Meter Data

In 2023, 98.6% of the 2,439 service points enrolled in the IPR program had meters capable of transmitting hourly meter reads. The remaining participants, lacking AMI data, are instead estimated based on the usage patterns of similar pumps. This estimation factors in the expected rate of DRU failure during an event.

Among service points that do have hourly read capabilities, it is rare but possible for errors to occur in the hourly data. This may occur for a variety of reasons including high system noise or issues at a substation. From June 15 to September 15 of the 2023 season, 99.3% of meter data among IPR participants was successfully relayed and stored in the company database.

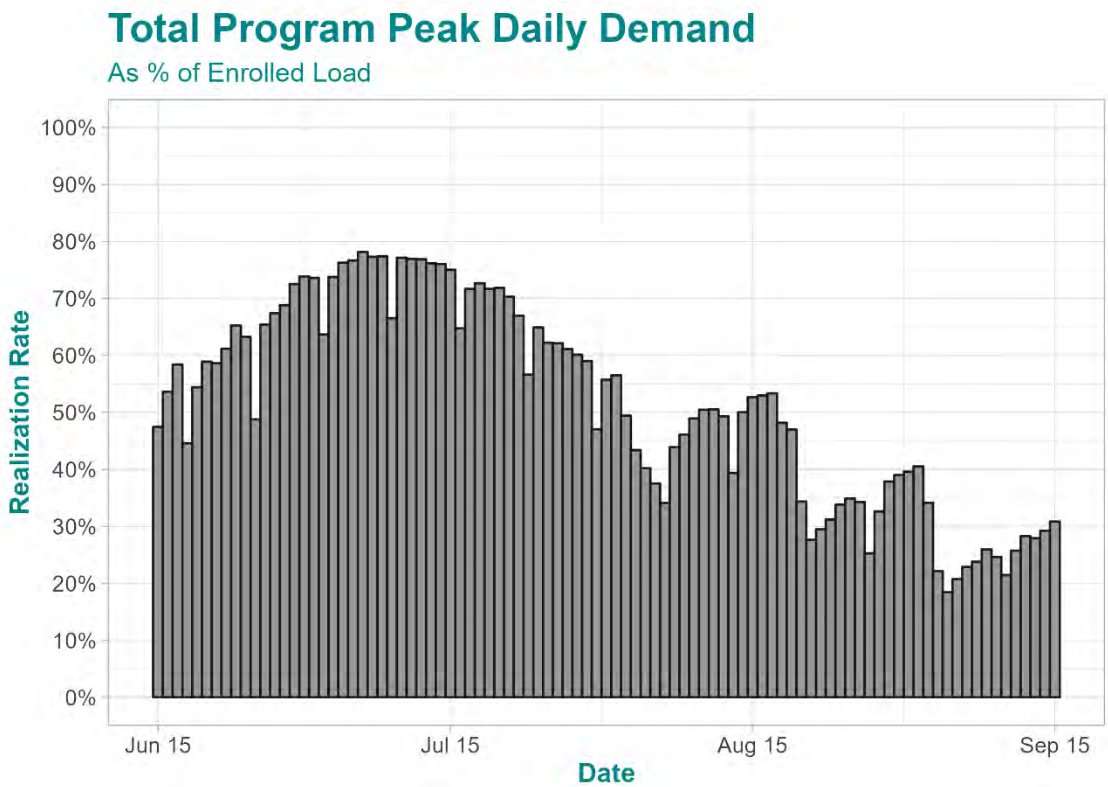
Missing observations were filled in using an interpolation approach if there was only one missing observation. Otherwise, if a meter had multiple consecutive data points missing, data was filled in via extrapolation approach, utilizing usage patterns of similar pumps.

Season Peak Potential Reduction

The Peak Potential Reduction is the theoretical load reduction that would have occurred if an all-group event were called during the peak window of the season. This number takes into account the average number of device failures, opt-outs, and small load left on determined from actual events (see Load Left On Analysis, below). This analysis is used to report capacity of the program each year and for cost-effectiveness reporting on the program.

The total enrolled load will always be higher than the actual season peak due to pumps operating on different schedules. The Peak Day of the season is the day where the average usage among all program participants between the hours of 10:00 AM and 2:00 PM is the highest. The realization rate (average usage for all participants divided by total enrolled load) typically peaks in late June or early July and fluctuates throughout the season, as demonstrated in Figure 1. In 2023, the peak occurred on July 6th with a coincident load of 294.9 MW, equating to a realization rate of 78.1% of total enrolled load.

Figure 1. 2023 Total Program Peak Daily Demand



The Peak Potential Reduction is calculated based on the season coincident peak. It is adjusted to account for the load that will not be curtailed due to device failures, opt-outs, and small load left on. In 2023, these adjustments represented approximately 11.3% of the enrolled load, or 42.8 MW of load left on. This equals a final Peak Potential Reduction of 252.1 MW for the 2023 season. Table 4 provides an overview of key season numbers. Realization rate is based on percentage of total enrolled load.

Table 4. 2023 Season Peak Potential Reduction

Load Type	Load Amount	Realization Rate	Description
Enrolled	377.2 MW	100.0%	Combined Load of all enrolled pumps
Season Peak	294.9 MW	78.1%	Maximum program coincident peak on July 6th, 2023
Peak Potential Reduction	252.1 MW	66.8%	Season peak minus predicted load left on

Event Load Reduction

Calculating the performance of the program requires a comparison between usage before the event (baseline usage) and usage during the event. See Appendix 1 for the definition of terms and the demand reduction calculation method. Baseline usage represents the amount of demand that would have needed to be served in absence of a demand response event. The baseline is calculated using the average of the first four hours of the five hours before the dispatch group start time. The difference between the baseline usage and actual load left on during an event represents the realized, actual load reduction. Table 5 displays the load reduction results for each event day. The load reduction at generation level includes a 7.6 percent line loss.

Table 5. 2023 Load Reduction by Event and Hour

Event Date	Groups	Hourly Load Reduction (MW)						
		3–4 p.m.	4–5 p.m.	5–6 p.m.	6–7 p.m.	7–8 p.m.	8–9 p.m.	9–10 p.m.
7/6/2023	A	-	-	-	54.4	53.3	52.7	52.0
7/21/2023	B,C	54.3	59.5	75.4	114.3	59.2	55.1	40.4
7/22/2023	D	-	-	-	46.8	53.4	53.1	51.9
8/1/2023	A,B,C,D	33.1	100.9	143.0	187.7	152.6	86.8	44.9
8/15/2023	A,C	2.6	17.4	85.2	86.1	81.9	67.8	-
8/16/2023	B,D	-	42.0	91.2	91.7	91.8	46.1	-
8/17/2023	A,B,C,D	-	89.1	127.2	169.3	168.5	79.0	42.0

Load Left On Analysis

Load can be left on during an event for several reasons:

- Device failure. This can occur when a load-controlling device is not functioning properly or otherwise fails to receive the curtailment signal at the start of the event.
- Opt Outs. Participants may choose to opt out of events, however they will receive a reduction to their incentive for doing so. Idaho Power monitors the frequency of these opt outs.
- Small Load Left On. Some participants also have small non-pump loads connected to their meter such as pivots, control panel load from cooling fans or other electronic controls, lights, or electric fences that are left on during an event.

Table 6 presents a breakdown of the load left on for each event this season. Load is presented as a percentage of enrolled MW that was left on by each failure type. For example, in the July 6th event, approximately 12.4 MW of load was left on due to DRU failure, out of an expected dispatched load of 89.9 MW, resulting in a device failure rate of 13.8%. Manual dispatch participants do not have DRUs and are not obligated to reduce load to zero, so they are excluded from this portion of the analysis.

Table 6. 2023 Load Left On by Event

Event Date	Device Failure	Opt Out	Small Load Left On	Total Left On	Average MW On During the Event
6-Jul	13.8%	5.9%	1.9%	21.6%	18.1
21-Jul	5.5%	1.6%	1.5%	8.6%	9.4
22-Jul	5.7%	2.0%	2.9%	10.7%	9.7
1-Aug	4.4%	0.6%	1.1%	6.0%	17.3
15-Aug	4.4%	0.2%	1.6%	6.3%	6.9
16-Aug	3.2%	0.6%	1.4%	5.2%	8.8
17-Aug	4.0%	1.5%	1.1%	6.7%	18.9

Percentages are based on load left on during event compared to total nominated MW.

Table 7 presents the Load Left On rates used in calculating the season peak potential. These percentages represent the expected load that would be left on during a peak-hour event with all dispatch groups called. The results are based on averages of events called in the 2023 season, weighted by dispatch group.

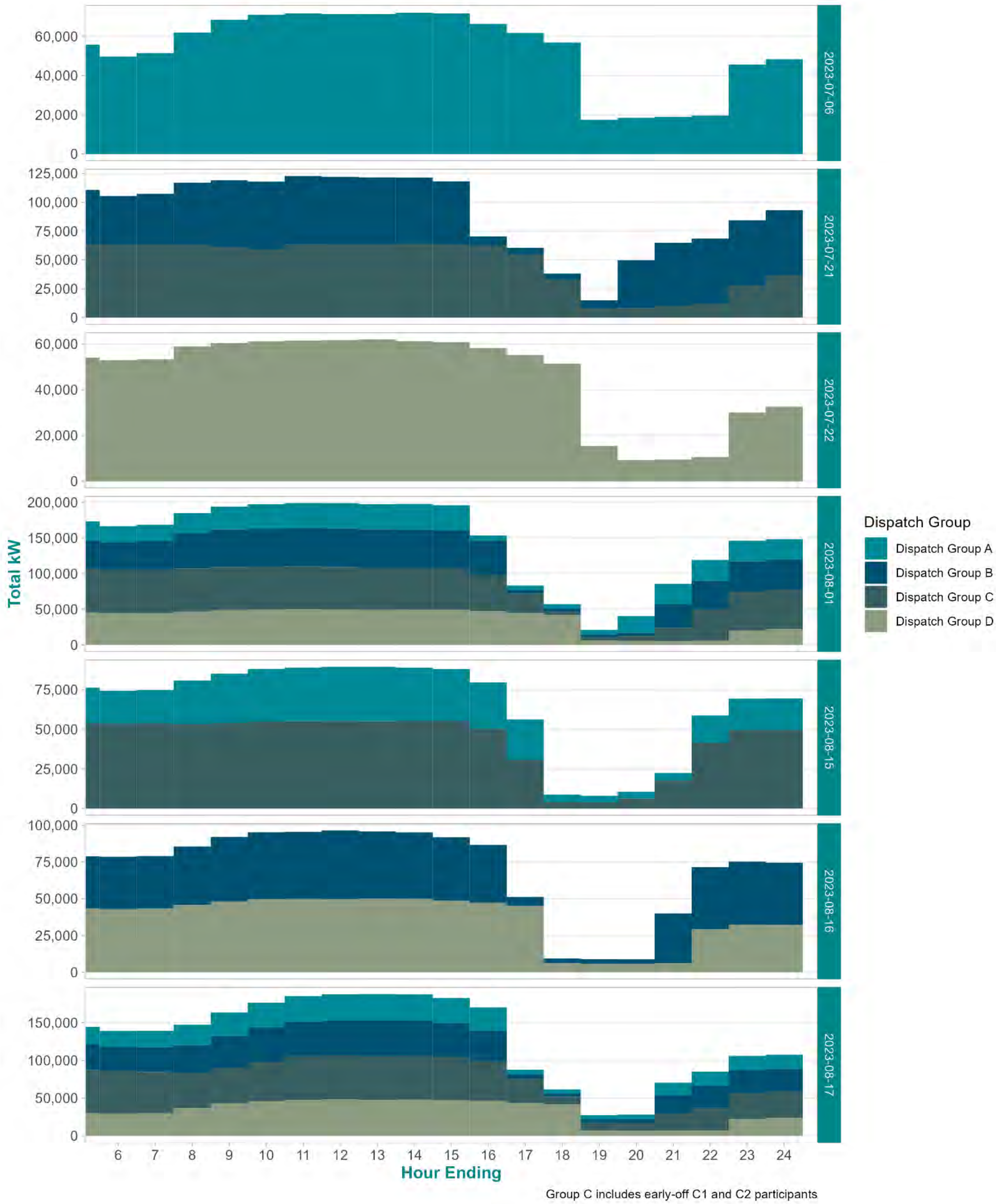
Table 7. 2023 Peak Potential Load Left On

Load Left On Type	Percentage	Peak MW Left On
Device Failures	5.9%	22.2 MW
Opt Out	1.5%	5.5 MW
Small Load Left On	1.7%	6.4 MW
Manual Load Left On	2.3%	8.7 MW
Total	11.3%	42.8 MW

Load Reduction Results

The bar charts in Figure 2 show actual event day loads by dispatch group for the hours leading up to, during, and after the event. A reduction in demand during the active event period is clearly shown on the charts. On days when multiple dispatch groups were called, a gradual drop and subsequent rise in system load is reflected, due to the staggered start/end times for the groups participating. Maximum demand reduction occurred toward the middle of the event, when all groups were shut down; small system load shown during the maximum reduction period is attributed to device failures, opt-outs, and small load left on on during the event. Note that the Y axes are individudually scaled for each event to improve visual clarity.

Figure 2. 2023 Event Day Loads by Dispatch Group



Appendix 1. The Demand Reduction Calculation Method

Abbreviations

ADO—Automatic Dispatch Option

AEL—Average Event Load

AMI—Automated Metering Infrastructure

BL—Baseline Load (Baseline Usage)

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:

$$DR_{group} = \Sigma\ DR_{pump\ AMI} + \Sigma\ DR_{pump\ MV\text{-}90} + \frac{DR_{(groups)}}{DR_{nominated\ (groups)}} * \text{Nominated } DR_{\text{pumps with errors}}$$

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 calculated reduction for the Automatic Dispatch Option sites and the Manual Dispatch Option sites:

$\text{Total Program DR} = DR_{MDO} + DR_{Group}$

Historical DSM Expense and Performance 2002–2023

		Total Costs			Savings and Demand Reductions			Levelized Costs[a]	
Program/Year	Participants	Utility Cost[b]		Resource Cost[c]	Annual Energy (kWh)	Peak Demand[d] (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			
2022	19,127	829,771		829,771		20			
2023	18,714	1,987,623		1,987,623		20			
Total		**$ 33,401,480**		**$ 33,401,480**					
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			

		Total Costs		Savings and Demand Reductions			Levelized Costs[a]	
Program/Year	Participants	Utility Cost[b]	Resource Cost[c]	Annual Energy (kWh)	Peak Demand[d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2017	141	658,156	658,156		36			
2018	140	433,313	433,313		33			
2019	145	626,823	626,823		31			
2020	141	542,480	542,480		24			
2021	139	501,973	501,973		31			
2022	159	519,618	519,618		25			
2023	271	1,076,149	1,076,149		33			
Total		**$ 17,525,118**	**$ 17,525,118**					
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			
2022	2,142	8,503,140	8,503,140		155			
2023	2,439	8,299,830	8,299,830		188			
Total		**$ 129,319,300**	**$ 129,319,300**					

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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**
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
2022	267	152,718	152,718	22,755		5	1.448	1.448
2023	99	146,232	146,232	46,109		3	1.068	1.068
Total..........................	**7,772**	**$ 1,152,586**	**$ 1,152,586**	**1,461,798**		**9**	**$ 0.107**	**$ 0.107**
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
2022	49,136	1,086,813	1,086,813	3,741,954		10	0.037	0.037
2023	53,028	902,288	902,288	3,960,690		8	0.034	0.034
Total..........................	**616,325**	**$ 17,897,653**	**$ 17,897,653**	**84,979,448**		**11**	**$ 0.025**	**$ 0.025**

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	**Participants**	**Utility Cost [b]**	**Resource Cost [c]**	**Annual Energy (kWh)**	**Peak Demand [d] (MW)**	**Measure Life (Years)**	**Total Utility ($/kWh)**	**Total Resource ($/kWh)**
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
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
2022	370,739	534,982	714,445	1,728,352		15	0.030	0.040
2023	184,950	294,197	402,523	883,491		15	0.032	0.044
Total	**15,788,111**	**$ 29,445,219**	**$ 61,856,285**	**263,616,205**		**9**	**$ 0.015**	**$ 0.032**
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

		Total Costs		Savings and Demand Reductions			Levelized Costs[a]	
Program/Year	Participants	Utility Cost[b]	Resource Cost[c]	Annual Energy (kWh)	Peak Demand[d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
2022	52	38,163	38,163	54,516		18	0.062	0.062
Total	**12,493**	**$ 5,970,354**	**$ 5,970,354**	**15,567,813**		**19**	**$ 0.033**	**$ 0.033**
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**

		Total Costs		Savings and Demand Reductions			Levelized Costs[a]	
Program/Year	Participants	Utility Cost[b]	Resource Cost[c]	Annual Energy (kWh)	Peak Demand[d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
2021	1,048	635,182	2,223,826	1,365,825		15	0.044	0.157
2022	1,080	666,016	2,414,026	1,310,260		15	0.050	0.180
2023	1,035	624,047	1,987,191	1,040,069		16	0.056	0.180
Total	**8,779**	**$ 8,289,662**	**$ 22,868,350**	**18,745,936**		**17**	**$ 0.040**	**$ 0.111**
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
2022	425	184,858	239,783	28,350		11	0.771	1.000
2023	337	230,011	274,124	11,329		13	2.156	2.570
Total	**3,451**	**$ 2,145,129**	**$ 2,465,721**	**1,125,480**		**11**	**$ 0.225**	**$ 0.259**

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy (kWh)	Savings and Demand Reductions: Peak Demand [d] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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
2022	104,826	964,791	964,791	20,643,379		1	0.044	0.044
2023	96,901	883,505	883,505	17,659,087		1	0.047	0.047
Total	**493,993**	**$ 4,112,913**	**$ 4,112,913**	**76,386,005**		**1**	**$ 0.051**	**$ 0.051**
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**	**$ 0.026**	**$ 0.084**
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
2022	97	34,181	34,181	41,959		11	0.096	0.096
Total	**2,230**	**$ 756,682**	**$ 756,682**	**1,839,363**		**11**	**$ 0.049**	**$ 0.049**
Multifamily Energy Efficiency Program								
2023	0	23,974	23,974	0		11	n/a	n/a
Total	**0**	**$ 23,974**	**$ 23,974**	**0**		**n/a**	**$** n/a	**$** n/a

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
2022	7	8,825	8,825	0		45	n/a	n/a
2023	3	7,860	7,860	0		45	n/a	n/a
Total	**119**	**$ 106,208**	**$ 194,320**	**126,713**		**28**	**$ 0.062**	**$ 0.113**
Rebate Advantage								
2003	73	27,372	79,399	227,434		45	0.008	0.022
2004	105	52,187	178,712	332,587		45	0.010	0.034
2005	98	46,173	158,462	312,311		45	0.009	0.032
2006	102	52,673	140,289	333,494		45	0.010	0.027
2007	123	89,269	182,152	554,018		45	0.010	0.021
2008	107	90,888	179,868	463,401		45	0.012	0.025
2009	57	49,525	93,073	247,348		25	0.015	0.029
2010	35	39,402	66,142	164,894		25	0.018	0.031

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy (kWh)	Savings and Demand Reductions: Peak Demand [d] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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
2022	97	167,622	402,649	255,541		44	0.043	0.104
2023	79	137,100	159,600	214,236		44	0.042	0.49
Total.........................	**1,632**	**$ 1,936,254**	**$ 3,949,723**	**6,215,520**		**39**	**$ 0.021**	**$ 0.043**
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
2017	277	323,520	603,420	608,292		45	0.029	0.054
2018	307	400,912	926,958	777,369		36	0.028	0.064
2019	322	534,118	1,411,391	774,597		54	0.035	0.092
2020	248	473,504	865,989	649,522		58	0.044	0.081

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2021	90	247,600	524,876	389,748		61	0.039	0.082
2022	109	235,732	578,922	337,562		58	0.045	0.110
2023	64	195,296	241,468	234,945		58	0.053	0.066
Total.........................	**5,697**	**$ 7,000,429**	**$ 12,892,688**	**10,776,335**		**37**	**$ 0.044**	**$ 0.081**
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
2022	1,874	128,856	128,856	39,595		40	0.218	0.218
2023	2,462	262,344	262,344	11,199		40	1.571	1.571
Total.........................	**20,209**	**$ 1,440,256**	**$ 1,440,256**	**218,927**		33	**$ 0.461**	**$ 0.461**
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**	**$ 0.044**	**$ 0.074**

Program/Year	Participants	Total Costs		Savings and Demand Reductions		Measure Life	Levelized Costs [a]	
		Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	(Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
Weatherization Solutions for Eligible Customers								
2008	16	52,807	52,807	71,680		25	0.057	0.057
2009	41	162,995	162,995	211,719		25	0.059	0.059
2010	47	228,425	228,425	313,309		25	0.056	0.056
2011	117	788,148	788,148	1,141,194		25	0.042	0.042
2012	141	1,070,556	1,070,556	257,466		25	0.254	0.254
2013	166	1,267,791	1,267,791	303,116		25	0.240	0.240
2014	118	791,344	791,344	290,926		25	0.163	0.163
2015	171	1,243,269	1,243,269	432,958		25	0.175	0.175
2016	147	1,323,793	1,323,793	621,653		25	0.130	0.130
2017	164	1,108,862	1,121,071	604,733		23	0.115	0.117
2018	141	1,022,471	1,022,471	571,741		23	0.112	0.112
2019	129	957,626	957,626	504,988		23	0.119	0.119
2020	27	208,715	208,715	47,360		23	0.338	0.338
2021	7	57,656	57,656	12,591		30	0.317	0.317
2022	27	205,788	205,788	48,233		30	0.307	0.307
2023	12	87,719	87,719	18,184		30	0.347	0.347
Total	**1,471**	**$ 10,577,964**	**$ 10,590,174**	**5,451,851**		**24**	**$ 0.151**	**$ 0.151**
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**	**$ 0.052**	**$ 0.081**
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

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy (kWh)	Savings and Demand Reductions: Peak Demand [d] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
2011	273	1,278,112	1,861,836	2,648,676		25	0.036	0.052
2012	228	1,321,927	1,743,863	621,464		25	0.157	0.208
2013	245	1,336,742	1,984,173	657,580		25	0.150	0.223
2014	244	1,267,212	1,902,615	509,620		25	0.184	0.276
2015	233	1,278,159	2,072,901	529,426		25	0.179	0.290
2016	234	1,254,338	1,870,481	722,430		25	0.129	0.192
2017	196	1,269,507	1,721,632	654,464		30	0.134	0.182
2018	190	1,254,630	1,795,301	641,619		30	0.136	0.194
2019	193	1,264,767	1,890,584	639,880		30	0.137	0.205
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
2022	147	1,277,717	2,024,735	272,647		30	0.338	0.535
2023	162	1,216,848	1,924,928	305,675		30	0.289	0.455
Total	**6,041**	**$ 25,512,934**	**$ 38,392,023**	**31,496,635**		**25**	**$ 0.062**	**$ 0.093**
WAQC—Oregon								
2002	31	24,773	47,221	68,323		25	0.027	0.051
2003	29	22,255	42,335	102,643		25	0.016	0.031
2004	17	13,469	25,452	28,436		25	0.035	0.067
2005	28	44,348	59,443	94,279		25	0.035	0.047
2006						25		
2007	11	30,694	41,700	42,108		25	0.054	0.074
2008	14	43,843	74,048	73,841		25	0.040	0.068
2009	10	33,940	46,513	114,982		25	0.023	0.031
2010	27	115,686	147,712	289,627		25	0.030	0.038
2011	14	46,303	63,981	134,972		25	0.025	0.035
2012	10	48,214	76,083	26,840		25	0.133	0.210
2013	9	54,935	67,847	24,156		25	0.168	0.208
2014	11	52,900	94,493	24,180		25	0.162	0.289
2015	10	36,873	46,900	20,595		25	0.133	0.169
2016	12	35,471	63,934	23,732		25	0.111	0.199
2017	7	37,978	61,052	15,074		30	0.175	0.281
2018	3	18,344	24,191	7,886		30	0.161	0.213
2019	4	38,960	62,905	9,419		30	0.287	0.463

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2020	0	24,414	24,414	0		30	n/a	n/a
2021	1	9,473	21,586	1,752		30	0.375	0.854
2022	0	3,778	3,778	0		30	n/a	n/a
2023	5	100,194	190,341	8,585		30	0.839	1.594
Total	**253**	**$ 836,843**	**$ 1,285,928**	**1,111,430**		**25**	**$ 0.058**	**$ 0.088**
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	**6,466**	**$ 26,525,047**	**$ 40,008,142**	**33,268,922**		**25**	**$ 0.061**	**$ 0.092**
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**	**$ 0.023**	**$ 0.035**
Commercial Energy-Saving Kits (Commercial Education Initiative)								
2005		3,497	3,497					
2006		4,663	4,663					
2007		26,823	26,823					
2008		72,738	72,738					
2009		120,584	120,584					
2010		68,765	68,765					
2011		89,856	89,856					
2012		73,788	73,788					
2013		66,790	66,790					
2014		76,606	76,606					
2015		65,250	65,250					
2016								
2017								
2018	1,652	146,174	146,174	442,170		10	0.034	0.034
2019	2,629	161,945	161,945	569,594		10	0.029	0.029
2020	1,379	103,678	103,678	258,368		11	0.047	0.047

		Total Costs		Savings and Demand Reductions			Levelized Costs[a]	
Program/Year	Participants	Utility Cost[b]	Resource Cost[c]	Annual Energy (kWh)	Peak Demand[d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2021	906	74,617	74,617	296,751		11	0.029	0.029
2022	334	22,770	22,770	48,758		10	0.059	0.059
2023	1,117	55,563	55,563	190,827		6	0.054	0.054
Total	**8,017**	**$ 1,234,107**	**$ 1,234,107**	**1,806,468**		**10**	**$ 0.086**	**$ 0.086**
New Construction								
2004		28,821	28,821					
2005	12	194,066	233,149	494,239		12	0.043	0.052
2006	40	374,008	463,770	704,541		12	0.058	0.072
2007	22	669,032	802,839	2,817,248		12	0.015	0.040
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
2022	88	2,780,507	3,641,930	27,615,777		12	0.011	0.015
2023	102	2,168,636	2,990,934	10,642,465		14	0.021	0.029
Total	**1,545**	**$ 32,976,287**	**$ 68,745,429**	**237,349,476**		**12**	**$ 0.016**	**$ 0.032**
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

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
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
2022	525	4,870,916	13,402,016	22,890,679		12	0.024	0.065
2023	526	3,184,964	9,012,722	14,457,180		12	0.025	0.070
Total	**18,381**	**$ 69,091,471**	**$ 168,710,161**	**454,540,883**		**12**	**$ 0.017**	**$ 0.041**
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**	**$ 0.020**	**$ 0.038**
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					

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	**Participants**	**Utility Cost [b]**	**Resource Cost [c]**	**Annual Energy (kWh)**	**Peak Demand [d] (MW)**	**Measure Life (Years)**	**Total Utility ($/kWh)**	**Total Resource ($/kWh)**
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					
2022	12	7,493	7,493					
2023	7	6,402	6,402					
Total	**248**	**$ 131,566**	**$ 131,566**					
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
2022	680	1,345,429	1,345,429	3,228,366		11	0.049	0.049
2023	166	366,674	366,674	791,512		11	0.055	0.055
Total	**1,437**	**$ 3,083,989**	**$ 3,083,989**	**7,221,979**		**11**	**$ 0.051**	**$ 0.051**
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

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
2022	106	8,919,927	25,715,468	56,157,060		13	0.017	0.049
2023	95	11,359,176	26,228,419	60,667,088		14	0.019	0.044
Total.........................	**2,602**	**$ 143,740,662**	**$ 322,132,764**	**949,157,032**		**13**	**$ 0.016**	**$ 0.036**
Green Motors Rewind—Industrial								
2016	14			123,700		7		
2017	13			143,976		7		
2018	25			64,167		7		
2019	12			117,223		8		
2020	10			56,012		8		
2021	4		12,172	20,430		8		
2022	9		3,424	19,851		8		
2023	17		11,915	63,538		8		
Total.........................	**104**	**$ 0**	**$ $27,511**	**608,896**		**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

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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
2022	519	2,080,027	14,083,686	6,937,855		18	0.027	0.179
2023	643	1,708,967	14,744,378	4,558,425		12	0.042	0.361
Total	**15,815**	**$ 43,410,441**	**$ 209,733,819**	**240,143,917**		**9**	**$ 0.025**	**$ 0.119**
Green Motors Rewind—Irrigation								
2016	23			73,617		19		
2017	27			63,783		19		
2018	26			67,676		19		
2019	34			44,705		20		
2020	23			36,147		20		
2021	12		87,254	19,352		21		
2022	6		5,634	16,951		23		
2023	4		1,911	4,463		21		
Total	**155**	**$ 0**	**$ $94,799**	**326,693**		**20**		
Other Programs								
Building Operator Training								
2003	71	48,853	48,853	1,825,000		5	0.006	0.006
2004	26	43,969	43,969	650,000		5	0.014	0.014
2005	7	1,750	4,480	434,167		5	0.001	0.002
Total	**104**	**94,572**	**97,302**	**2,909,167**		**5**	**0.007**	**0.007**
Comprehensive Lighting								
2011		2,404	2,404					
2012		64,094	64,094					
Total		**$ 66,498**	**$ 66,498**					

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy (kWh)	Savings and Demand Reductions: Peak Demand [d] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
Distribution Efficiency Initiative								
2005		21,552	43,969					
2006		24,306	24,306					
2007		8,987	8,987					
2008		-1,913	-1,913					
Total		**$ 52,932**	**$ 75,349**					
DSM Direct Program Overhead								
2007		56,909	56,909					
2008		169,911	169,911					
2009		164,957	164,957					
2010		117,874	117,874					
2011		210,477	210,477					
2012		285,951	285,951					
2013		380,957	380,957					
2014		478,658	478,658					
2015		272,858	272,858					
2016		293,039	293,039					
2017		1,759,352	1,759,352					
2018		1,801,955	1,801,955					
2019		2,119,820	2,119,820					
2020		1,811,869	1,811,869					
2021		2,226,910	2,226,910					
2022		2,795,885	2,795,885					
2023		2,511,829	2,511,829					
Total		**$ 17,459,092**	**$ 17,459,092**					
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

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
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**	**$ 0.029**	**$ 0.044**
Other C&RD and CRC BPA								
2002		55,722	55,722					
2003		67,012	67,012					
2004		108,191	108,191					
2005		101,177	101,177					
2006		124,956	124,956					
2007		31,645	31,645					
2008		6,950	6,950					
Total..........................		**$ 495,654**	**$ 495,654**					
Residential Economizer Pilot								
2011		101,713	101,713					
2012		93,491	93,491					
2013		74,901	74,901					
Total..........................		**$ 270,105**	**$ 270,105**					
Residential Education Initiative								
2005		7,498	7,498					
2006		56,727	56,727					
2007								
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					

Program/Year	Participants	Total Costs: Utility Cost [b]		Total Costs: Resource Cost [c]		Savings and Demand Reductions: Annual Energy (kWh)	Savings and Demand Reductions: Peak Demand [d] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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					
2022			300,175		300,175					
2023			371,316		371,316					
Total		$	**4,179,844**	$	**4,179,844**	**1,491,225**				
Solar 4R Schools										
2009			45,522		45,522					
Total		$	**45,522**	$	**45,522**					
Market Transformation										
Consumer Electronic Initiative										
2009			160,762		160,762					
Total		$	**160,762**	$	**160,762**					
NEEA										
2002			1,286,632		1,286,632	12,925,450				
2003			1,292,748		1,292,748	11,991,580				
2004			1,256,611		1,256,611	13,329,071				
2005			476,891		476,891	16,422,224				
2006			930,455		930,455	18,597,955				
2007			893,340		893,340	28,601,410				
2008			942,014		942,014	21,024,279				
2009			968,263		968,263	10,702,998				
2010			2,391,217		2,391,217	21,300,366				
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				

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy (kWh)	Savings and Demand Reductions: Peak Demand [d] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
2019		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	16,818,788				
2022		2,789,937	2,789,937	24,125,402				
2023 [1]		2,726,302	2,726,302	23,914,101				
Total		**$ 48,007,718**	**$ 48,007,718**	**440,338,160**				
Annual Totals								
2002		1,932,520	2,366,591	16,791,100	0.0			
2003		2,566,228	3,125,572	18,654,343	0.0			
2004		3,827,213	4,860,912	19,202,780	6.5			
2005		6,523,348	10,383,577	37,978,035	43.9			
2006		11,174,181	20,950,110	67,026,303	43.6			
2007		14,896,816	27,123,018	91,145,357	57.9			
2008		20,213,216	44,775,829	128,508,579	74.3			
2009		33,821,062	53,090,852	143,146,365	235.5			
2010		44,643,541	68,981,324	193,592,637	357.7			
2011		44,877,117	79,436,532	183,476,312	415.2			
2012		47,991,350	77,336,341	172,054,327	448.8			
2013		26,100,091	54,803,353	109,505,690	54.5			
2014		35,648,260	71,372,414	145,475,713	389.7			
2015		37,149,893	70,467,082	162,533,155	374.5			
2016		40,499,570	70,984,604	170,792,152	379.0			
2017		44,828,089	78,799,054	191,471,395	383.0			
2018		42,926,872	75,797,483	184,078,634	358.7			
2019		47,390,056	83,661,890	203,301,810	332.5			
2020		49,354,064	100,230,772	198,432,599	336.0			
2021		37,056,897	79,194,093	142,920,507	312.8			
2022		41,456,433	82,964,848	169,565,800	199.7			
2023		40,935,045	77,886,062	139,683,196	240.2			
Total Direct Program		**$ 675,815,863**	**$ 1,239,199,544**	**2,891,001,189**				

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy (kWh)	Peak Demand [d] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
Indirect Program Expenses								
DSM Overhead and Other Indirect								
2002		128,855						
2003		-41,543						
2004		142,337						
2005		177,624						
2006		309,832						
2007		765,561						
2008		980,305						
2009		1,025,704						
2010		1,189,310						
2011		1,389,135						
2012		1,335,509						
2013		$741,287						
2014		1,065,072						
2015		1,891,042						
2016		2,263,893						
2017		2,929,407						
2018		1,335,208						
2019		1,194,640						
2020		1,202,238						
2021		1,296,605						
2022		1,507,146						
2023		1,044,428						
Total		**$ 23,873,596**						
Total Expenses								
2002		2,061,375						
2003		2,528,685						
2004		3,969,550						
2005		6,700,972						
2006		11,484,013						
2007		15,662,377						

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy (kWh)	Savings and Demand Reductions: Peak Demand [d] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
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						
2022		42,963,579						
2023		41,979,473						
Total 2002–2023		**$ 699,689,459**						

[a] Levelized Costs are based on financial inputs from IPC's *2021 Integrated Resource Plan* and calculations include line loss adjusted energy savings.
[b] The Total Utility Cost is all cost incurred by IPC to implement and manage a DSM program.
[c] The Total Resource Cost is the total expenditures for a DSM program from the point of view of IPC and its customers as a whole.
[d] 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 line losses of 9.7% before 2023, and 7.6% starting in 2023.
[1] Savings are preliminary funder share estimates. Final results will be provided by NEEA in April 2024.

Utility Consumer Analytics, Inc

Adaptive Consumer Engagement

Idaho Power Corporation
Home Energy Report 2023
Final Program Summary

Version 1.3

Updated: 3/7/2024

www.adaptiveconsumerengagement.com

Table of Contents

Revision History

Date	Version	Description	Author/Editor
2-12-2023	1.0	Initial Draft	Thea Winch
2-26-2023	1.1	v1.1 edits/comments	Thea Winch
3-5-2023	1.2	v1.2 additional edits/comments	Thea Winch
3-7-2023	1.3	Final Version	Thea Winch

Document Approval

This section acknowledges approval of the information presented within. Please use the track changes feature to indicate any changes necessary before the plan can be approved. When ready to approve, please indicate the version number being approved and complete the fields below.

This Idaho Power Company Home Energy Report 2023 Final Program Summary, version 1.3, approved by:

Client Name:	
Name, Title:	
Signature	
Date:	
Client Name:	
Name, Title:	
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Date:	
Utility Consumer Analytics, Inc.	
Name, Title	
Signature:	
Date:	

Executive Summary

1. Project Overview

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.

Filters applied to identify customers who may participate in the program are based on recommendations from the vendor, as well as Idaho Power's experience and pilot learnings. Due to Oregon's small customer base, Idaho Power's (IPC) HER program is currently available only in Idaho.

Program Group refers to customers in the treatment group who are actively being treated with reports. These customers, by default, are also part of the evaluation group.

Evaluation Group refers to customers in the treatment or control group and is factored into the savings evaluations. Treatment customers in this group may or may not be actively receiving reports. Customers in the treatment group but not in the program group remain in the treatment group to maintain the RCT but are not actively treated for a variety of reasons discussed later in section 3 of the report.

Customers in the evaluation group are broken into treatment and corresponding control groups. T1 through T5 were onboarded in 2017 and 2018 as part of the pilot. T6 became active in 2020.

- **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
- **T5:** customers with low year-round energy use added in Year One.
    - *Note: these customers were removed from the program in 2020 and received their last report in February 2020*
- **T6:** expansion of customers based on eligibility criteria determined after the pilot

The table below shows the number of customers in the treatment, control, and program groups at the beginning and end of 2023. Customers are removed from both groups when they **move out**.

Table 1: 2023 RCT and Program Group Participant Counts

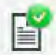
	Program			Control			Treatment		
	Jan 1	Dec 31	Net Diff	Jan 1	Dec 31	Net Diff	Jan 1	Dec 31	Net Diff
T1	4,400	4,144	256	1,196	1,137	59	4,803	4,509	294
T2	3,680	3,480	200	674	625	49	4,203	3,968	235
T3	4,616	4,377	239	2,916	2,760	156	4,892	4,624	268
T4	2,171	2,073	98	2,158	2,043	115	2,292	2,178	114
T5*					42,455			3,639	
T6	84,210	78,401	5,809	11,604	10,879	725	85,806	80,214	5,592
Combined Total	99,077	92,475	6,602	18,548	59,899	1,104	101,996	99,132	6,503

**T5 stopped receiving reports in 2020, so they are no longer in the Program Group. Residual savings from T5 are still calculated for the PSR, so Treatment and Control counts are still tracked.*

The Home Energy Reports included the following elements:

- **Customer information:** customer name, address, and account number
- **Household energy-usage disaggregation:** home usage is 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

Table 2 – 2023 Report Delivery Schedule by Cohort

	2023											
Cohort	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4, T6												

2. 2023: Summary of Results and Findings

Main takeaways from 2023 are as follows.

Savings

The total savings calculated for 2023 are 17,737,130 kWh. Collectively, the savings for all waves combined are statistically significant. Although T-5 did not receive reports after February 2020, when compared with their control group, they showed persistent savings. Excluding the savings from T5, the program's overall annual 2023 savings are 17,467,444 kWh.

Using a weighted average calculation without T5 residual savings factored in, the treatment groups saved 1.24% or 182.92 kWh per customer. With residual savings from T5 included, the weighted average savings for all treatment groups was 178.92 per customer or 1.24%.

Table 3: 2023 Program Savings by T-Groups

Cohort	Average Energy Savings in kWh per Customer	Cumulative Savings (all months, all households, kWh)	Percent Savings	Statistical Significance
T1	11.05	49,817	0.05%	N
T2	183.89	729,671	0.88%	N
T3	249.21	1,152,330	1.69%	Y
T4	213.14	464,213	2.04%	Y
T5	74.11	269,686	1.04%	Y
T6	187.89	15,071,413	1.28%	Y
Combined Groups	**178.92**	**17,737,130**	**1.24%**	**Y**

Table 4: 2023 Home Energy Reports Delivered in 2023

Report Cycle	Recipients	# of Email Only Recipients	# of Paper Only Recipients	# of Both Email & Paper Recipients	# of Unique Customers Receiving HERs	Total Reports Delivered
February	T1, T2, T3, T4, T6	106	57,741	39,054	96,901	135,955
May	T1, T2, T3, T4, T6	137	47,285	47,926	95,348	143,274
August	T1, T2, T3, T4, T6	145	46,490	47,096	93,731	140,827
November	T1, T2, T3, T4, T6	152	45,134	46,845	92,131	138,976
2023 Report Totals		**540**	**196,650**	**180,921**	**378,111**	**559,032**
2023 Participants					**96,955**	

Notes on Table 4:

- *Total Reports Delivered is calculated by adding email only + paper only + (both email and paper x 2).*
- *The participant count is based on the number of reports sent in the first report cycle of the year. For 2023, the participant count will be 96,901.*
  Note: An additional 54 customers received at least one report during the year but did not receive a February report.

Table 5: Year-Over-Year Home Energy Reports Delivered

Program Year	Recipients	Email Only Reports Sent	Paper Only Reports Sent	Both Paper and Email Reports Sent	# of Program Participants
Year 1 of Pilot (2017-2018)	T1, T3, T4, T5	N/A	149,546	N/A	23,914
Year 2 of Pilot (2018-2019)	T1, T2, T3, T4, T5	N/A	116,087	N/A	24,976
2020	T1, T2, T3, T4, T5, T6	257	488,545	N/A	127,313
2021	T1, T2, T3, T4, T6	507	445,334	N/A	115,153
2022	T1, T2, T3, T4, T6	578	406,587	98,570	104,826
2023	T1, T2, T3, T4, T6	540	196,650	180,921	96,955
Total Reports Delivered	**N/A**	**1,882**	**1,802,749**	**279,491**	**N/A**

Notes on Table 5:

- *T2 was launched in Year 2 of Pilot*
- *Email reports launched at the beginning of 2019*
- *T5 was discontinued in 2020. The last report they received was in February 2020*
- *T6 launched in May 2020, and customers received the first report in June 2020*
- *In August of 2022, we expanded email HERs (eHERs) to all customers with an email address.*
- *IPC pulled Total Reports Delivered data for Year 1 of Pilot (2017-2018) and Year 2 (2018-2019)*
- *Uplight pulled Total Reports Delivered Data for 2020, 2021, 2022, and 2023*

Email HER-Specific Statistics

In 2023, 181,461 total emails were sent. Of those, 179,715 emails were successfully delivered, and a total of 94,451 were opened. This is a 53% open rate, which is stronger than average. The total clickthrough rate (that is, the rate of clicks on links contained within the emails) was 2.13%.

Customer Calls fielded by IPC's Customer Solutions Advisors

The total number of customer calls has steadily decreased from the peak in 2020 when T6 was launched. In 2023, there was a 6% decrease in the total number of calls compared to 2022. The reduction in 2023 is especially notable since the total number of reports delivered increased significantly when eHERs were expanded to all eligible customers in the Program Group in 2022. The expansion increased the number of eHERs sent from 507 in 2021 to 181,461 in 2023.

Table 6: Year-Over-Year Customer Calls

	Year 1 of Pilot (2017-2018)	Year 2 of Pilot (2018-2019)	2020	2021	2022	2023
Total Calls*	411	246	1,087	660	409	385
Total Reports Delivered	149,546	116,087	448,802	445,841	505,735	559,032
% to # of reports delivered	0.27%	0.21%	0.24%	0.15%	0.08%	0.07%

Notes on Table 6:

- *IPC pulled Total Reports Delivered data for Year 1 of Pilot (2017-2018) and Year 2 (2018-2019)*
- *Uplight pulled Total Reports Delivered Data for 2020, 2021, and 2022*

3. Program Attrition

Attrition Rates

The attrition rate measures the number of people removed from the HER program due to not meeting program requirements (as specified below) or because participants chose to opt out. The permanent attrition rate in 2023 was 4.78%, with a total of 6,445 customers removed. Of these 5,440 were removed due to move-outs (affects both the Program and Evaluation Groups) and 1,005 were permanently removed from the Program Group for one of the following reasons: opting out, incompatible location type*, incompatible property type**, or unsupported rate code***. This is down from 2022, when the attrition rate was 6.84%, with 9,228 customers being permanently removed, and from 2021, when the permanent attrition rate was 7.82%, with 10,546 customers being permanently removed.

Move-out removals affect the Evaluation Group (both treatment and control). Other types of permanent removals, including customers who opt out of the program, remain in the evaluation group to maintain the balance of the RCT even though they no longer receive reports.

**Customers with zip codes outside of the geographic parameters for similar home comparisons or those categorized as insufficient location benchmarking are verified as incompatible locations.*

***Pilot customers whose home types are single-family homes or manufactured homes are eligible to receive reports. For T6, only customers whose home type is single-family homes are eligible to receive reports. All other home types are considered incompatible property types.*

****Customers whose rate code is I06 (Residential Service On-Site Generation/solar).*

Table 7: 2023 Attrition Summary

	Permanent Removals		Opt-Outs	
	Count	%	Count	%
T1234	808	3.07	10	0.053
T6	5,637	5.20	59	0.071
Combined	6,445	4.78	69	0.067
Overall Attrition Rate	**4.85%**			

Notes on Table 7:

- *The attrition metrics, including opt-outs, are calculated using the difference between the participant counts from the last report of the previous year to the last report of the current year.*

Table 8: Year Over Year Attrition

	Opt-Out Count	Opt-Out %	Overall Attrition %
2018	172	0.64%	12%
2019	66	0.22%	15.15%
2020	154	0.1%	9.4%
2021	138	0.12%	7.82%
2022	106	0.08%	6.92%
2023	69	0.05%	4.83%

Year Over Year Savings Comparisons

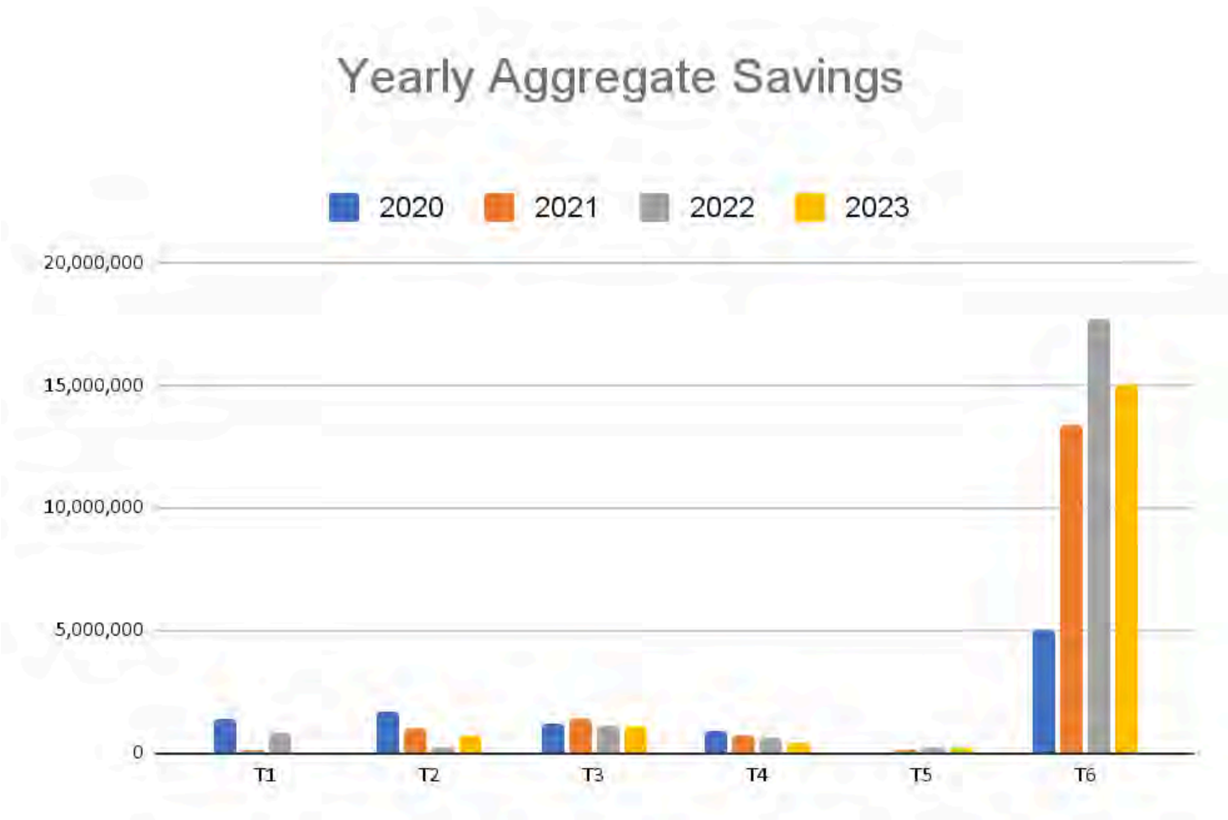
Table 9: Year Over Year Savings Comparisons

	T1	T2	T3	T4	T5	T6	Aggregate Savings in kWh	Count of Evaluation Group
2018	____	____	____	____	____	N/A	3,281,780	23,914
2019	____	____	____	____	____	N/A	8,444,746	24,976
2020	1,445,666	1,734,800	1,237,313	881,080	67,831	5,017,703	10,427,940	127,138
2021	183,325	981,868	1,378,427	740,448	100,575	13,382,802	16,767,446	115,153
2022	781,761	238,339	1,113,894	612,969	259,616	17,728,033	20,734,611	104,826
2023	49,817	729,671	1,152,330	464,213	269,686	15,071,413	17,737,130	99,132
Aggregate Savings in MWh	____	____	____	____	____	____	77,393	N/A

Notes on Table 9:

- *2018-2019 savings and participant counts were sourced from IPC's DSM Reports and/or Pilot Program Summary Reports (PSR). Only the aggregate savings for T1 - T5 were pulled.*
- *T5 transitioned to residual savings starting in March 2020.*
- *T6 launched in 2020.*
- *Note: We noticed swings in aggregate savings for T1 and T2. Uplight is investigating why this is happening, and if changes are needed moving forward, they will be discussed with IPC.*

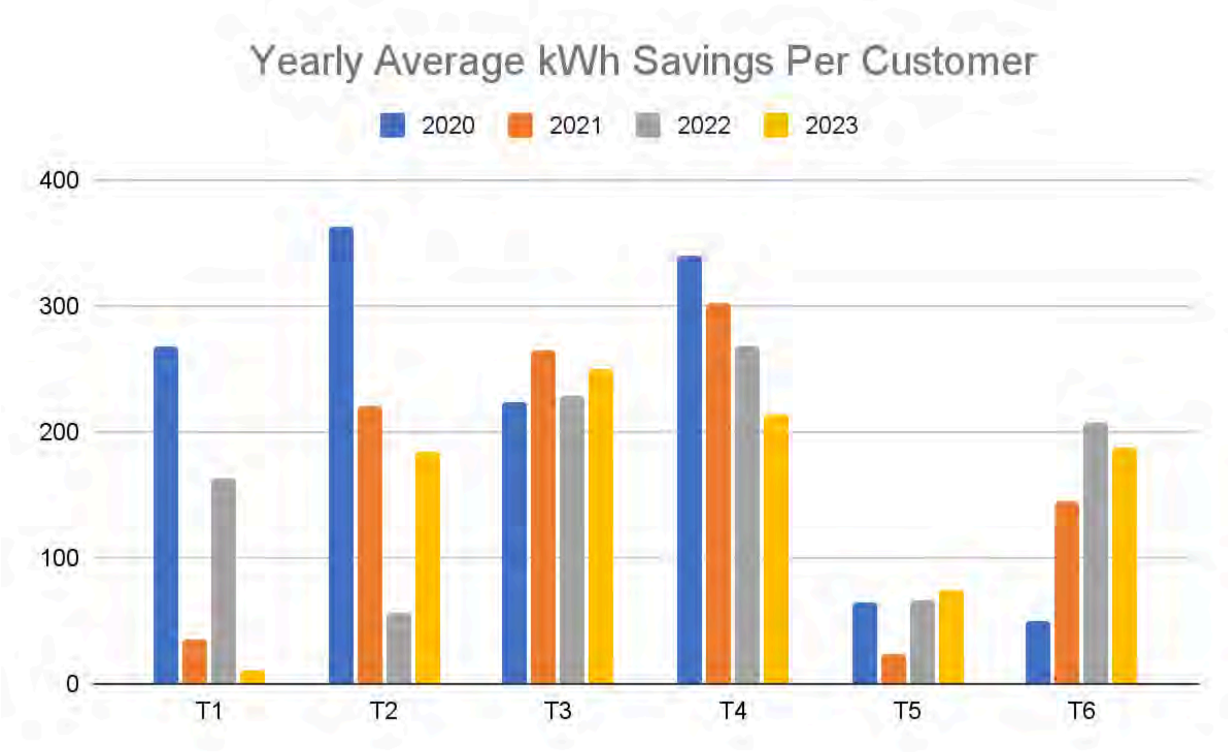
Figure 1: Yearly Aggregate Savings



Notes on Figure 1:

- *T5 savings are present in the chart. The savings are so small compared to T6 that they are barely visible.*

Figure 2: Yearly Average kWh Savings Per Customer



1. Program Overview

1.1 Team Structure

Since 2017, the IPC Home Energy Report program has been a joint effort between Idaho Power Company, Utility Consumer Analytics | N. Harris Computer Corporation (formerly Aclara), and Uplight (formerly Ecotagious). Uplight acquired Ecotagious in July 2019, and in June 2021, N. Harris Computer Corporation acquired Adaptive Consumer Engagement (ACE) from Aclara Technologies.

1.2 Objectives

1.2.1 Program Objectives

The following business requirements were captured during an onsite meeting on August 22, 2019, and documented in the contract as part of 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 the 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 2020, the savings calculated using a difference-in-difference methodology can be attributed to treatment in previous years.

IPC is working with its third-party consultant to identify an appropriate trigger to stop including T5 savings in the aggregate yearly savings estimate.

1.3 Eligibility Screening

1.3.1 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.

Table 10: 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

The eligibility criteria applied in years one and two were also used in year three to determine the eligible participants in the T6 group. New criteria were added based on learnings from the pilot.

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) randomly removed 29,369 customers from the control groups for Pilot waves 1, 2, 3, and 4 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 are Shown in Table 9

The criteria for culling customers during eligibility screening are shown in Table 9.

In late 2020, an issue arose where the benchmarking group for several treatment customers fell below the required threshold of 100 homes. Although adequate benchmarking was part of the initial criteria, the size of the benchmarking group during eligibility screening had been set too low. This issue created a situation where customers remaining in the program could potentially receive sporadic reports and have a negative customer experience. As a result, the vendor and IPC made a joint decision to remove participants with inadequate benchmarks from active treatment. At this time, the vendor also confirmed those customers remaining in the treatment had enough homes in their respective benchmarking groups to provide quality data for subsequent reporting periods.

Table 11: Criteria and Rationale for Culling Customers During Eligibility Screening

[removed table for public version]

Figure 3: Eligibility Funnel for 2020 Expansion

[removed table for public version]

1.4 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 considering exclusionary factors such as move-ins/move-outs and 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 as a result of ongoing 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 ongoing 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.

2020 Expansion

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 the optimization of the existing treatment groups was complete, a total of 18,492 customers were identified as pilot participants eligible for treatment in year three. The following changes were made to the pilot 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 pilot 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 12: Reduction in Pilot 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.

2022 eHER Expansion

In August of 2022, eHERs were expanded to all customers with email addresses. Customers in this group received eHERs in addition to their standard paper reports. Before this, only customers who had opted into eHERs received an eHER only. This substantially increased the number of eHERs sent to each cycle. In 2021, before the expansion, a total of 507 eHERs were sent in the program year. In 2022, that number increased to 99,148 (a combination of August and November cycles). This increased to 181,461 in 2023 (a combination of all four cycles).

1.5 Customer Data Acquisition/Integration

In the 2023 Program year, UCA-Harris planned to upload the "hot water heater likely" flag directly to My Account using the prioritization below. This did not happen, however, and Uplight continued to use an ad-hoc process to provide enhanced segmentation for customers with and without electric water heaters. Here is the methodology for Uplight's ad-hoc process:

1. If there is no water heater data from My Account for a customer, and there is no data in the "hot water heater likely" file from Idaho Power, leave it blank.
2. If there is no data from My Account for a customer, but there is data in the "hot water heater likely" file from Idaho Power, use the hot water heater data from Idaho Power.
3. If there is water heater data from My Account but no data in the "hot water heater likely" file from Idaho Power, use the hot water heater data from My Account.
4. If there is water heater data from My Account and data in the "hot water heater likely" file from Idaho Power, prioritize the hot water heater data from My Account.

Table 13: Data Requirements

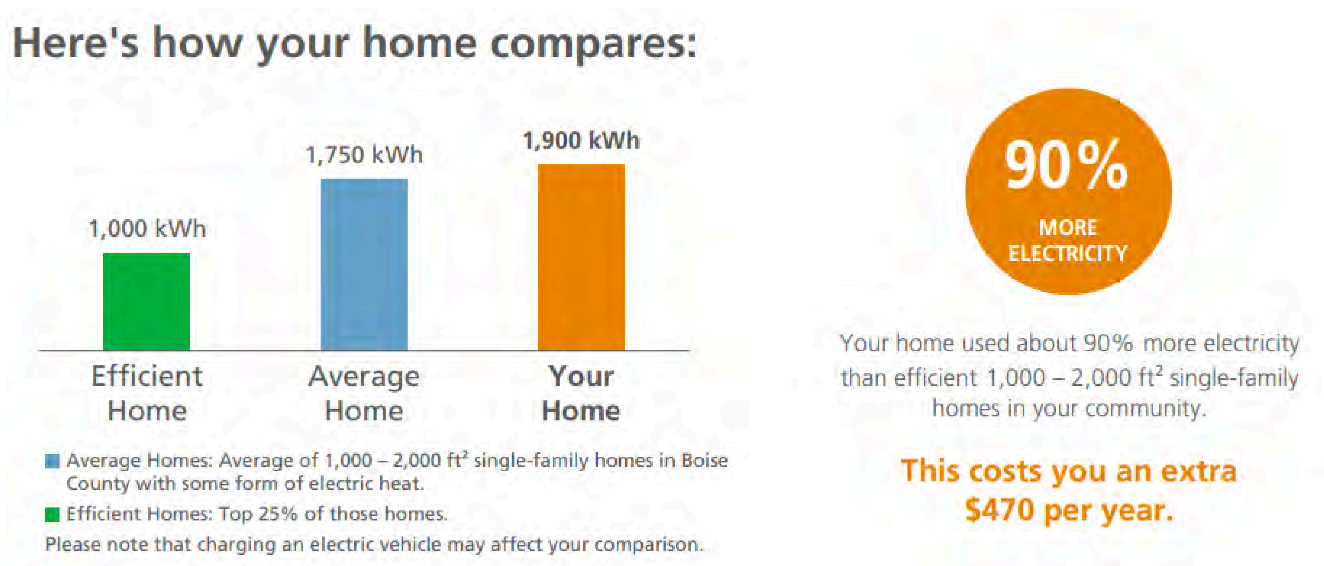
Integration Point	Description	Format	Frequency	Initiator	Recipient
Public Record Data	UCA-Harris calls Melissa Data for the latest property records for treatment group customers, selected control customers, and random samples for benchmarking.	CSV	batch: one-time historical (performed year one)	UCA-Harris	UCA-Harris
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	UCA-Harris
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	UCA-Harris
Action and Profile Data	UCA-Harris extracts customer action and profile data from *My Account* tools (EnergyPrism) for treatment and control group customers.	CSV	recurring weekly	UCA-Harris	UCA-Harris
Opt-Outs	UCA-Harris provides a weekly report on all customer calls and opt-outs to Idaho Power.	CSV	recurring weekly	Idaho Power	UCA-Harris

Do Not Contact (DNC) List	Starting with the August 2022 cycle, Idaho Power provides an updated DNC list once a quarter - prior to reports being sent. Uplight removes customers on the DNC list from the eHER mailing list.	CSV	recurring quarterly	Idaho Power	Uplight
Hot Water "likely list"	Idaho Power provided account numbers for customers who are likely to have electric hot water heaters. This data was then used to provide targeted water usage tips for customers who are likely to have hot water heaters.	CSV	one-time (performed in November 2022 as part of the eHER expansion)	Idaho Power	Uplight

1.6 Benchmarking Flags

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) Home Size (square feet), 2) Home Type, and 3) County. In the 2020 expansion, two additional flags were added, one for ESH and one for AC.

Figure 4 - Peer Comparison Section



1.7 Overview of Segmentation Used for 2023 Improving Tip Selection

Idaho Power and Uplight are always on the lookout for new ways to keep report messaging personalized and fresh. This is a good way to drive additional customer engagement with the intent of increasing program savings and participation. In 2023, the segmentation in Table 14 was used.

Table 14: Segmentation Used for 2023 Quarterly Home Energy Reports

Report Cycle	Segmentation
February	Hot Water Heater/Appliances and Lights
May	Air Conditioning/Appliances and Lights
August	Air Conditioning/Always On
November	Electrical Space Heating/Appliances and Lights

1.8 Key Decisions

Included NCOA group (USPS undeliverables) in Program Group

The inclusion of USPS undeliverables in our Program Group went well in 2022 and is now part of our permanent process.

Before May 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 the 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. IPC has not received HERs marked "return to sender" in any notable quantity to date.

1.9 Vendor History

<table>
<tr><th>Time Period</th><th>Idaho Power Contractor</th><th>Subcontractor</th><th>Consulting Support</th></tr>
<tr><td>April 2017</td><td rowspan="2">Aclara:
· Receives IPC data and conveys to Ecotagious
· Manages timeline and invoices IPC</td><td>Ecotagious:
· Receives data from Aclara, produces and disseminates HERs using proprietary algorithms</td><td rowspan="3">DNV: Craig Williamson
· Advice on C/T sizing, experimental design, etc.
· Assigned C/T groups</td></tr>
<tr><td>November 2019</td><td>Uplight acquires Ecotagious
· Cory Knoll PM</td></tr>
<tr><td>June 2021</td><td rowspan="2">UCA Harris acquires Aclara HER programs</td><td rowspan="4">Uplight:
· Thea Winch replaces Cory as PM</td></tr>
<tr><td>August 2021</td><td rowspan="3">DNV: Ken Agnew
· Advice on anything related to experimental design and savings calculations</td></tr>
<tr><td>May 2023</td><td>HERs move to SilverBlaze, a division of UCA Harris</td></tr>
<tr><td>January 2024</td><td>Uplight:
· Receives IPC data, produces and disseminates HERs using proprietary algorithms</td></tr>
</table>

2. 2023 Program Results Detail

2.1 Objectives: Findings

2.1.1 Energy Savings

Cumulative Savings During Treatment Period

In total, we saw an average of 182.92 kWh savings per treatment customer. This added up to a total combined savings of 17,467,444 kWh across all treatment groups as of December 31, 2023. Savings calculations from T3, T4, and T6 were statistically significant. See Table 3 for 2023 savings per cohort. The aggregate savings with all treatment groups combined were statistically significant.

Additionally, the T5 treatment group was treated with home energy reports through February 2020 and continued to show persistent savings post-treatment. All treatment customers in 2023, including the T5 post-treatment period, showed a total combined savings of 17,737,130 kWh and an average savings of 178.92 kWh per customer. Savings calculations from T5 were statistically significant. The aggregate savings with all groups combined were also statistically significant.

Table 15: 2023 Cumulative Savings Active by Cohort
T12346 Treatment Period: Jan 1, 2023 - Dec 31, 2023

Cohort	Avg kWh Savings per Customer	Average Savings Percent	95% Confidence Margin of Error	One-Sided Null Hypothesis P-Value	Cumulative Aggregate Savings (kWh)
Winter Heating – T1	11.05	0.05%	411.90	0.489728	49,817
Winter Heating – T2	183.89	0.88%	233.85	0.215828	729,671
Year-Round - T3	249.21	1.69%	112.48	0.013359	1,152,330
Year-Round - T4	213.14	2.04%	98.76	0.015459	464,213
Expansion - T6	187.89	1.28%	39.66	1.08399E-06	15,071,413
Combined	182.92	1.24%	29.95	2.50686E-33	**17,467,444**

Notes on Table 15:

- *In 2021, the decision was made to continue including IO6 customers in our Evaluation Group for yearly reporting. The data in Table 15 includes IO6 customers.*

Table 16: 2023 Cumulative Savings by T5 (inactive Cohort)
T5 Persistent Period: Jan 1, 2023 - Dec 31, 2023

Cohort	Avg kWh Savings per Customer w/ IO6	Average Savings Percent w/ IO6	Cumulative Aggregate Savings (kWh) w/ IO6
Year-Round - T5	74.11	1.04%	269,686

Table 17: 2023 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	178.92	1.237%	17,737,130

2.1.2 Year-to-Date average Savings Per Customer By Treatment Group

Table 18: Average kWh Savings per Cohort

	T1	T2	T3	T4	T6
Jan 2023	115.66	(13.46)	23.64	33.87	20.86
Feb 2023	36.79	(15.64)	46.73	60.62	39.63
Mar 2023	31.06	5.61	67.95	83.38	54.13
Apr 2023	8.87	50.57	87.29	105.36	61.04
May 2023	4.01	77.46	101.77	123.94	70.61
Jun 2023	10.77	89.31	112.34	138.61	85.62
Jul 2023	33.54	122.69	139.36	159.86	107.34
Aug 2023	33.06	124.56	160.95	184.23	124.01
Sep 2023	31.84	136.45	186.74	178.39	142.10
Oct 2023	15.62	151.21	215.78	184.39	151.20
Nov 2023	4.69	156.14	236.13	192.47	170.44
Dec 2023	11.05	183.89	249.21	213.14	187.89

Notes on Table 18:

- *Starting in 2023, we began pulling Year-to-Date Monthly Savings to maintain consistency with the Quarterly Monitoring Reports.*
- *Numbers in parentheses represent negative savings for that month.*

2.1.3 2023 Combined Savings for Expansion Participants (T6) Vs. Pilot Participants (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. Savings for T6 have ramped up and are performing well.

Compared to the pilot customer group, an analysis of savings within the expansion participant group (T6) found that in 2023, T6 saved an average of 187.89 kWh per customer. T3 and T4 continue outperforming T6, while T1 and T2 have underperformed. In aggregate, the active pilot cohorts saved an average of 156.82 kWh per customer, and T5 had a residual average savings of

74.11 kWh per customer. The combined average savings for T1, T2, T3, T4, T5, and T6 was 178.92 kWh per customer.

2023 was the third 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 Delivery, Open, and Bounce Rates

In 2023, a total of 181,461 email reports were sent to Idaho customers and seeds (i.e., IPC employees receiving an eHER to evaluate it). Of these, 179,715 emails were successfully delivered, and a total of 94,451 were opened. This resulted in a 53% open rate, which is stronger than average. The total clickthrough rate (the rate of clicks on links contained within the emails) was 2.13%.

2.3 Customer Feedback

2.3.1 Customer Service Line Calls and Opt-Out Rates

Table 19: CSA Calls and Opt-Out Call Rates

	2018	2019	2020	2021	2022	2023
Total Calls	411	246	1,087	660	409	385
Opt-Out Calls	172	66	211	115	93	94
% of Opt-Out Calls to Total Calls	42%	27%	19%	17%	23%	24%

In 2023, IPC customer solutions advisors (CSAs) received 385 calls related to the HER program. Customers must call in to opt out of paper reports, so it makes sense that opt-outs are a notable percentage of total calls.

From January to December 2023, CSAs classified each call they received into one of eight categories as specified in the table below:

- General
- Profile Update

- Opt-Out
- Escalation
- Non-Program-Related
- Switching to Email
- Switch to Paper
- Other

Figure 5: 2023 Calls by Type

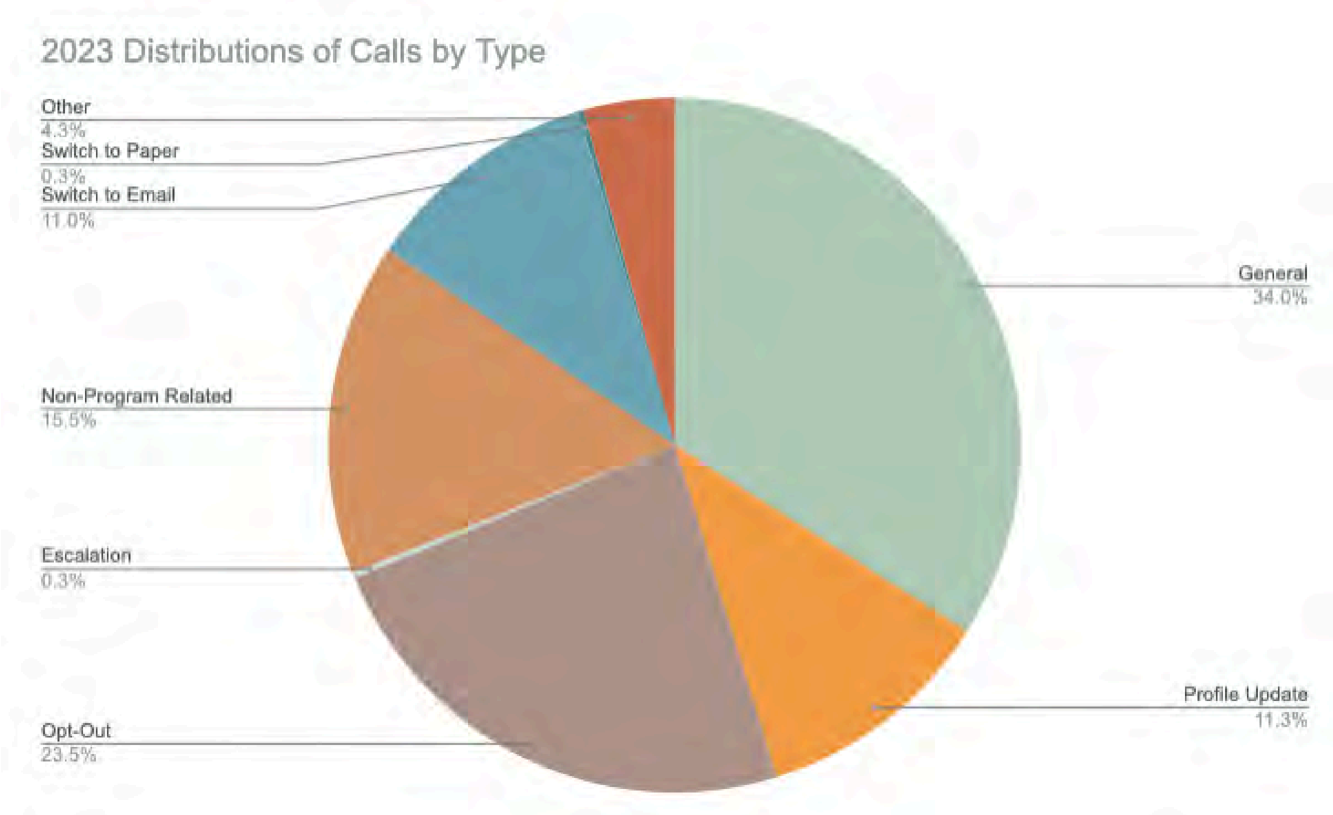


Table 20: – Reasons for Calls to CSAs in 2023 by Category

Call Reason	2023												Total
	Jan	Feb 🗎	Mar	Apr	May 🗎	Jun	Jul	Aug 🗎	Sep	Oct	Nov 🗎	Dec	
General	1	30	1	2	25	3	4	37	—	6	26	1	136
Profile Update	1	9	2	3	8	—	—	10	—	2	10	—	45
Opt-Out	—	26	3	2	16	2	—	11	—	3	30	1	94
Switch to Email	—	9	1	—	10	—	—	9	1	—	14	—	44
Switch to Paper	—	1	—	—	—	—	—	—	—	—	—	—	1
Escalation	—	—	—	—	—	—	—	1	—	—	—	—	1
Non-Program-Related	2	10	8	—	8	4	1	13	2	1	12	1	62
Other	—	4	—	1	5	—	1	4	—	2	—	—	17
Total Reasons*	**4**	**89**	**15**	**8**	**72**	**9**	**6**	**85**	**3**	**14**	**92**	**3**	**400**
Total Calls*	**4**	**87**	**15**	**8**	**68**	**9**	**6**	**82**	**3**	**14**	**86**	**3**	**385**

🗎 ***indicates report month***

****Some customers call for more than one reason, which is why the Total Reasons and Total Calls vary.***

Following are some sample notes from CSAs regarding phone calls from customers about the HER program:

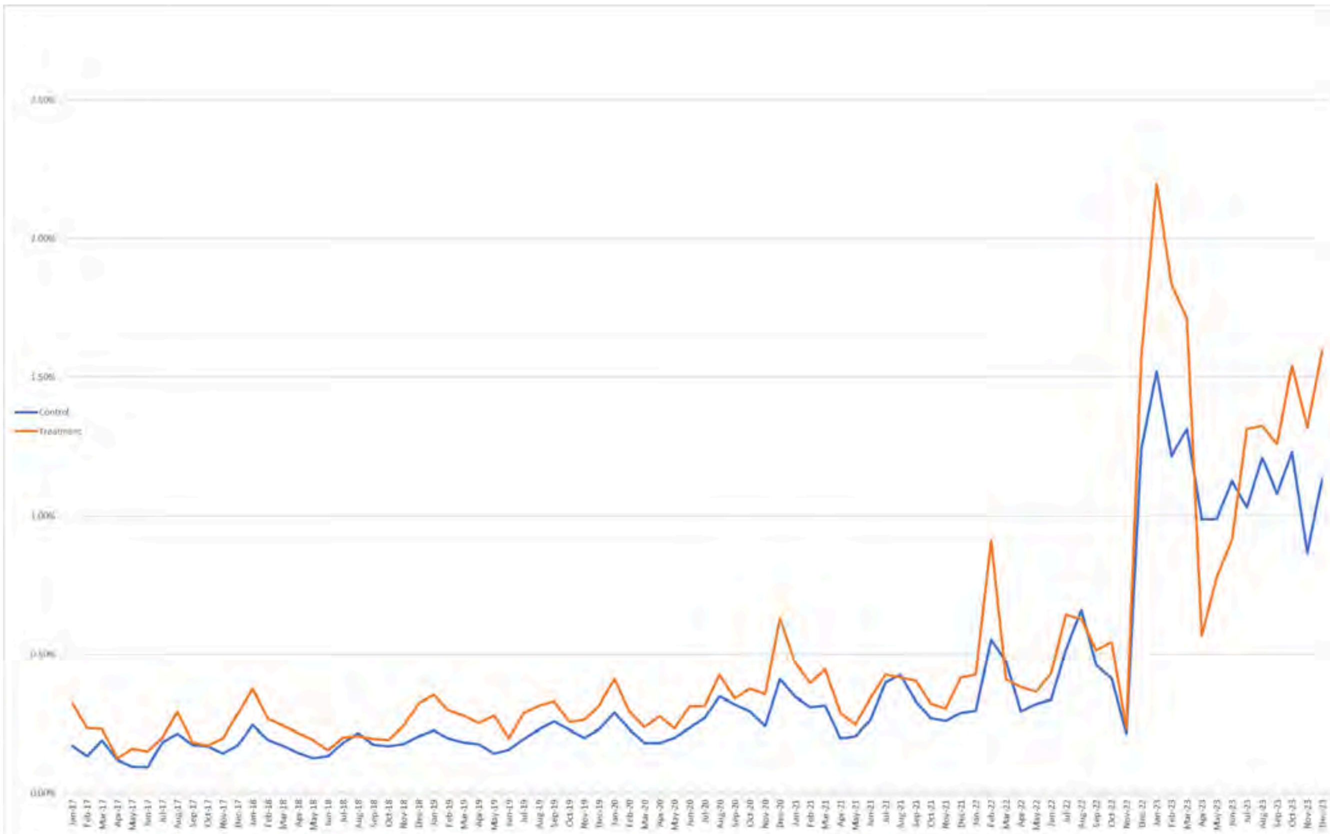
- *"Customer prefers to receive information via email"*
- *"HER report prompted to sign up for home energy audit"*
- *"Customer wants us to save the cost they have done what they can already."*
- *"Inq about the incentives or rebates available since she saw at the bottom of HER Report that we have some available.*
- *"I'm requesting to not receive these reports anymore. The high electric bills are depressing enough without adding the fact my 123 year old house uses half again the amount of energy an average house uses. I can do nothing about the baseboard and radiant ceiling heat. I keep the heat in the mid-60s and it's done nothing to change my bill."*
- *"says they have done all they are willing to do so report is pointless"*
- *"Cust could not figure out why it was showing that 39 percent of their energy is for electric heat when they are not electric. We went over what type a system they have, and it is a heat pump, educated that runs solely on electricity, she had no idea of this. Recommend Home Profile to update data to be more specifically tailored."*
- *"[Customer] called in regarding last two bills, which were significantly higher than year before. He installed new heat pump, had a heat pump prior. He wanted to discuss with EA. Submitted EA SIO. Didn't have a computer that works, so no my account.*
- *"[Customer] called about report..is on hospice with quite a bit of equipment so the report made sense to him that they were a little higher than average"*
- *"[Customer] George emailed that he is happy with his usage and the report"*
- *"Caller interested in solar, but because of high use HER report. Had in depth solar convo, also considering getting an EV, looked at TVP. Recommended updating Home Profile for accuracy and getting Home Energy Audit for increased energy efficiency."*
- *"[Customer], HER had just arrived so he used the 800 on the report to call in a trouble order outage."*
- *"Why does my usage compare this way? Profile was marked gas heat instead of electric. Updated profile."*

2.4 Additional Metrics

2.4.1 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 0.10 percent more active on My Account than the controls since January 2017.

Figure 6 - My Account Activity Treatment vs. Control Program to Date



2.4.2 Attrition Rate Detail

HER Expansion (T6) Attrition Rates

Table 21: T6 Attrition Rates in 2023

T6	Feb	May	Aug	Nov	Total
Total Reports Delivered	82,157	80,763	79,360	77,952	320,232
Move-Outs	1,062	1,066	1,126	1,511	4,765
Unsupported Rate Code (I06)	289	242	93	174	798
Location	—	—	—	—	—
Property	5	4	3	3	15
Opt-Outs	12	26	13	8	59
USPS - Non-Deliverables[1]	—	—	—	—	—
Total Permanent Removals	**1,368**	**1,338**	**1,235**	**1,696**	**5,637**
AMI Insufficient/Negative Usage	279	169	317	16	781
Insufficient Benchmarking	64	83	93	99	339
Total Temporary Removals	**343**	**252**	**410**	**115**	**1,120**
Total Removals	**1,711**	**1,590**	**1,645**	**1,811**	**6,757**

[1] 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.

HER Pilot (T12345) Attrition Rates

Table 22: T12345 Attrition Rates in 2023

T12345	Feb	May	Aug	Nov	Total
Total Reports Delivered	14,638	14,448	14,220	14,021	57,327
Move-Outs	155	134	172	214	675
Unsupported Rate Code (I06)	36	39	17	31	123
Location	—	—	—	—	—
Property	—	—	—	—	—
Opt-Outs	3	1	4	2	10
USPS - Non-Deliverables [2]	—	—	—	—	—
Total Permanent Removals	**194**	**174**	**193**	**247**	**808**
AMI Insufficient/Negative Usage	27	27	57	3	114
Insufficient Benchmarking	12	14	19	20	65
Total Temporary Removals	**39**	**41**	**76**	**23**	**179**
Total Removals	**233**	**215**	**269**	**270**	**987**

[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.

3. Process Improvements, Lessons Learned, and Future Considerations

3.1 Process Improvements

Revised How Quarterly Progress to Forecast Tracking

IPC noted that forecast numbers didn't always align with the quarter's savings recorded in the QMR. This is because there was a difference in how the quarterly savings were calculated for QMRs and the yearly data was pulled for the PSR. Uplight transitioned to pulling the QMR data using the same method as the Program Summary Report to keep the data consistent.

Implemented Smart Notifications for CSA Escalations

When customers call in with a HER-related escalation, the CSA inputs notes on the call into a CSA survey. Previously, escalations only surfaced during the weekly CSA Report that captures all CSA surveys. Escalations need to be responded to quickly. Since the original process relied on a CSA Report, which is pulled once a week, there was a delay between when a potential escalation call occurred and when the IPC Program Specialist could act on the escalation.

To address this, UCA-Harris/ Uplight reconfigured the CSA survey with “smart notification” so that an email is immediately sent to the IPC Program Specialist when an escalation is submitted to Silver Blaze/Uplight through a CSA survey. This allows the Program Specialist to quickly respond within one business day to any calls marked as an escalation.

3.2 Lessons Learned

In 2023 there were several lessons learned. These learnings serve as a way to identify future program improvement opportunities.

Incorporating the Do Not Contact List Quarterly

As part of the eHER expansion in August 2022, we updated the cadence in which a new Do Not Contact (DNC) list is incorporated. Idaho Power was to provide an updated DNC list once a quarter before eHERs go out. Uplight then would cross-reference the DNC list with the eHER mailing list and remove any customers that appeared on both lists. This was to ensure that Program Group customers who ask to be added to Idaho Power's DNC list are not receiving emails they do not want.

During the 2023 program year, UCA-Harris/Uplight discovered that incorporating an updated DNC list was missed after the August 2022 report. As a result, treatment customers added to IPC's DNC list after August were potentially still receiving reports. To evaluate the impact, Uplight/UCA-Harris looked at the number of customers in treatment who were to receive an eHER in November 2023 and were added to the DNC list after the eHER expansion in 2023. Only one customer fell into that category.

Since the impact was low and customers were able to opt out of eHERs and HERs or notify IPC using other methods, IPC made the decision not to include new DNC lists on a quarterly basis so long as opt-outs are accounted for, which they are. However, DNC will continue to be an important data point to consider each time a new communication pattern is considered.

Microsite Engagement Tracking Was Broken

The Home Energy Report (HERs) program has a Microsite that presents an overview of the HERs, along with Frequently Asked Questions (FAQ). The Microsite is available so that customers can self-serve in answering standard program questions.

In January of 2023, Uplight discovered the Microsite was down and no longer accessible to customers. UCA-Harris relaunched the Microsite but did not implement engagement tracking. As a result, there are no Microsite engagement metrics for 2023. Uplight has a plan to address this in 2024. Please refer to section **3.3 Future Consideration,** for more information.

Example of Microsite data that was included in 2022 PSR:

Table 23: Microsite Activity by Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Unique Clicks	96	58	43	18	23	17	18	14	11	22	29	74	423
Total Clicks	96	58	43	18	23	17	18	14	11	30	29	74	431
Unique Page Views	19	45	21	26	43	12	22	66	18	116	41	14	443
Total Page Views	19	44	21	28	44	12	28	70	20	141	43	18	488

indicates report month

From January 1, 2022 to December 31, 2022, there were a total of 443 unique page views (that is, people who navigated to the site) and 423 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 — idahopower.com/HomeEnergyReport — is available from HER reports.

Some eHER Customers Did Not Receive a Welcome Note

When eHERs the eHER expansion took place in August 2022, the intention was to only send future eHERs to customers that were part of the August 2022 eHER cycle and customers that requested to receive eHERs only. This was because the August 2022 eHER template included a note about the expansion and why they were receiving the eHER as part of the expansion. IPC wanted to ensure that customers had either received the eHER Welcome Note, which was only included in the August 2022 eHER template, or requested to be included. The filter was applied for the August 2022 and November 2022 cycles, but there was a miscommunication about the filter being an ongoing requirement.

To better understand the impact and determine the next steps, Uplight and IPC looked into data around customers who received an eHER but did not receive the Welcome Note. They found that 4,981 unique customers received an eHER in 2023 but did not receive a Welcome Note. Of those, only 11 customers had unsubscribed. IPC and Uoplight identified two paths forward:

> Option 1 - keep sending eHERs to everyone regardless of whether or not they received a welcome letter.
>
> Option 2 - keep sending eHERs to folks that received eHERs up until August 2023. Starting November 2023, do not send eHERs to new customers unless they ask specifically to be opted into eHERs.

IPC decided to move forward with option 2. There were three main factors that informed that decision.

1. Only 11 out of the 4,981 customers had received an eHER in 2023 but did not receive a Welcome Note.
2. There were no CSA escalations as a result of this miss.
3. Abruptly ending eHERs for the 4,981 customers that received an eHER in 2023 but did not receive a Welcome Note wouldn't be a great customer experience that could lead to an increase in CSA calls and escalations.

3.3 Future Considerations

Based on the findings from 2023, Utility Consumer Analytics/Uplight has the following recommendations for enhancing the program in 2023 and beyond:

Add “electric hot water heater likely” data to My Account

Now that the electric hot water heater likely flag is incorporated, enhanced segmentation for customers with and without electric water heaters is possible. In November 2022, we used the new flag to provide money and electricity-saving water tips to customers likely to have electric hot water heaters.

The next step was to upload the “electric hot water heater likely” directly to My Account with the above-mentioned prioritization. We started this process in Q2 of 2023, but while creating content for the February 2024 reports in Q4 2023, Uplight found a variance in the number of water-heater-likely customers in the new My Account feed and the file that was provided by IPC in 2022. In order to keep February 2024 reports progressing, a workaround was used.

There is still value in including this item as a future consideration because incorporating the data into My Account will improve customers’ Profiles in My Account and allow us to use the My Account data export as the source of truth for the water heater type.

Conduct a Customer Satisfaction (CSAT) Survey after the Launch of New Templates

In 2024, the Home Energy Report program will be migrating to a new platform. This migration will include the launch of new HER and eHER templates. Conducting a CSAT survey after the launch of the new templates will allow IPC to collect feedback from customers on the new reports.

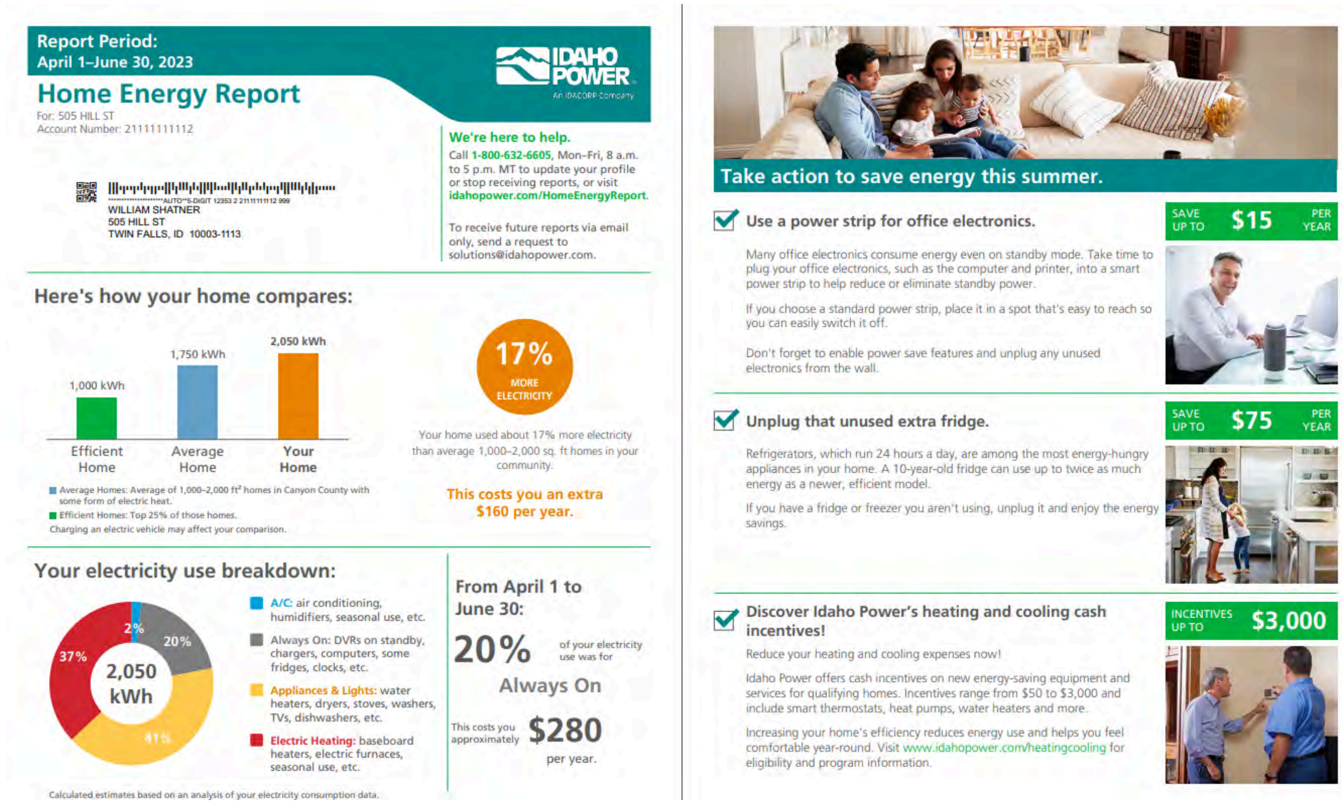
Address Microsite Engagement Tracking Gap

As covered in section 3.2, Lessons Learned under Microsite Engagement Tracking Was Broken**, Microsite** engagement tracking is not available for 2023. To address this, Uplight will launch a new Microsite in 2024 as part of the Home Energy Report migration efforts. The new site will include engagement tracking that can be used for quarterly reporting during QMRs and yearly reporting in the PSR. Site availability tracking is also recommended to ensure that Uplight is informed of Microsite site downtime so there isn’t another gap in its availability.

4. Appendices

4.1 Appendix A: Sample Home Energy Reports

4.1.1 A-1. Sample Print HER — Always-On Tips



Report Period:
April 1–June 30, 2023

IDAHO POWER
An IDACORP Company

Home Energy Report

For: 505 HILL ST
Account Number: 21111111112

****************AUTO**5-DIGIT 12353 2 21111111112 999
WILLIAM SHATNER
505 HILL ST
TWIN FALLS, ID 10003-1113

We're here to help.
Call 1-800-632-6605, Mon–Fri, 8 a.m. to 5 p.m. MT to update your profile or stop receiving reports, or visit idahopower.com/HomeEnergyReport.

To receive future reports via email only, send a request to solutions@idahopower.com.

Here's how your home compares:

Efficient Home	Average Home	Your Home
1,000 kWh	1,750 kWh	2,050 kWh

Average Homes: Average of 1,000–2,000 ft² homes in Canyon County with some form of electric heat.
Efficient Homes: Top 25% of those homes.
Charging an electric vehicle may affect your comparison.

17% MORE ELECTRICITY

Your home used about 17% more electricity than average 1,000–2,000 sq. ft homes in your community.

This costs you an extra $160 per year.

Your electricity use breakdown:

2,050 kWh
2% | 20% | 41% | 37%

A/C: air conditioning, humidifiers, seasonal use, etc.
Always On: DVRs on standby, chargers, computers, some fridges, clocks, etc.
Appliances & Lights: water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
Electric Heating: baseboard heaters, electric furnaces, seasonal use, etc.

From April 1 to June 30:
20% of your electricity use was for
Always On
This costs you approximately $280 per year.

Calculated estimates based on an analysis of your electricity consumption data.

Take action to save energy this summer.

Use a power strip for office electronics. SAVE UP TO $15 PER YEAR

Many office electronics consume energy even on standby mode. Take time to plug your office electronics, such as the computer and printer, into a smart power strip to help reduce or eliminate standby power.

If you choose a standard power strip, place it in a spot that's easy to reach so you can easily switch it off.

Don't forget to enable power save features and unplug any unused electronics from the wall.

Unplug that unused extra fridge. SAVE UP TO $75 PER YEAR

Refrigerators, which run 24 hours a day, are among the most energy-hungry appliances in your home. A 10-year-old fridge can use up to twice as much energy as a newer, efficient model.

If you have a fridge or freezer you aren't using, unplug it and enjoy the energy savings.

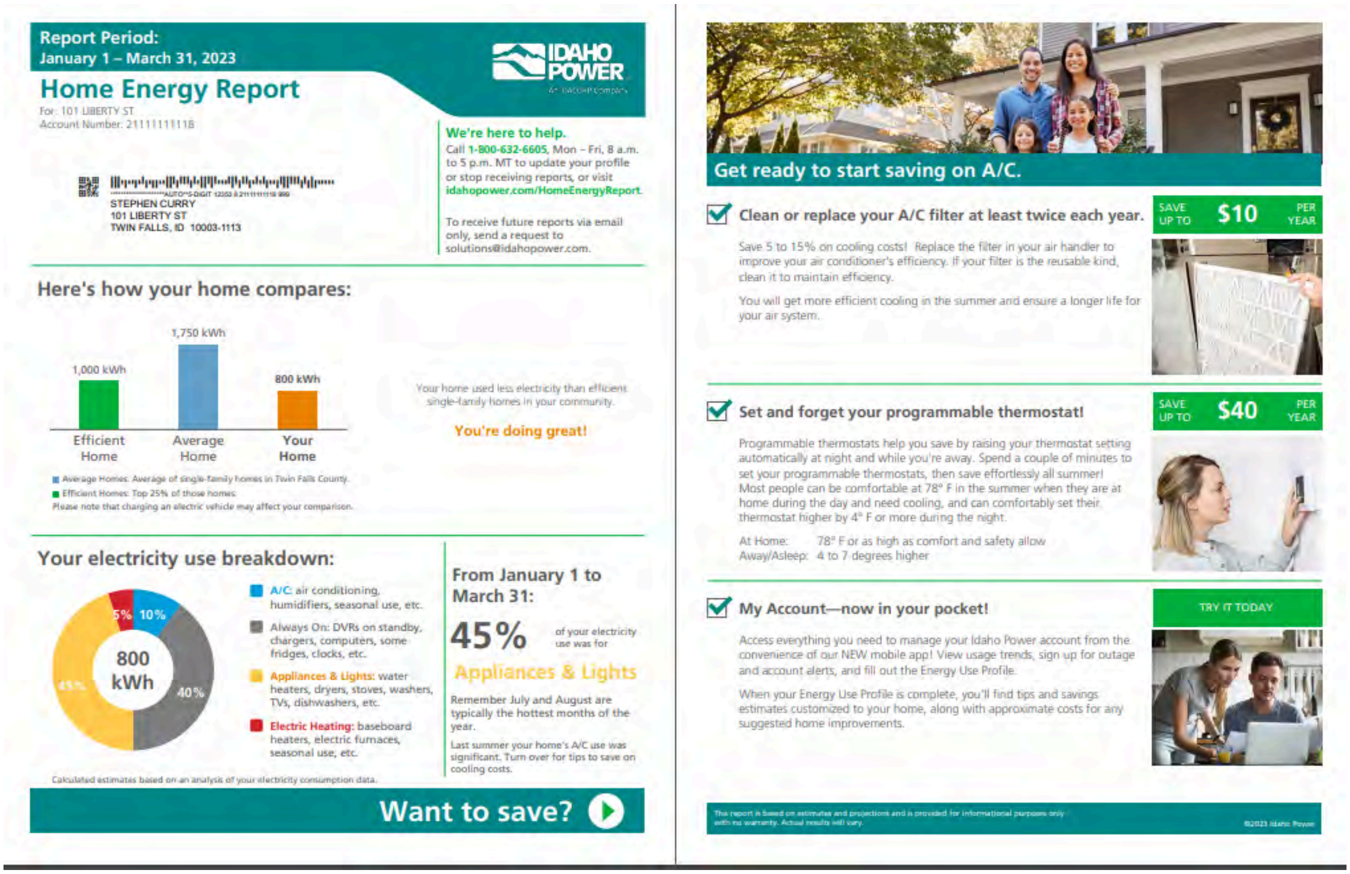
Discover Idaho Power's heating and cooling cash incentives! INCENTIVES UP TO $3,000

Reduce your heating and cooling expenses now!

Idaho Power offers cash incentives on new energy-saving equipment and services for qualifying homes. Incentives range from $50 to $3,000 and include smart thermostats, heat pumps, water heaters and more.

Increasing your home's efficiency reduces energy use and helps you feel comfortable year-round. Visit www.idahopower.com/heatingcooling for eligibility and program information.

4.1.2 A-2. Sample Print HER — A/C Tips



Report Period:
January 1 – March 31, 2023

IDAHO POWER

Home Energy Report

For: 101 LIBERTY ST
Account Number: 2111111118

STEPHEN CURRY
101 LIBERTY ST
TWIN FALLS, ID 10003-1113

We're here to help.
Call 1-800-632-6605, Mon – Fri, 8 a.m. to 5 p.m. MT to update your profile or stop receiving reports, or visit idahopower.com/HomeEnergyReport.

To receive future reports via email only, send a request to solutions@idahopower.com.

Here's how your home compares:

Efficient Home	Average Home	Your Home
1,000 kWh	1,750 kWh	800 kWh

Your home used less electricity than efficient single-family homes in your community.

You're doing great!

Average Homes: Average of single-family homes in Twin Falls County.
Efficient Homes: Top 25% of those homes.
Please note that charging an electric vehicle may affect your comparison.

Your electricity use breakdown:

800 kWh

5% 10% 40% 45%

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 January 1 to March 31:

45% of your electricity use was for

Appliances & Lights

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?

Get ready to start saving on A/C.

Clean or replace your A/C filter at least twice each year. SAVE UP TO $10 PER YEAR

Save 5 to 15% on cooling costs! Replace the filter in your air handler to improve your air conditioner's efficiency. If your filter is the reusable kind, clean it to maintain efficiency.

You will get more efficient cooling in the summer and ensure a longer life for your air system.

Set and forget your programmable thermostat! SAVE UP TO $40 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 to set 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

My Account—now in your pocket! TRY IT TODAY

Access everything you need to manage your Idaho Power account from the convenience of our NEW mobile app! View usage trends, sign up for outage and account alerts, and fill out the Energy Use Profile.

When your Energy Use Profile is complete, you'll find tips and savings estimates customized to your home, along with approximate costs for any suggested home improvements.

This report is based on estimates and projections and is provided for informational purposes only with no warranty. Actual results will vary.

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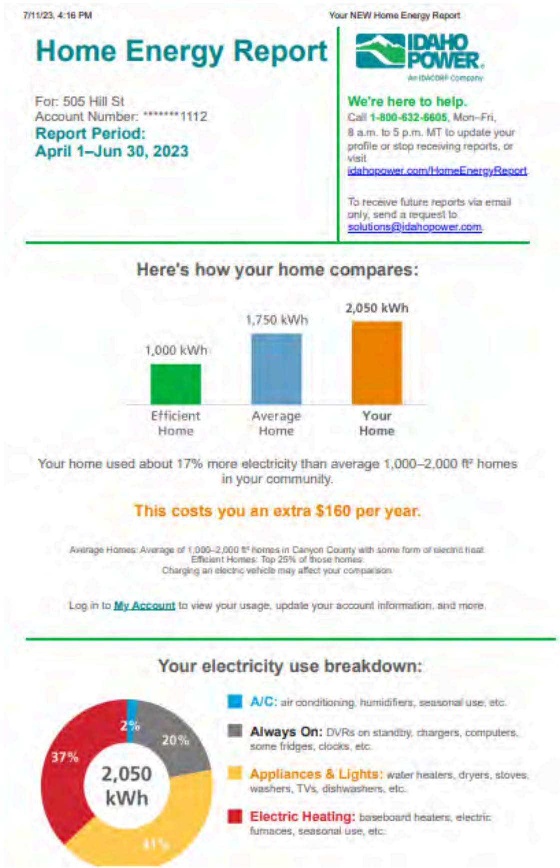
4.1.3 A-3. Sample Email Report — Always-On Tips



7/11/23, 4:16 PM

Your NEW Home Energy Report

Home Energy Report

For: 505 Hill St
Account Number: *******1112
Report Period:
April 1–Jun 30, 2023

IDAHO POWER.
An IDACORP Company

We're here to help.
Call **1-800-632-6605**, Mon–Fri, 8 a.m. to 5 p.m. MT to update your profile or stop receiving reports, or visit idahopower.com/HomeEnergyReport.

To receive future reports via email only, send a request to solutions@idahopower.com.

Here's how your home compares:

Your home used about 17% more electricity than average 1,000–2,000 ft² homes in your community.

This costs you an extra $160 per year.

Average Homes: Average of 1,000–2,000 ft² homes in Canyon County with some form of electric heat.
Efficient Homes: Top 25% of those homes.
Charging an electric vehicle may affect your comparison.

Log in to **My Account** to view your usage, update your account information, and more.

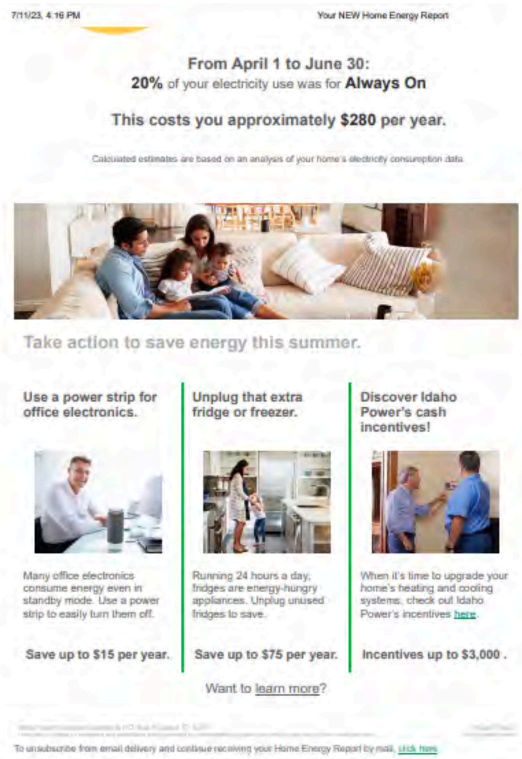
Your electricity use breakdown:

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.



7/11/23, 4:16 PM

Your NEW Home Energy Report

From April 1 to June 30:
20% of your electricity use was for **Always On**

This costs you approximately $280 per year.

Calculated estimates are based on an analysis of your home's electricity consumption data.

Take action to save energy this summer.

Use a power strip for office electronics.

Many office electronics consume energy even in standby mode. Use a power strip to easily turn them off.

Save up to $15 per year.

Unplug that extra fridge or freezer.

Running 24 hours a day, fridges are energy-hungry appliances. Unplug unused fridges to save.

Save up to $75 per year.

Discover Idaho Power's cash incentives!

When it's time to upgrade your home's heating and cooling systems, check out Idaho Power's incentives here.

Incentives up to $3,000 .

Want to learn more?

To unsubscribe from email delivery and continue receiving your Home Energy Report by mail, click here.

4.1.4 A-4. Sample Email Report — A/C Tips

Home Energy Report

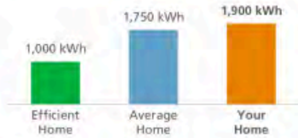
IDAHO POWER.

For: 1776 Independence Pl
Account Number: *******1117
Report Period:
April 1–Jun 30, 2023

We're here to help.
Call **1-800-632-6605**, Mon–Fri, 8 a.m. to 5 p.m. MT to update your profile or stop receiving reports, or visit idahopower.com/HomeEnergyReport

To receive future reports via email only, send a request to solutions@idahopower.com.

Here's how your home compares:



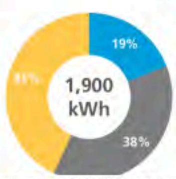
Your home used about 90% more electricity than efficient 1,000–2,000 ft² single-family homes in your community.

This costs you an extra $470 per summer.

Average Homes: Average of 1,000–2,000 ft² single-family homes in Boise County.
Efficient Homes: Top 25% of those homes.
Charging an electric vehicle may affect your comparison.

Log in to **My Account** to view your usage, update your account information, and more.

Your electricity use breakdown:



- **A/C:** air conditioning, humidifiers, seasonal use, etc.
- **Always On:** DVRs on standby, chargers, computers, some fridges, clocks, etc.
- **Appliances & Lights:** water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
- **Electric Heating:** baseboard heaters, electric furnaces, seasonal use, etc.

From April 1 to June 30:
19% 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.
Look below for tips to save on cooling costs.

Calculated estimates are based on an analysis of your home's electricity consumption data.

Follow these tips to save some cash this summer.

Install an energy-efficient ceiling fan.

ENERGY STAR rated ceiling fans use 20% less energy than regular models.

Save up to $20 per year.

ENERGY STAR® windows make a clear difference.

ENERGY STAR certified windows prevent excessive heat transfer and can cut heating and cooling costs by 20%.

Save up to $45 per year.

Discover Idaho Power's cash incentives!

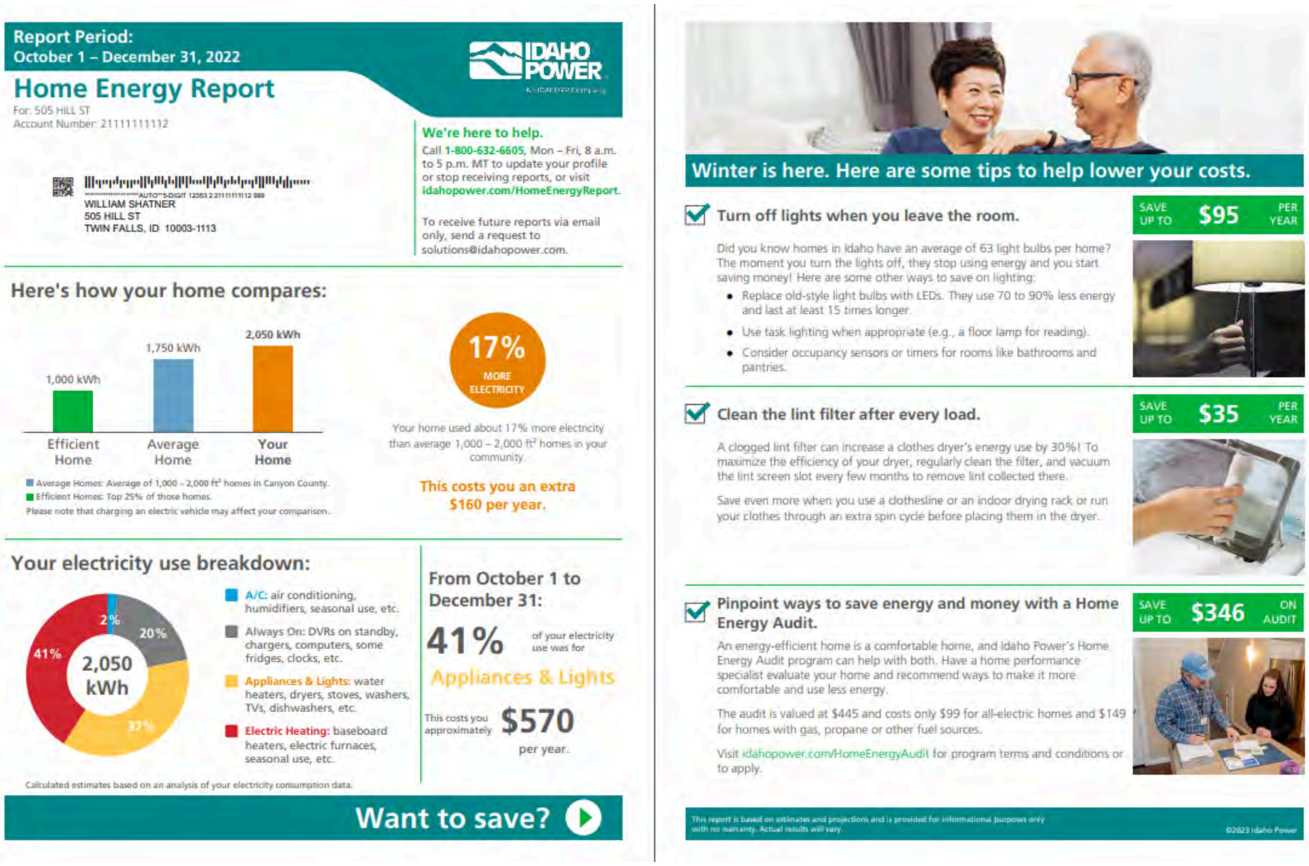
When it's time to upgrade your home's heating and cooling systems, check out Idaho Power's incentives here.

Incentives up to $3,000 .

Want to learn more?

To unsubscribe from email delivery and continue receiving your Home Energy Report by mail, click here

4.1.5 A-5. Sample Print Report — Appliances & Lights Tips



Report Period:
October 1 – December 31, 2022

IDAHO POWER

Home Energy Report

For: 505 HILL ST
Account Number: 21111111112

**************AUTO**5-DIGIT 12353 2 21111111112 999
WILLIAM SHATNER
505 HILL ST
TWIN FALLS, ID 10003-1113

We're here to help.
Call 1-800-632-6605, Mon – Fri, 8 a.m. to 5 p.m. MT to update your profile or stop receiving reports, or visit idahopower.com/HomeEnergyReport.

To receive future reports via email only, send a request to solutions@idahopower.com.

Here's how your home compares:

	Efficient Home	Average Home	Your Home
	1,000 kWh	1,750 kWh	2,050 kWh

Average Homes: Average of 1,000 – 2,000 ft² homes in Canyon County.
Efficient Homes: Top 25% of those homes.
Please note that charging an electric vehicle may affect your comparison.

17% MORE ELECTRICITY

Your home used about 17% more electricity than average 1,000 – 2,000 ft² homes in your community.

This costs you an extra $160 per year.

Your electricity use breakdown:

2,050 kWh: 2%, 20%, 37%, 41%

- 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 October 1 to December 31:

41% of your electricity use was for Appliances & Lights

This costs you approximately $570 per year.

Want to save?

Winter is here. Here are some tips to help lower your costs.

Turn off lights when you leave the room. SAVE UP TO $95 PER YEAR

Did you know homes in Idaho have an average of 63 light bulbs per home? The moment you turn the lights off, they stop using energy and you start saving money! Here are some other ways to save on lighting:

- Replace old-style light bulbs with LEDs. They use 70 to 90% less energy and last at least 15 times longer.
- Use task lighting when appropriate (e.g., a floor lamp for reading).
- Consider occupancy sensors or timers for rooms like bathrooms and pantries.

Clean the lint filter after every load. SAVE UP TO $35 PER YEAR

A clogged lint filter can increase a clothes dryer's energy use by 30%! To maximize the efficiency of your dryer, regularly clean the filter, and vacuum the lint screen slot every few months to remove lint collected there.

Save even more when you use a clothesline or an indoor drying rack or run your clothes through an extra spin cycle before placing them in the dryer.

Pinpoint ways to save energy and money with a Home Energy Audit. SAVE UP TO $346 ON AUDIT

An energy-efficient home is a comfortable home, and Idaho Power's Home Energy Audit program can help with both. Have a home performance specialist evaluate your home and recommend ways to make it more comfortable and use less energy.

The audit is valued at $445 and costs only $99 for all-electric homes and $149 for homes with gas, propane or other fuel sources.

Visit idahopower.com/HomeEnergyAudit for program terms and conditions or to apply.

This report is based on estimates and projections and is provided for informational purposes only with no warranty. Actual results will vary.

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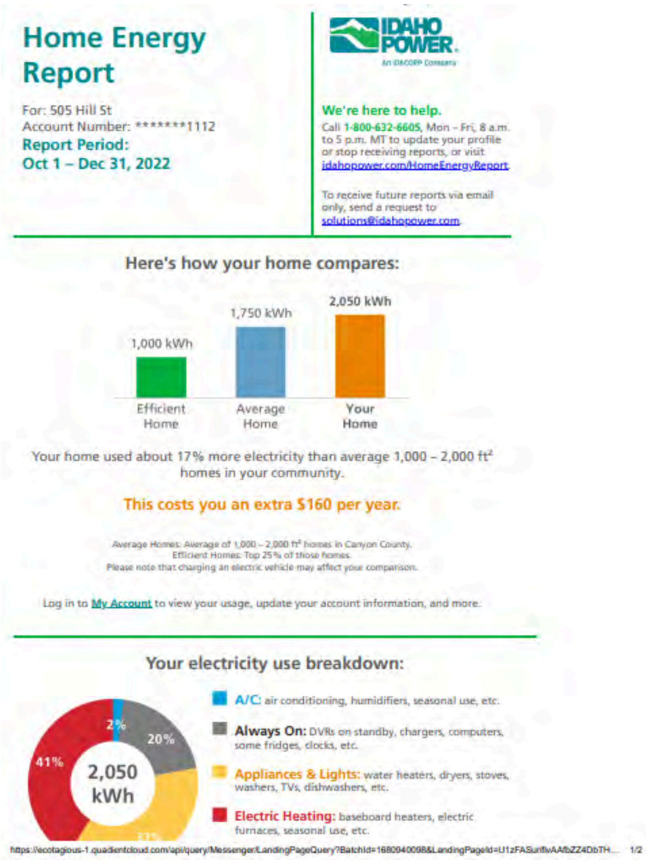
4.1.6 A-6. Sample Email Report — Appliances & Lights Tips



Home Energy Report

For: 505 Hill St
Account Number: *******1112
Report Period:
Oct 1 – Dec 31, 2022

IDAHO POWER. An IDACORP Company

We're here to help.
Call 1-800-632-6605, Mon – Fri, 8 a.m. to 5 p.m. MT to update your profile or stop receiving reports, or visit idahopower.com/HomeEnergyReport.

To receive future reports via email only, send a request to solutions@idahopower.com.

Here's how your home compares:

Your home used about 17% more electricity than average 1,000 – 2,000 ft² homes in your community.

This costs you an extra $160 per year.

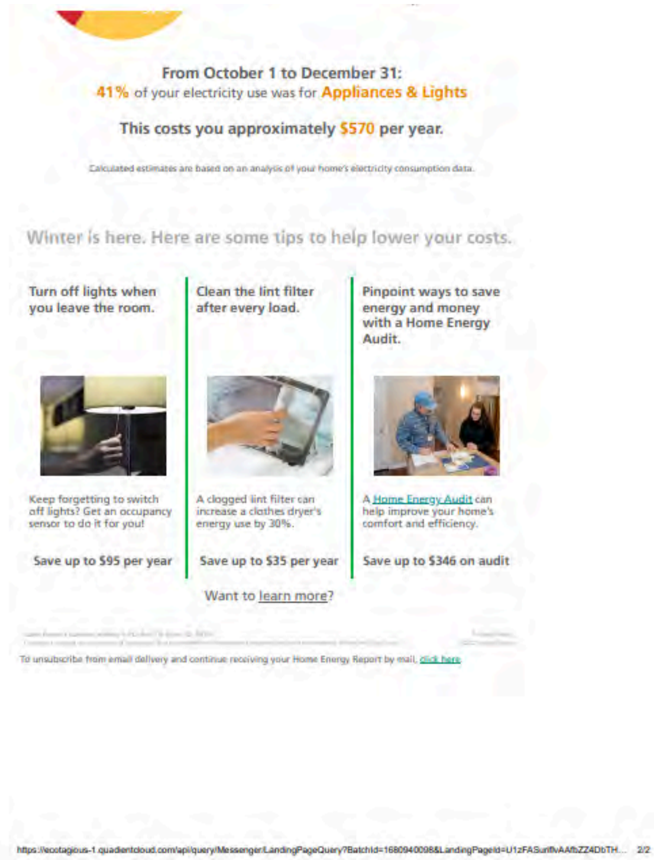
Average Homes: Average of 1,000 – 2,000 ft² homes in Canyon County.
Efficient Homes: Top 25% of those homes.
Please note that charging an electric vehicle may affect your comparison.

Log in to My Account to view your usage, update your account information, and more.

Your electricity use breakdown:

A/C: air conditioning, humidifiers, seasonal use, etc.
Always On: DVRs on standby, chargers, computers, some fridges, clocks, etc.
Appliances & Lights: water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
Electric Heating: baseboard heaters, electric furnaces, seasonal use, etc.

https://ecotagious-1.quadientcloud.com/api/query/Messenger/LandingPageQuery?BatchId=1680940098&LandingPageId=U1zFASurlfvAAfbZZ4DbTH... 1/2



From October 1 to December 31:
41% of your electricity use was for Appliances & Lights

This costs you approximately $570 per year.

Calculated estimates are based on an analysis of your home's electricity consumption data.

Winter is here. Here are some tips to help lower your costs.

Turn off lights when you leave the room.	Clean the lint filter after every load.	Pinpoint ways to save energy and money with a Home Energy Audit.
Keep forgetting to switch off lights? Get an occupancy sensor to do it for you!	A clogged lint filter can increase a clothes dryer's energy use by 30%.	A Home Energy Audit can help improve your home's comfort and efficiency.
Save up to $95 per year	Save up to $35 per year	Save up to $346 on audit

Want to learn more?

To unsubscribe from email delivery and continue receiving your Home Energy Report by mail, click here.

https://ecotagious-1.quadientcloud.com/api/query/Messenger/LandingPageQuery?BatchId=1680940098&LandingPageId=U1zFASurlfvAAfbZZ4DbTH... 2/2

4.1.7 A-7. Sample Print Report — Heating Tips

LAST WINTER (November 1, 2022–March 31, 2023)

IDAHO POWER

Home Energy Report

For: 505 HILL ST
Account Number: 21111111112

WILLIAM SHATNER
505 HILL ST
TWIN FALLS, ID 10003-1113

We're here to help.
Call 1-800-632-6605, Mon–Fri, 8 a.m. to 5 p.m. MT to update your profile or stop receiving reports, or visit idahopower.com/HomeEnergyReport.

To receive future reports via email only, send a request to solutions@idahopower.com.

Here's how your home compares:

Average Homes: Average of 1,000–2,000 ft² homes in Canyon County with some form of electric heat.
Efficient Homes: Top 25% of those homes.
Charging an electric vehicle may affect your comparison.

Your home used about 17% more electricity than average 1,000–2,000 sq. ft homes in your community.

This costs you an extra $160 per winter.

Your electricity use breakdown:

- **A/C:** air conditioning, humidifiers, seasonal use, etc.
- Always On: DVRs on standby, chargers, computers, some fridges, clocks, etc.
- **Appliances & Lights:** water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
- **Electric Heating:** baseboard heaters, electric furnaces, seasonal use, etc.

Calculated estimates based on an analysis of your electricity consumption data.

From November 1, 2022 to March 31, 2023:

41% of your electricity use was for **Electric Heating**

This costs you approximately **$570** per winter.

Want to save?

Is heating eating up your bank account? Here are some tips!

Taking a vacation? Turn down the heat.

SAVE UP TO **$25** PER YEAR

Don't pay to heat your home when you are not around to enjoy the warmth! Turn the heat down when you travel.

Many people can safely turn their thermostats down to 55 F without freezing pipes, but it's important to know your home. If you decide to reduce the temperature, leave cabinet doors open to allow heat to get to un-insulated pipes under sinks and appliances near exterior walls. It also helps to leave a trickle of cold water running in the faucet farthest from your main valve.

Let the sun in during the longer daylight hours.

SAVE UP TO **$90** PER YEAR

Heat loss from windows can account for 10 to 25 percent of your heating bill. But windows can also be a source of heat gain by letting sunlight in, even as we head into winter.

Daytime: keep curtains and blinds on south- and west-facing windows open to allow sunlight to enter and warm your home.

Evening: Close your curtains and blinds at night to help keep the heat inside.

Looking to install a smart thermostat? You may qualify for an incentive!

$50 CASH INCENTIVE

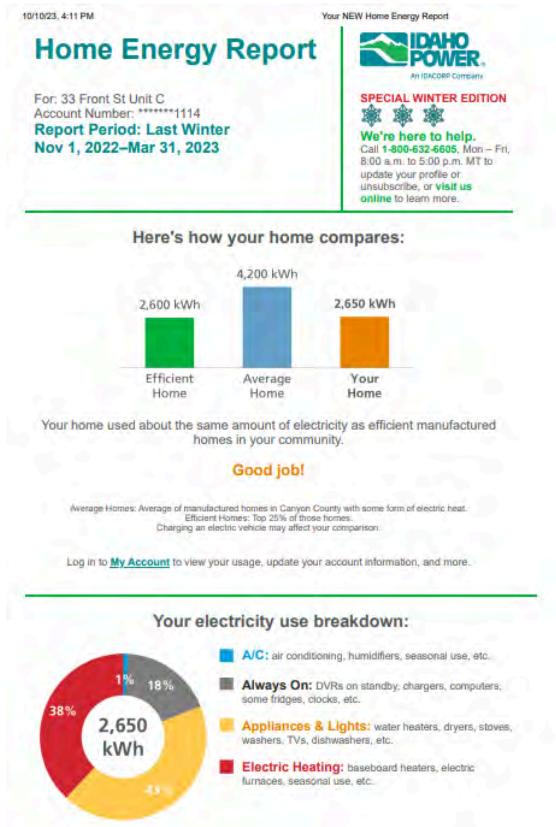
Up to 50% of your home's energy costs may go to heating and cooling. Efficiently controlling your heating and cooling equipment can keep your home more comfortable and save you money.

Idaho Power offers a $50 cash incentive when you install an internet-enabled smart thermostat in a home with a qualified electric furnace or heat pump.

This report is based on estimates and projections and is provided for informational purposes only with no warranty. Actual results will vary.

©2023 Idaho Power

4.1.8 A-8. Sample Email Report — Heating Tips



10/10/23, 4:11 PM

Your NEW Home Energy Report

Home Energy Report

For: 33 Front St Unit C
Account Number: *******1114
Report Period: Last Winter
Nov 1, 2022–Mar 31, 2023

IDAHO POWER. An IDACORP Company

SPECIAL WINTER EDITION

We're here to help.
Call **1-800-632-6605**, 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:

2,600 kWh — Efficient Home
4,200 kWh — Average Home
2,650 kWh — Your Home

Your home used about the same amount of electricity as efficient manufactured homes in your community.

Good job!

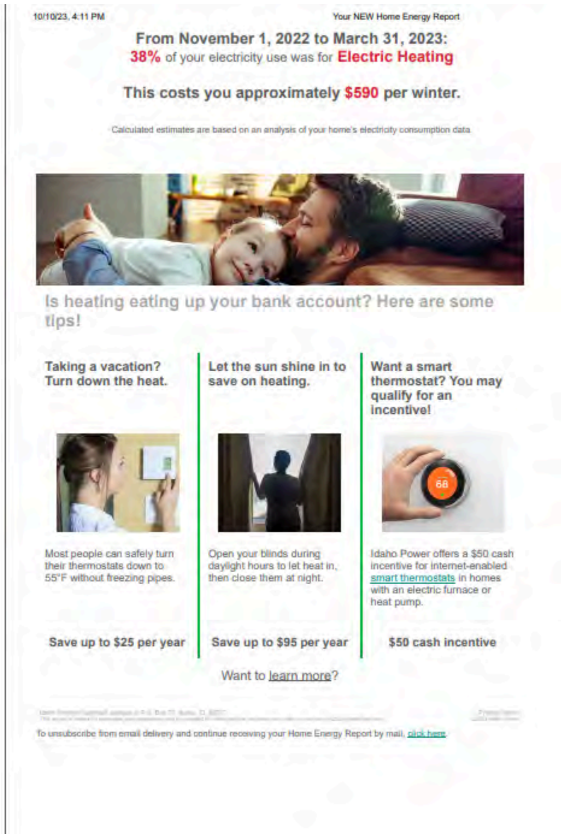
Average Homes: Average of manufactured homes in Canyon County with some form of electric heat.
Efficient Homes: Top 25% of those homes.
Charging an electric vehicle may affect your comparison.

Log in to **My Account** to view your usage, update your account information, and more.

Your electricity use breakdown:

2,650 kWh
1%
18%
38%
43%

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.



10/10/23, 4:11 PM

Your NEW Home Energy Report

From November 1, 2022 to March 31, 2023:
38% of your electricity use was for **Electric Heating**

This costs you approximately $590 per winter.

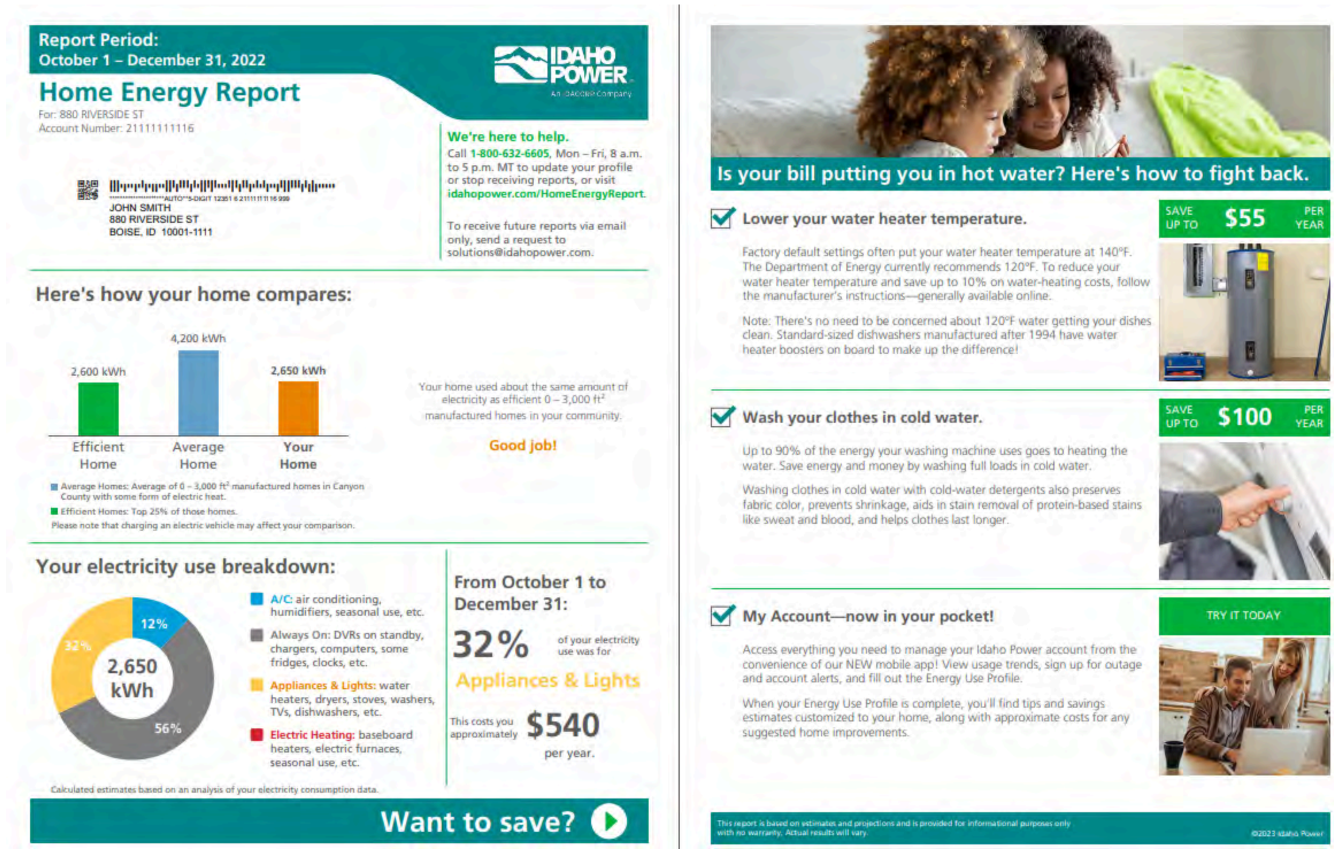
Calculated estimates are based on an analysis of your home's electricity consumption data.

Is heating eating up your bank account? Here are some tips!

Taking a vacation? Turn down the heat.	**Let the sun shine in to save on heating.**	**Want a smart thermostat? You may qualify for an incentive!**
Most people can safely turn their thermostats down to 55°F without freezing pipes.	Open your blinds during daylight hours to let heat in, then close them at night.	Idaho Power offers a $50 cash incentive for internet-enabled smart thermostats in homes with an electric furnace or heat pump.
Save up to $25 per year	**Save up to $95 per year**	**$50 cash incentive**

Want to learn more?

To unsubscribe from email delivery and continue receiving your Home Energy Report by mail, click here.



4.2 Appendix B: Quarterly Program Monitoring Reports

Reports on program metrics were reported on a quarterly basis, according to the schedule below.

Report #	Date Presented	Report Period
Q1	May 31, 2023	January 1, 2023 – March 31, 2023
Q2	August 30, 2023	April 1, 2023 - June 30, 2023
Q3	November 15, 2023	July 1, 2023 - September 30, 2023
Q4	February 21, 2023	October 1, 2023 - December 31, 2023

SCHOOL YEAR 2022-2023
ANNUAL REPORT

23

Student Energy Efficiency Kit Program
Designed and implemented by Tinker LLC

IDAHO POWER®

STUDENT ENERGY EFFICIENCY KIT PROGRAM

MESSAGE FROM **TINKER LLC**

Joseph Thrasher

Dear Denise,

We wanted to take a moment to express our gratitude for continuing our partnership and entrusting us to deliver IPC's Student Energy Efficiency Kit Program. We enjoyed working with the teachers, students, and parents within your service area. We truly appreciate your support and would love to continue our partnership for years to come.

For your reference, enclosed is our school year 2022-2023 report regarding your program. We hope you are pleased with the outcomes.

Cheerfully,

Joseph Thrasher

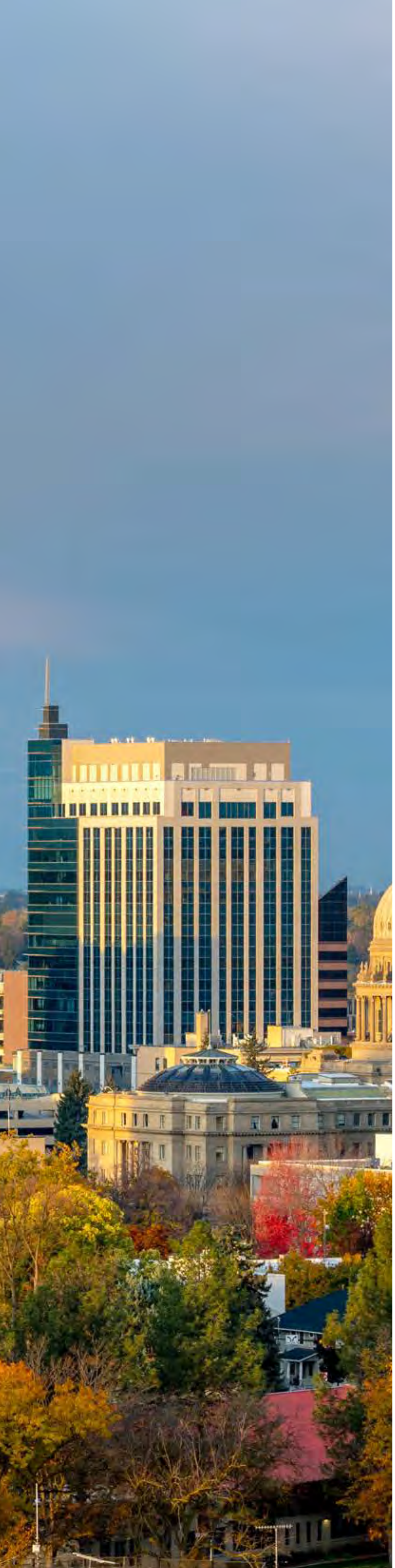


TABLE OF CONTENTS

STUDENT ENERGY EFFICIENCY KIT PROGRAM
EXECUTIVE SUMMARY

School Year 2022-2023

Tinker LLC is pleased to submit this annual report describing the implementation and outcomes of the Student Energy Efficiency Kit Program ("SEEK"). From August 2022 through June 2023, Tinker LLC supported the energy efficiency education efforts in Idaho and Oregon through a partnership with Idaho Power Company ("IPC").

The program was developed to educate students in IPC's service area about energy efficiency through the implementation of a locally-based education program within schools. Tinker LLC and IPC staff developed curriculum that included lessons, STEM activities, digital program resources, student contests, teacher grants, and an Energy Efficiency Kit containing energy-saving devices for each student. The Student Energy Efficiency Kit Program is known and marketed to the schools as the EnergyWise Program. Program objectives included the following:

- Leverage classroom teachers from schools within IPC's service area to provide their 4th – 6th grade students with quality, age-appropriate instruction regarding the wise use of electricity.
- Encourage the wise use of electricity at home by engaging students and their families in activities that support and reinforce energy efficiency and conservation concepts.
- Provide age-appropriate tools to facilitate student participation and incentives to encourage follow through for all Program participants, i.e., teachers, students, and parents.
- Cross-market IPC's other residential energy efficiency programs as directed by IPC.
- Provide IPC with annual energy savings information in the form of an annual program summary report based on student responses.
- Enhance IPC's brand as a trusted energy advisor.
- Maintain or enhance IPC's customer satisfaction.

By the Numbers

179
schools participated

342
teachers participated

12,204
students enrolled

2,875,810
kWh saved annually

230.89
kWh per student kit distributed

169.79
kWh per teacher kit distributed

Tinker LLC managed all aspects of the program design and implementation, including school recruitment, lesson development, day-to-day program management, and reporting.
Below are the program outcomes:

1. **Curriculum.** To support educational goals, Tinker worked with IPC staff to develop six lessons specifically for Idaho Power students. Each lesson included locally-based information, teacher resources, hands-on activities, and supported Idaho state education standards. Below is the list of lessons developed:

    - Natural Resources
    - Electric Energy
    - Energy-Water Nexus
    - Peak and Off-Peak Time
    - Electric Bill
    - Efficiency and Conservation

2. **School Participation.** During the school year 2022-2023, 179 schools, representing 342 teachers and 12,204 students participated in the program. Each of these students received an Energy Efficiency Kit and access to digital learning resources.

3. **Knowledge Retention.** To determine the baseline knowledge, students were asked to complete a 10-question assessment before the program was introduced. After completing the lessons, they completed a post-program assessment to determine the knowledge gained through the program. The average pre-assessment test score was 65%. After completing the lessons, the average test score was 86%--an increase of 21%.

4. **Energy Efficiency Kits.** A take-home Energy Efficiency Kit was provided to 12,204 students and 342 teachers. Each contained products that can be used at home to conserve water and energy. Students work with their parents to use the products and report on their actions.

5. **Student Survey.** At the close of the program, students are asked to complete a survey detailing the actions they took and which products from the Energy Efficiency Kit they installed. Surveys were received from 8,401 students. Based on the reported data, projected savings from kits can be found below.

	Electricity	Natural Gas	Water	Green House Gas Reduction
Annual savings per student kit:	230.89 kWh	4.43 Therms	1,813 Gals	0.36 Metric Tons
Annual savings per teacher kit:	169.79 kWh	3.26 Therms	1,333 Gals	0.30 Metric Tons
Annual program savings:	2,875,810 kWh	55,220 Therms	22,581,210 Gals	4,480.64 Metric Tons
Lifetime program savings:	23,034,025 kWh	552,198 Therms	225,812,098 Gals	40,743.17 Metric Tons

*The algorithms and data used for these calculations can be found in Appendix A & B

STUDENT ENERGY EFFICIENCY KIT PROGRAM
DESCRIPTION

School Year 2022-2023

The Student Energy Efficiency Kit Program is a locally-based curriculum designed to teach fourth-, fifth-, and sixth-grade school students about energy and how to use it wisely. Offered as a completely turnkey program, Tinker managed all aspects of the program implementation.

Tinker designed and customized three lessons appropriate for fourth-, fifth-, and sixth-grade students attending schools in IPC's service territory. Next, Tinker contacted fourth-, fifth-, and sixth-grade teachers using a variety of communication tools to introduce the program and collect enrollment commitments. Participating teachers, students, and parents were then provided access to Tinker's online platform or web application.

Program Delivery

Delivered by classroom teachers, the curriculum fit seamlessly within the current classroom setting. The curriculum included lessons that were designed to support Idaho and Oregon state education standards, featured engaging digital content, and included hands-on activities. Moreover, each lesson included resources such as video streaming content, online assessments, and more.

Using resources from our web application, teachers delivered the curriculum to their students. Students and parents were also provided access to the web application, which included portals designed specifically for each participating segment.

IPC was provided with its own customized version of the web application that displayed its logo at the top of each page and referenced it throughout the pages.

> "I really enjoyed the activities and the incentives for students to do the lessons."
>
> S. Huckins, Teacher
> Henry L. Slater Elementary School

The digital delivery of the program through the web application allowed for:

- **Program Tracking.** All program actions were tracked and recorded in real-time. The data was analyzed and used to inform unique actions by program staff and published within an on-line dashboard. IPC staff was supplied credentials to access the dashboard and encouraged to follow program progress.
- **Additional Engagement Opportunities.** Other IPC related programs were promoted within each relevant portal.

Upon completion of the lessons, students acquired new knowledge of energy efficiency, and each student was provided an Energy Efficiency Kit containing energy-saving devices. During the final lesson, students completed exercises using the devices included in the kit, giving their families an opportunity to immediately and consistently conserve water and energy.

Throughout the program, students completed simple surveys and assessments. This data was collected, analyzed, and summarized to gauge the curriculum's impact on students. At the close of the unit, students and parents completed a pledge to continue to conserve energy and water.

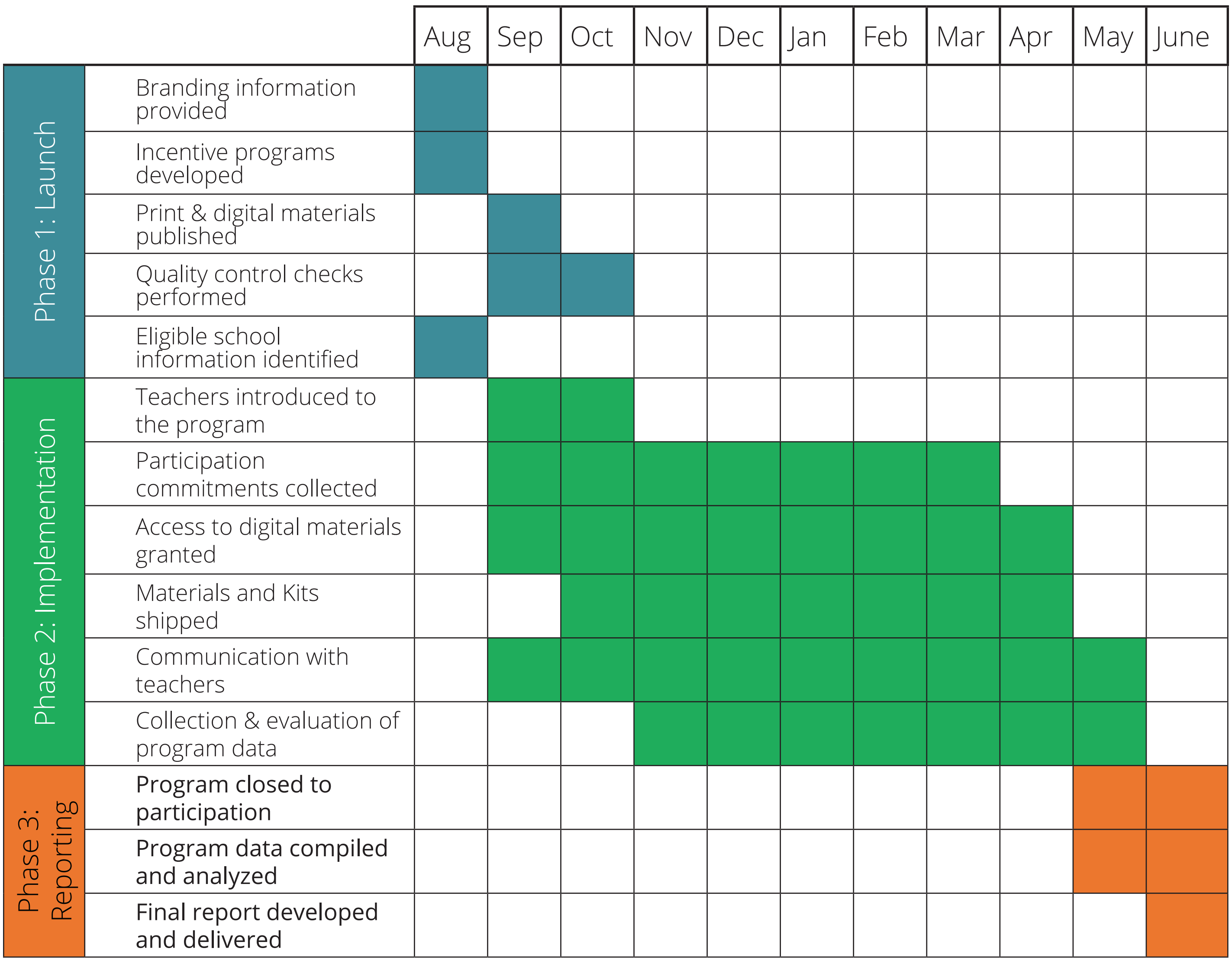
At the end of the school year, all data generated from the lessons and any predefined success metrics were collected to present in this Final Report.

> "I love that it connects the students to a real-life application of energy usage and conservation. Often, I notice that students often don't think about where the electricity comes from or where it comes from."
>
> C. Perry, Teacher
> Rulon M Ellis Elementary

STUDENT ENERGY EFFICIENCY KIT PROGRAM

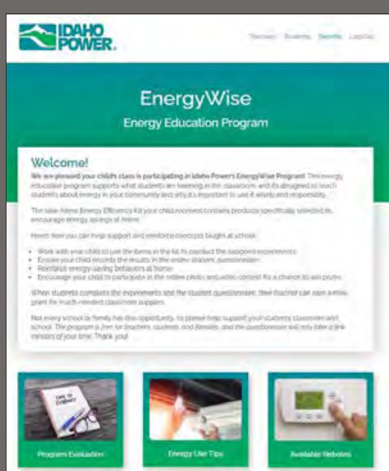
PROGRAM TIMELINE

School Year 2022-2023



During the program, teachers, students, and parents were provided with a variety of resources expertly designed to educate about energy efficiency and encourage energy efficient behaviors. These resources, including the web application, a printed teacher guide, parent letter, and online lesson materials, were customized to feature the IPC logo and brand. Each are described on the following pages and below.

PARENT PROGRAM RESOURCES



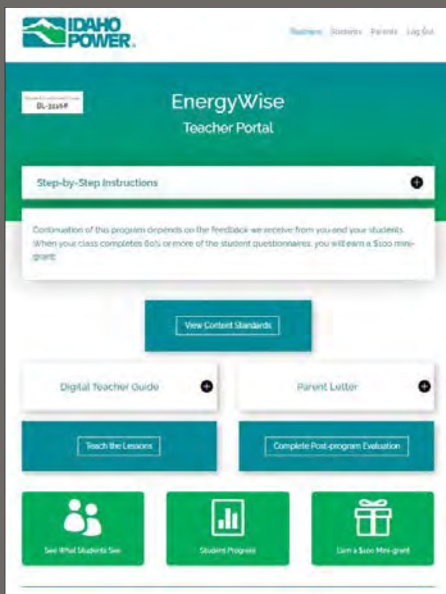
DIGITAL MATERIALS

Parents of participating students were provided access to the parent portal through the web application. The available resources included the following.

- A parent letter describing the program, its goals, and the energy efficiency opportunities available
- Additional energy efficiency resources offered by IPC
- Program evaluation

> "I really enjoy the online lessons that are in the program. I also like the energy kit that gets sent with the program."
>
> R. Hart, Teacher
> Gem Prep Elementary School

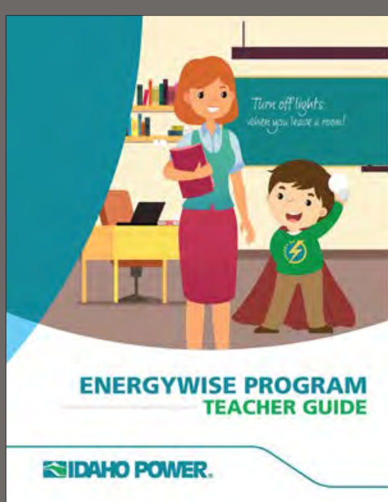
TEACHER PROGRAM RESOURCES



DIGITAL MATERIALS

Teachers were provided access to the teacher portal through the web application. The available resources included the following.

- Instructions to guide teachers through the administration of the program
- Supported Idaho state education standards
- Letter to parents in English and Spanish
- Lesson materials including:
    - Lesson plans
    - Digital slides for classroom presentations
    - Online resources
    - Video content
    - Online homework exercises
    - Assessments
- Post-program Evaluation
- Student progress reporting

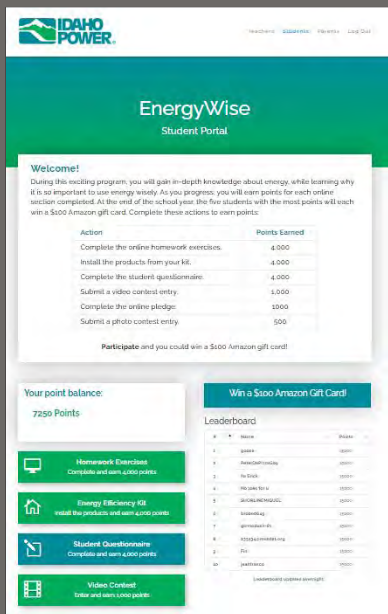


SUPPORTING PHYSICAL MATERIALS

Participating teachers were provided a printed Teacher Guide to support the digital resources. The Teacher Guide included the following:

- Program goals
- Instructions to administer the program
- Unit plan
- Lesson plans
- Contest and mini-grant information
- Answer keys

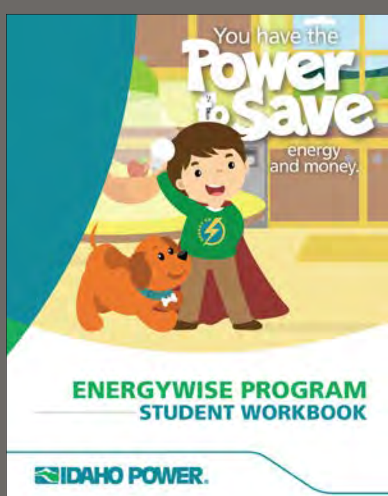
STUDENT PROGRAM RESOURCES



DIGITAL MATERIALS

Students were provided access to the student portal within the web application. Resources available included the following:

- Instructions for installing the products inside the kits
- Access to digital lessons and assessments
- Video contest information
- The student leader board
- Additional energy efficiency information



SUPPORTING PHYSICAL MATERIALS

Participating students were provided a student workbook to support the digital resources. The student workbook included the following:

- Classroom activity worksheets
- Classroom assessments
- The Energy Efficiency Kit product installation guide and data collection forms

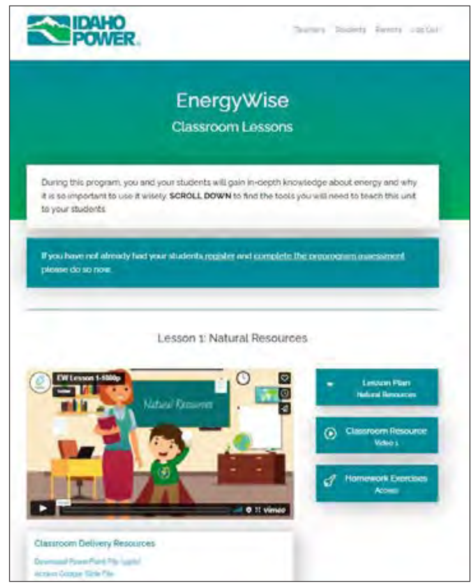
STUDENT ENERGY EFFICIENCY KIT PROGRAM
PROGRAM CONTENT

Phase 2: Implementation

The Student Energy Efficiency Kit Program curriculum was designed to build upon and supplement fourth-, fifth-, and sixth-grade science, math, and language arts curriculum. The curriculum included the following:

Locally-Based Content: To support educational goals, Tinker worked with IPC staff to develop six lessons specifically for students. Each lesson included locally-based information and supported Idaho state education standards. Below is the list of lessons we developed:

- Natural Resources
- Electric Energy
- Energy-Water Nexus
- Peak and Off-Peak Time
- Electric Bill
- Efficiency and Conservation
- Energy At Home



Web Application

To support each lesson, Tinker worked with IPC staff to include teaching resources, video resources, hans-on activities, and homework exercises in the lessons.

At the conclusion of each classroom lesson, teachers had the option of assigning online homework exercises that reviewed the content taught in the classroom. Tinker worked with IPC staff to develop each homework exercise. These exercises included locally-based video content, interactive activities, labeled graphics, flash card grids, and more. The extensive information in each exercise was designed to be engaging and to maximize the knowledge retention of the student.

> "I love how well the program supports our state standard of identifying properties, uses, and availability of Earth materials."
>
> C. Young, Teacher
> Vale Elementary School

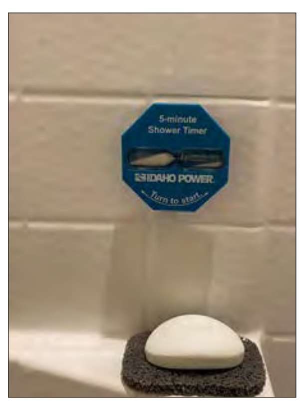
Phase 2: Implementation

A take-home Energy Efficiency Kit was provided to 342 teachers and 12,204 students. Each contained products that can be used at home to conserve water and energy. Students work with their parents to use the products and report on their actions.

Each kit contained the following items:

- Showerhead
- Three LED Lightbulbs
- LED Night Light
- Shower Timer
- Digital Thermometer
- Filter Whistle
- Water Flow Rate Bag
- Reminder Stickers and Magnets
- Quick Start Guide
- Water Bottle Decals

Energy Efficiency Kit



STUDENT ENERGY EFFICIENCY KIT PROGRAM
STUDENT COMPETITIONS

Phase 2: Implementation

A fun component of the Student Energy Efficiency Kit Program was the student competitions: the Student Challenge, Video Contest, and Photo Contest.

Student Challenge
Each student that registered for the online activities were automatically entered into the Student Challenge. As students progressed through the online portion of the program, they earned points for each activity completed. In the web application, students followed their point progress and competed with classmates. Below is a sample of these activities:

Action	Points Earned
Complete the online homework exercises	4,000
Install the products from the Energy Efficiency Kit	4,000
Complete the student survey	4,000
Submit a video contest entry	1,000
Complete the online pledge	500

The five students that accumlated the most points were awarded prizes.

Photo Contest
Students were given the opportunity to participate in a product photo contest. Students snapped a photo of a product installed from their kit for a chance to earn points and win prizes. Photos were uploaded through the Tinker web application. Thirteen entries were selected as winners and received prizes.

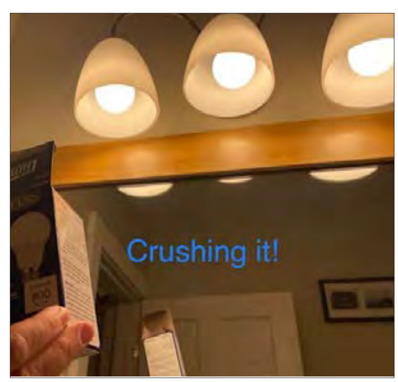
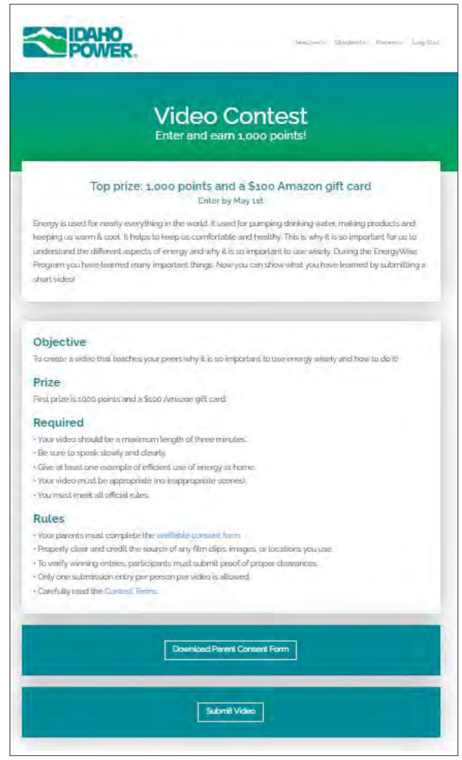


Photo Contest Submission

Video Contest

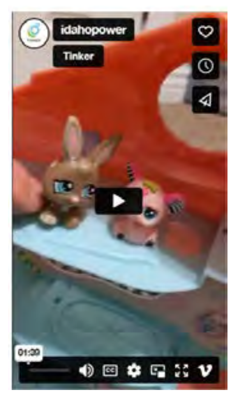
As part of the program, students were given the opportunity to participate in a video contest. Students could create a short two- to three-minute video about energy efficiency for a chance to win. Videos could be uploaded through the Tinker web application. Five entries were selected as winners and received prizes.



> "My favorite thing about the program was the kit boxes, the online homework quizzes for the students, and points awarded."
>
> C. Royse, Teacher
> Silver Trail Elementary School

Video Contest Submission

Video Contest Submission



Video Contest Submission

STUDENT ENERGY EFFICIENCY KIT PROGRAM
RECRUITMENT

Phase 2: Implementation

Beginning in August 2022, Tinker began the planning and recruitment of eligible teachers. Eligible teachers were from elementary schools in IPC's service area based on a list of zip codes and communities served as provided by IPC. Tinker staff researched school and teacher information as well as determined eligibility in such a way that students who received a kit at that school in a prior grade did not have a second opportunity to receive a kit at the same school in a subsequent grade. As needed, IPC provided written clarification and verification of school and regional assignments.

In September 2022, Tinker commenced active recruitment of eligible teachers. The program was offered to fourth-, fifth-, and sixth-grade teachers using a variety of communication tools to introduce the program and collect enrollment commitments. This included email templates, phone scripts, a promotional flyer, and video content. Tinker received commitments from 342 teachers. In April 2023, Tinker ceased active recruitment activities.

Teacher Recruitment Video

PARTICIPATION

Phase 2: Implementation

During the 2022–2023 school year, fourth-, fifth, and sixth-grade teachers were introduced to the program and asked to participate. Commitments were received from 179 schools, representing 342 teachers and 12,204 students. The table represents participation in each region of IPC's service territory.

Region	State	Teachers	Students	Total Kits
Canyon	ID	60	2,007	2,067
Capital	ID	138	4,929	5,067
Eastern	ID	40	1,271	1,311
Southern	ID	65	2,712	2,777
Western	ID	27	1,036	1,063
	Total Idaho:	330	11,955	12,285
Western	OR	12	249	261
	Total Oregon:	12	249	261

*Detailed participation data can be found in Appendix C

STUDENT ENERGY EFFICIENCY KIT PROGRAM
PROJECTED SAVINGS

Phase 3: Reporting

Through the program, 12,204 Energy Efficiency Kits were distributed to students. The kits were packed with high efficiency products that when installed help to curb household water and energy usage while reducing green house gas emissions. Students work with their parents to install the products and report their actions. Using the data collected, we calculated the projected resource savings. Projections are found below:

	Electricity	Natural Gas	Water	Green House Gas Reduction
Annual savings per student kit	230.89 kWh	4.43 Therms	1,813 Gals	0.36 Metric Tons
Annual program savings student kits	2,817,742 kWh	54,105 Therms	22,125,253 Gals	4,378.20 Metric Tons
Lifetime program savings student kits	22,568,924 kWh	541,047 Therms	221,252,527 Gals	39,801 Metric Tons

*The algorithms and data used for these calculations can be found in Appendix A

Through the program, 342 Energy Efficiency Kits were distributed to teachers. Like students, teachers are asked to install the products. However, unlike students, some teachers received a kit in a prior school year or prior school years. To best estimate the projected savings from the teacher kits, Tinker has applied a 25% discount to the kit savings for each year a teacher previously received a kit. The table below depicts the percentage of savings applied to teacher kits based on previous program participation.

Participating Years	Number of Teachers	Savings Percentage Applied
1	155	100%
2	83	75%
3	33	50%
4	71	25%

The factors that Tinker considered to determine the discount percentage were:

1. Energy efficiency products within the kits have changed occasionally year-over-year. Thus the entirety of the product savings for those products in which teachers have never received can be counted.
2. Products such as the LED lightbulbs and showerhead can be used in others areas of the home. Thus savings can be counted for those products.
3. In future program years, we intend to ask the teachers to report specific installation data. In the absence of data for this year a reasonable discount percentage was applied.

Savings projections for the Teacher Kits are found below:

	Electricity	Natural Gas	Water	Green House Gas Reduction
Average annual savings per teacher kit	169.79 kWh	3.26 Therms	1,333 Gals	0.30 Metric Tons
Average annual program savings teacher kits	58,068 kWh	1,115 Therms	455,957 Gals	102.44 Metric Tons
Average lifetime program savings teacher kits	465,100 kWh	11,150 Therms	4,559,572 Gals	942.17 Metric Tons

*The algorithms and data used for these calculations can be found in Appendix B

Total projected program savings was derived by adding the projected savings from students and teachers. The total projected savings is found below:

	Electricity	Natural Gas	Water	Green House Gas Reduction
Annual program savings:	2,875,810 kWh	55,220 Therms	22,581,210 Gals	4,480.64 Metric Tons
Lifetime program savings:	23,034,025 kWh	552,198 Therms	225,812,098 Gals	40,743.17 Metric Tons

PROGRAM ASSESSMENTS

Phase 3: Reporting

To determine the effectiveness of the program, we collected pre- and post-program data to assess changes in students' knowledge, attitude, and behavior with respect to energy efficiency. The outcome is provided below.

PRE-ASSESSMENT

ON THE AVERAGE STUDENTS SCORED 65% ON THE PRE-PROGRAM ASSESSMENT.

National Average: 66%

POST-ASSESSMENT

ON THE AVERAGE STUDENTS SCORED 86% ON THE POST-PROGRAM ASSESSMENT.

National Average: 86%

21%

AFTER PARTICIPATING IN THE PROGRAM, STUDENTS INCREASED THEIR TEST SCORES BY 21%

National Average: 20%

LESSON ASSESSMENTS

At the conclusion of each lesson, students were ask to complete a lesson assessment. The assessment was designed to measure knowledge growth within the topic as well as the re-enforce the education. The results are used to determine the effectiveness of each lesson. The table below contains the average student score within each lesson assessment.

Lesson	Assessment
Natural Resources	95%
Electric Energy	92%
Energy-Water Nexus	87%
Peak and Off-peak Time	86%
Electric Bill	88%
Efficiency and Conservation	92%

STUDENT ENERGY EFFICIENCY KIT PROGRAM

STUDENT PLEDGES

Phase 3: Reporting

As part of the program students are asked to pledge four different ways they will save energy at home. Below is a sampling of the pledges collected:

"One thing I pledge, to do is. To turn off every light in my house to save energy."

Student

"I pledge to save energy by turning my air conditioning off once in a while."

Student

"I pledge to save energy by unplugging devices that I am not using currently."

Student

"I pledge to take short showers and turn off the water from the sink when I'm brushing my teeth."

Student

"I pledge to install all of the products from your Kit because thy'ree made to save energy."

Student

"I pledge to save energy by opening the blinds in the winter for heat."

Student

"I pledge to turn off the lights when it's daytime because the sun is giving light so you don't need it."

Student

"I pledge to save as much energy as I can by taking up good habits about saving energy."

Student

"I pledge to save energy by teaching people how to save energy and helping them do it."

Student

"I pledge by not taking a 30 minute shower."

Student

"I pledge to save energy by not being on electronics as much."

Student

"I pledge to save energy by doing my laundry on the weekends."

Student

STUDENT SURVEY

Phase 3: Reporting

At the conclusion of the program, students are asked to complete a survey detailing the actions they took and which products from the Energy Efficiency Kit they install. Surveys were received from 8,401 students. The reported data can be found below.

1 Did you enjoy the program?

It was excellent	38%
Pretty good	46%
Neutral	12%
Not so great	3%
It was terrible	1%

2 Was the online content easy to use?

Yes	87%
No	13%

3 How many people (adults and children) live in your home?

4.78 People

4 Which type of fuel (energy) is used to heat water in your home?

Electricity	62%
Natural gas	29%
Propane	9%

5 Which type of fuel (energy) is does your heater use in the winter?

Electricity	11%
Natural gas	79%
Propane	10%

6 Which type of fuel (energy) is does your air conditioner use in the summer?

Electricity	84%
Natural gas	2%
Propane	9%
We don't have one	5%

7 How many showers are in your home?

1.97 Showers

8 Did you install the high efficiency showerhead from your kit?

Yes	46%
No, but I will install	28%
No	26%

9 What was the water flow rate from your previous showerhead?

2.21 G.P.M.

10 What was the water flow rate when you installed the new showerhead from the kit?

1.40 G.P.M.

11 Did you use the shower timer from your kit?

Yes	65%
No, but I will	19%
No	16%

12 Did you install the LED night light?

Yes	79%
No, but I will	19%
No	2%

13 When installing the night light did you replace an existing night light?

Yes	51%
No	49%

14 How many LED lightbulbs did you install?

3	47%
2	69%
1	85%
0	15%

16 What was the wattage of the first lightbulb you replaced with the LED lightbulb?

40.01 Watts

17 What was the wattage of the second lightbulb you replaced with the LED lightbulb?

40.97 Watts

18 What was the wattage of the third lightbulb you replaced with the LED lightbulb?

40.68 Watts

19 Did you use the digital thermometer?

Yes	52%
No, but I will	26%
No	22%

20 Did you raise or lower your water temperature?

Our water was the perfect temperature. We did not adjust the water heater temperature.	76%
Our water was too hot! We lowered the water heater temperature.	12%
Our water was not hot enough. We raised our water heater temperature.	12%

21 Did you install the furnace filter whistle?

Yes	32%
No, but I will	28%
No	40%

22 Did you use the sticker and magnet pack from your kit?

Yes	68%
No, but I will	19%
No	13%

STUDENT ENERGY EFFICIENCY KIT PROGRAM
TEACHER EVALUATION

Phase 3: Reporting

At the conclusion of the unit teachers were asked to complete a post-program evaluation. Outcomes are below:

1. Did you enjoy the program?		
	It was excellent	44.30%
	It was pretty good	50.63%
	Neutral	4.43%
	Not so great	0.63%
	It was terrible	0.00%
2. How satisfied were your students with this program?		
	They thought it was AWESOME!	31.65%
	They liked it	54.43%
	It was ok	12.66%
	They really didn't like it	0.63%
	They thought it was terrible	0.63%
3. Did this program support the education standards in your grade level?		
	Yes	93.04%
	No	1.90%
	Unsure	5.06%
4. Was the online content easy to use?		
	Yes	81.01%
	No	18.99%
4a. How could the online content be improved?		
5. Which lesson was your favorite?		
	Natural Resources	34.18%
	Electric Energy	10.13%
	Energy-Water Nexus	10.13%
	Peak and Off-Peak Time	17.72%
	Electric Bill	8.86%
	Efficiency and Conservation	11.39%
	Course Review	2.53%
	Energy At Home	5.06%

6. Was the program staff courteous?

Yes	83.54%
No	0.00%
Did not interact with program staff	16.46%

6a. Did the program staff effectively answer all of your questions?

Yes	99.24%
No	0.76%

7. What was your favorite thing about the program?

8. Would you change anything about the program? If so, what?

9. Would you like to see this program continue?

Yes	100.00%
No	0.00%

10. If offered, would you participate again next school year?

Yes	97.47%
No	2.53%

11. Is there anything else you'd like to share about the program?

12. To aid in continuous improvement of the program, select teachers serve in an advisory capacity. Advising teachers are provided a stipend and meet twice per year. If asked, would you be willing to participate as an advisor?

Yes	26.58%
No	34.18%
Maybe	39.24%

STUDENT ENERGY EFFICIENCY KIT PROGRAM
CONTINUOUS IMPROVEMENT

Phase 3: Reporting

In addition to successful implementation of the Student Energy Efficiency Kit Program, Tinker LLC evaluates program outcomes in an effort to continually improve the program. Areas to be enhanced are identified below:

Content. As identified in this report, students successfully completed the lessons which resulted in a net knowledge gain. During school year 2023-2024, Tinker LLC plans to enhance the content through:

1. The evaluation and potential redesign of the Energy-Water Nexus lesson.
2. On July 1, 2023 the Energy Independence and Security Act (EISA) will go into full effect, significantly impacting the savings Idaho Power is allowed to claim with respect to the three LED A Lamps included in the Student Energy Efficiency Kit Program. As a result, Tinker LLC with work with Idaho Power to evaluate the energy efficiency devices included in the Energy Efficiency Kit. Any changes to the Energy Efficiency Kit contents will impact different segments of the program's content.

Teacher Program Administration. Based on feedback from participating teachers, Tinker LLC plans to enhance the following teacher administration tools:

1. Development and publication of a Frequently Asked Questions (FAQs) page for teachers.
2. Develop and publish a program administration video tutorial for teachers. This video will guide teachers through each aspect of program implementation.

Teacher Registration. To further enhance teacher registration, Tinker LLC plans to develop and implement the following updates:

1. On the confirmation page, add a link to easily download a digital version of the Teacher Guide and embed the new program administration video.
2. Add access to the new FAQs page.

Assessments. Based on feedback from participating teachers, Tinker LLC plans to make some minor updates to the homework assessments. This includes:

1. Evaluate and potentially adjust the questions to better measure changes in student knowledge, attitude, and behavior pertaining to energy efficiency.
2. Enhance questions by including the correct answer with an explanation if a student answers the question incorrectly.

Phase 3: Reporting

Data Collection. As the program has matured, a deeper analysis of collected program data is required to further measure program success. Tinker LLC will work with IPC staff to identify desired reporting metrics and modify the program database to seamlessly provide the subsequent reports.

These enhancements will improve the program while continuing to meet the changing needs of educators and students. Ultimately these will result in increased knowledge leading to the adoption of sustainable habits as well as responsible energy use amongst program participants.

SHOWERHEAD RETROFIT

Student Energy Efficiency Kit Projected Savings

Reported Inputs (Exact Numbers Reported)		
Average household size:	4.78	people
Showers per home:	1.97	showers
Previous showerhead flow rate:	2.21	gallons
Retrofit showerhead flow rate:	1.40	gallons
Percent of homes with electric water heat:	62%	
Percent of homes with natural gas water heat:	29%	
Retrofit showerhead installation rate:	46%	
Participants using kits:	12,204	Kits
Assumed Inputs		
Showers per day per person:	0.67	showers[1]
Average length of use:	8.2	minutes[1]
Percent of showerhead water that is heated:	73%	hot water[1]
Temperature of incoming cold water:	55°	[1]
Temperature of outgoing hot water:	120°	[1]
Product life:	10	years[2]
Outcomes		
Projected annual water savings for all households:	22,125,252.69	Gallons[1]
Projected annual electric savings for all households:	1,802,500.09	kWh[4]
Projected annual natural gas savings for all households:	42,155.24	Therms[5]
Projected annual GHG reduction for all households:	3,595.00	Metric Tons[3]
Projected lifetime water savings for all households:	221,252,526.95	Gallons[1]
Projected lifetime electric savings for all households:	18,025,000.87	kWh[1]
Projected lifetime natural gas savings for all households:	421,552.44	Therms[1]
Projected lifetime GHG reduction for all households:	35,949.00	Metric Tons[3]

SHOWERHEAD RETROFIT

Student Energy Efficiency Kit Projected Savings

[1] *WaterSense® Specification for Showerheads Supporting Statement. EPA, 2010, Appendix A: Calculations and Key Assumptions. Note:*

Step 1 [(Previous showerhead flow rate - Retrofit showerhead flow rate) x Average length of use: 8.2min x Showers per day per person: 0.67 x Average household size] ÷ Full bathrooms per home = gallons saved per day

**Equation is divided by full bathrooms per home because we only provide one showerhead*

Step 2 gallons saved per day x 365 days = gallons saved per year

Step 3 gallons saved per year x retrofit showerhead installation rate x participants = gallons saved per year program-wide

[2] *Manufacturer*

[3] *"Greenhouse Gas Equivalencies Calculator." EPA, Environmental Protection Agency, June. 2023, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.*

[4] *WaterSense® Specification for Showerheads Supporting Statement. EPA, 2010, Appendix A: Calculations and Key Assumptions. Note:*

o KWh Required to Raise 1 Gallon of Water 65º F

[(1.0 Btu/lbs x º F) (1kWh/3,412 Btus) / (1 gal/8.34 lbs) x 65º F] / 0.90 = 0.18 kWh/gal

[5] *WaterSense® Specification for Showerheads Supporting Statement. EPA, 2010, Appendix A: Calculations and Key Assumptions. Note:*

o Therms Required to Raise 1 Gallon of Water 65º F

[(1.0 Btu/lbs x º F) (1 Therm/99,976 Btus) / (1 gal/8.34 lbs) x 65º F] / 0.60 = 0.009 Therms/gal

LED LIGHTBULB #1 RETROFIT

Student Energy Efficiency Kit Projected Savings

Reported Inputs		
Retrofit LED light bulb installation rate:	85%	
Participants using kits:	12,204	Kits
Average watts used by the replaced bulb:	40.01	watts
Assumed Inputs		
Remaining useful life of replaced bulb:	1,000	hours[1]
Watts used by the LED light bulb:	8	watts[2]
Hours of operation per day:	2.1	hours per day[3]
Outcomes		
Projected annual electric savings for all households:	254,518.27	kWh[4]
Projected annual GHG reduction for all households:	180	Metric Tons[5]
Projected lifetime electric savings for all households:	332,052.53	kWh[6]
Projected lifetime GHG reduction for all households:	235	Metric Tons[5]

[1] *Remaining Useful Life (RUL) is 1/3 of useful life. Average Halogen useful life is 3,000 hours. Thus RUL is 1000 hours. (https://www.bulbs.com/learning/arl.aspx)*

[2] *Manufacturer*

[3] *"Regional Technical Forum." ResidentialLighting-v10-0. Lamps_StorageRemoval. General Purpose and Three Way. 250 to 1049 lumens. Any - Res. Only*

[4] *{[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Hours of operation per day x 365 Days] ÷ 1,000} x Participants using kits x Retrofit LED light bulb installation rate*

[5] *"Greenhouse Gas Equivalencies Calculator." EPA, Environmental Protection Agency, June. 2023, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.*

[6] *{[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Remaining useful life of replaced bulb] ÷ 1,000} x Participants using kits x Retrofit LED light bulb installation rate*

LED LIGHTBULB #2 RETROFIT

Student Energy Efficiency Kit Projected Savings

Reported Inputs		
Retrofit LED light bulb installation rate:	69%	
Participants using kits:	12,204	Kits
Average watts used by the replaced bulb:	40.97	watts
Assumed Inputs		
Remaining useful life of replaced bulb:	1,000	hours[1]
Watts used by the LED light bulb:	8	watts[2]
Hours of operation per day:	2.1	hours per day[3]
Outcomes		
Projected annual electric savings for all households:	212,805.28	kWh[4]
Projected annual GHG reduction for all households:	151	Metric Tons[5]
Projected lifetime electric savings for all households:	277,632.46	kWh[6]
Projected lifetime GHG reduction for all households:	197	Metric Tons[5]

[1] *Remaining Useful Life (RUL) is 1/3 of useful life. Average Halogen useful life is 3,000 hours. Thus RUL is 1000 hours. (https://www.bulbs.com/learning/arl.aspx)*

[2] *Manufacturer*

[3] *"Regional Technical Forum." ResidentialLighting-v10-0. Lamps_StorageRemoval. General Purpose and Three Way. 250 to 1049 lumens. Any - Res. Only*

[4] *{[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Hours of operation per day x 365 Days] ÷ 1,000} x Participants using kits x Retrofit LED light bulb installation rate*

[5] *"Greenhouse Gas Equivalencies Calculator." EPA, Environmental Protection Agency, June. 2023, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.*

[6] *{[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Remaining useful life of replaced bulb] ÷ 1,000} x Participants using kits x Retrofit LED light bulb installation rate*

LED LIGHTBULB #3 RETROFIT

Student Energy Efficiency Kit Projected Savings

Reported Inputs		
Retrofit LED light bulb installation rate:	47%	
Participants using kits:	12,204	Kits
Average watts used by the replaced bulb:	40.68	watts
Assumed Inputs		
Remaining useful life of replaced bulb:	1,000	hours[1]
Watts used by the LED light bulb:	8	watts[2]
Hours of operation per day:	2.1	hours per day[3]
Outcomes		
Projected annual electric savings for all households:	143,679.32	kWh[4]
Projected annual GHG reduction for all households:	102	Metric Tons[5]
Projected lifetime electric savings for all households:	187,448.56	kWh[6]
Projected lifetime GHG reduction for all households:	133	Metric Tons[5]

[1] Remaining Useful Life (RUL) is 1/3 of useful life. Average Halogen useful life is 3,000 hours. Thus RUL is 1000 hours. (https://www.bulbs.com/learning/arl.aspx)

[2] Manufacturer

[3] "Regional Technical Forum." ResidentialLighting-v10-0. Lamps_StorageRemoval. General Purpose and Three Way. 250 to 1049 lumens. Any - Res. Only

[4] {[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Hours of operation per day x 365 Days] ÷ 1,000} x Participants using kits x Retrofit LED light bulb installation rate

[5] “Greenhouse Gas Equivalencies Calculator.” EPA, Environmental Protection Agency, June. 2023, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

[6] {[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Remaining useful life of replaced bulb] ÷ 1,000} x Participants using kits x Retrofit LED light bulb installation rate

LED NIGHT LIGHT RETROFIT

Student Energy Efficiency Kit Projected Savings

Reported Inputs

Retrofit LED night light installation rate:	79%	
Participants using kits:	12,204	Kits

Assumed Inputs

Product life:	8	years[1]
Watts used by the LED night light:	0.5	watts[1]
Average length of use:	4380	hours per year
Average watts used by the replaced bulb:	4	watts[1]

Outcomes

Projected annual electric savings for all households:	147,798.98	kWh[3]
Projected annual GHG reduction for all households:	105	Metric Tons[4]
Projected lifetime electric savings for all households:	1,182,391.86	kWh[3]
Projected lifetime GHG reduction for all households:	838	Metric Tons[4]

[1] *Manufacturer*

[3] *{[(Average wattage of light bulb replaced - Wattage of LED night light) x Hours of operation per day x 365 Days] ÷ 1,000} x Participants using kits x Retrofit LED night light installation rate*

[4] *"Greenhouse Gas Equivalencies Calculator." EPA, Environmental Protection Agency, June. 2023, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.*

FILTER WHISTLE RETROFIT

Student Energy Efficiency Kit Projected Savings

Reported Inputs

Filter Whistle installation rate:	32%	
Participants using kits:	12,204	Kits
Percent of customers with central air conditioning:	84%	
Percent of customers using gas heat:	79%	

Assumed Inputs

Annual energy (electricity) use by a central air conditioner:	4467	kWh[1]
Annual energy (natural gas) use by a central space heating or furnace	421	therms[1]
Projected increase in efficiency (electricity):	1.75%	[3]
Projected increase in efficiency (natural gas):	0.92%	[3]
Product life:	10	years[4]

Outcomes

Projected annual electric savings for all households:	256,439.82	kWh
Projected annual natural gas savings for all households:	11,949.49	Therms
Projected annual GHG reduction for all households:	245.2	Metric Tons[5]
Projected lifetime electric savings for all households:	2,564,398.21	kWh
Projected lifetime natural gas savings for all households:	119,494.85	Therms
Projected lifetime GHG reduction for all households:	2,449	Metric Tons[5]

[1] *U.S. Department of Energy, Energy Information Administration 2005 Residential Energy Consumption Web site: http://www.eia.gov/*

[2] *Idaho Power's 2022 Residential End-Use Study*

[3] *Reichmuth P.E., Howard. (1999). Engineering Review and Savings Estimates for the Filter Restriction Alarm.*

[4] *Provided by manufacturer.*

[5] *"Greenhouse Gas Equivalencies Calculator." EPA, Environmental Protection Agency, June. 2023, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.*

TEACHER KIT SAVINGS

Teacher Energy Efficiency Kit Projected Savings

No. of Years Participating	Student Kit Savings	Savings Percentage Applied	Number of Teachers	Total Annual Savings
1	230.89 kWh	100%	155	35,787.44 kWh
2	230.89 kWh	75%	83	14,372.7 kWh
3	230.89 kWh	50%	33	3,809.63 kWh
4	230.89 kWh	25%	71	4,098.24 kWh

Student Kit Savings x Savings Percentage Applied x Number of Teachers = Total Annual Savings

Total: 58,068.01 kWh

No. of Years Participating	Student Kit Savings	Savings Percentage Applied	Number of Teachers	Total Annual Savings
1	4.43 Therms	100%	155	687.17 Therms
2	4.43 Therms	75%	83	275.98 Therms
3	4.43 Therms	50%	33	73.15 Therms
4	4.43 Therms	25%	71	78.69 Therms

Student Kit Savings x Savings Percentage Applied x Number of Teachers = Total Annual Savings

Total: 1,114.99 Therms

No. of Years Participating	Student Kit Savings	Savings Percentage Applied	Number of Teachers	Total Annual Savings
1	1,812.95 Gals	100%	155	281,007.39 Gals
2	1,812.95 Gals	75%	83	112,856.19 Gals
3	1,812.95 Gals	50%	33	29,913.69 Gals
4	1,812.95 Gals	25%	71	32,179.88 Gals

Student Kit Savings x Savings Percentage Applied x Number of Teachers = Total Annual Savings

Total: 455,957.15 Gals

Total Annual Savings	No. of Teacher Kits Distributed	Average Annual Savings per Kit
58,068.01 kWh	342 kits	169.79 kWh
1,114.99 Therms	342 kits	3.26 therms
455,957.15 Gals	342 kits	1,333.21 Gals

Total Annual Savings ÷ No. of Teacher Kits Distributed = Average Annual Savings per Kit

PARTICIPATION TABLE

Capital Region

Region	State	School	Teachers	Students	Total
Capital	ID	Andrus Elementary	3	86	89
Capital	ID	Anser Charter School	1	52	53
Capital	ID	Barbara Morgan Stem Academy	2	85	87
Capital	ID	Basin Elementary	1	18	19
Capital	ID	Chaparral Elementary	1	23	24
Capital	ID	Christine Donnell School Of The Arts	1	85	86
Capital	ID	Collister Elementary	3	64	67
Capital	ID	Compass Public Charter School	1	112	113
Capital	ID	Cynthia Mann Elementary	2	53	55
Capital	ID	Discovery Elementary	4	96	100
Capital	ID	Eagle Hills Elementary	2	52	54
Capital	ID	East Canyon Elementary	0	0	0
Capital	ID	Falcon Ridge Public Charter	1	34	35
Capital	ID	Future Public School	1	48	49
Capital	ID	Garfield Elementary	1	30	31
Capital	ID	Glenns Ferry Elementary School	2	46	48
Capital	ID	Glenns Ferry Middle School	2	35	37
Capital	ID	Grace Jordan Elementary	2	53	55
Capital	ID	Hacker Middle School	5	137	142
Capital	ID	Hawthorne Elementary	1	18	19
Capital	ID	Heritage Middle School	2	345	347
Capital	ID	Hidden Springs Elementary	1	25	26
Capital	ID	Highlands Elementary	1	29	30

PARTICIPATION TABLE

Capital Region

Region	State	School	Teachers	Students	Total
Capital	ID	Hillcrest Elementary School	2	41	43
Capital	ID	Hillsdale Elementary	4	114	118
Capital	ID	Hunter Elementary	4	107	111
Capital	ID	Jefferson Elementary	1	20	21
Capital	ID	Joplin Elementary	2	50	52
Capital	ID	Koelsch Elementary	1	26	27
Capital	ID	Lake Hazel Elementary	3	76	79
Capital	ID	Lewis And Clark Middle School	2	244	246
Capital	ID	Liberty Elementary	1	24	25
Capital	ID	Longfellow Elementary	1	26	27
Capital	ID	Longfellow Elementary School	1	13	14
Capital	ID	Maple Grove School	2	66	68
Capital	ID	Mcmillan Elementary School	1	35	36
Capital	ID	Meridian Elementary	3	75	78
Capital	ID	Meridian Middle School	2	190	192
Capital	ID	Monroe Elementary	3	34	37
Capital	ID	Morley Nelson Elementary	2	52	54
Capital	ID	Mosaics Public School	1	59	60
Capital	ID	North Elementary	3	66	69
Capital	ID	North Star Charter School	1	84	85
Capital	ID	Owyhee Elementary School	1	12	13
Capital	ID	Peace Valley Charter School	1	29	30
Capital	ID	Peregrine Elementary School	1	45	46

PARTICIPATION TABLE

Capital Region

Region	State	School	Teachers	Students	Total
Capital	ID	Pierce Park Elementary	1	28	29
Capital	ID	Ponderosa Elementary School	3	81	84
Capital	ID	Reed Elementary	5	150	155
Capital	ID	River Valley Elementary	1	75	76
Capital	ID	Rolling Hills Public Charter School	1	32	33
Capital	ID	Ronald Reagan Elementary	3	82	85
Capital	ID	Rose Hill Montessori	1	2	3
Capital	ID	Ross Elementary	2	62	64
Capital	ID	Sage International School Of Boise	1	105	106
Capital	ID	Seven Oaks Elementary	3	90	93
Capital	ID	Shadow Hills Elementary	1	60	61
Capital	ID	Siena Elementary	1	130	131
Capital	ID	Silver Trail Elementary School	4	108	112
Capital	ID	Spalding Stem Academy	2	50	52
Capital	ID	St. Mark's Catholic School	1	40	41
Capital	ID	St. Mary's Catholic School	1	17	18
Capital	ID	Star Elementary	4	119	123
Capital	ID	Summerwind Stem Academy	3	57	60
Capital	ID	Taft Elementary	1	35	36
Capital	ID	The Village Charter School	1	19	20
Capital	ID	Ustick Elementary	1	75	76
Capital	ID	Valley View Elementary	3	71	74
Capital	ID	Victory Middle	1	180	181

PARTICIPATION TABLE

Capital Region

Region	State	School	Teachers	Students	Total
Capital	ID	West Elementary	4	95	99
Capital	ID	Whitney Elementary	3	61	64
Capital	ID	Whittier Elementary	1	27	28
Capital	ID	Willow Creek Elementary	2	64	66
			138	4929	5067

PARTICIPATION TABLE

Canyon Region

Region	State	School	Teachers	Students	Total
Canyon	ID	Birch Elementary	4	120	124
Canyon	ID	Centennial Baptist School	1	22	23
Canyon	ID	Centennial Elementary	2	56	58
Canyon	ID	Central Canyon Elementary School	1	26	27
Canyon	ID	Central Elementary	1	26	27
Canyon	ID	Desert Springs Elementary	4	118	122
Canyon	ID	East Canyon Elementary	4	130	134
Canyon	ID	Franklin D. Roosevelt Elementary	2	71	73
Canyon	ID	Greenhurst Elementary School	2	45	47
Canyon	ID	Heights Elementary	1	24	25
Canyon	ID	Heritage Community Charter School	1	60	61
Canyon	ID	Iowa Elementary School	1	78	79
Canyon	ID	Jefferson Middle School	1	100	101
Canyon	ID	Lake Ridge Elementary	3	88	91
Canyon	ID	Lewis And Clark Elementary	3	60	63
Canyon	ID	Melba Elementary School	3	65	68
Canyon	ID	Middleton Heights Elementary	1	25	26
Canyon	ID	Mill Creek Elementary	6	146	152
Canyon	ID	New Horizons Dual Language	1	70	71
Canyon	ID	Owyhee Elementary School	2	55	57
Canyon	ID	Park Ridge Elementary	1	75	76
Canyon	ID	Purple Sage Elementary	1	1	2
Canyon	ID	Roosevelt Elementary	1	35	36

PARTICIPATION TABLE

Canyon Region

Region	State	School	Teachers	Students	Total
Canyon	ID	Sherman Elementary	2	100	102
Canyon	ID	Thomas Jefferson Charter School	1	34	35
Canyon	ID	Victory Charter School	1	32	33
Canyon	ID	Vision Charter School	1	35	36
Canyon	ID	Washington Elementary School	1	26	27
Canyon	ID	West Canyon Elementary	1	25	26
Canyon	ID	West Middle School	3	191	194
Canyon	ID	Wilder Elementary School	1	18	19
Canyon	ID	Wilson Elementary School	2	50	52
		Total	60	2007	2067

PARTICIPATION TABLE

Eastern Region

Region	State	School	Teachers	Students	Total
Eastern	ID	Aberdeen Middle School	1	50	51
Eastern	ID	Arbon Valley Elementary	1	11	12
Eastern	ID	Blackfoot Charter Elementary	1	45	46
Eastern	ID	Connor Academy	1	65	66
Eastern	ID	Donald D Stalker Elementary School	1	23	24
Eastern	ID	Fort Hall Elementary	2	28	30
Eastern	ID	Gate City Elementary	1	30	31
Eastern	ID	Gem Prep Pocatello	1	30	31
Eastern	ID	Grace Lutheran School	1	30	31
Eastern	ID	Greenacres Elementary	2	51	53
Eastern	ID	I.T. Stoddard Elementary	1	64	65
Eastern	ID	Indian Hills Elementary	4	107	111
Eastern	ID	Inkom Elementary School	1	27	28
Eastern	ID	J.R. Simplot Elementary School	6	150	156
Eastern	ID	Lewis And Clark Elementary	3	72	75
Eastern	ID	Pioneer Elementary School #291	1	50	51
Eastern	ID	Ridge Crest Elementary	2	41	43
Eastern	ID	Rulon M Ellis Elementary	3	79	82
Eastern	ID	Syringa Elementary School	1	22	23
Eastern	ID	Tendoy Elementary	1	24	25
Eastern	ID	Tyhee Elementary	1	90	91
Eastern	ID	Wapello Elementary	2	38	40

PARTICIPATION TABLE

Eastern Region

Region	State	School	Teachers	Students	Total
Eastern	ID	Washington Elementary	1	30	31
Eastern	ID	William Thomas Middle School	1	114	115
		Total	40	1271	1311

PARTICIPATION TABLE

Southern Region

Region	State	School	Teachers	Students	Total
Southern	ID	Bickel Elementary	1	24	25
Southern	ID	Bliss Jr. High School	1	7	8
Southern	ID	Buhl Middle School	1	106	107
Southern	ID	Carey School	1	19	20
Southern	ID	Castleford School District	1	30	31
Southern	ID	Downey Elementary School	1	25	26
Southern	ID	Ernest Hemingway Steam School	1	24	25
Southern	ID	Filer Intermediate School	6	133	139
Southern	ID	Gooding Elementary School	1	96	97
Southern	ID	Gooding Middle School	1	98	99
Southern	ID	Hagerman Elementary School	1	31	32
Southern	ID	Hailey Elementary School	3	48	51
Southern	ID	Hansen Elementary School	1	50	51
Southern	ID	Heyburn Elementary	2	48	50
Southern	ID	Hilltop Adventist School	1	8	9
Southern	ID	I.B. Perrine Elementary	1	25	26
Southern	ID	Immanuel Lutheran School	1	19	20
Southern	ID	Jerome Middle School	3	327	330
Southern	ID	Lighthouse Christian School	1	12	13
Southern	ID	Murtaugh Intermediate School	2	41	43
Southern	ID	Oakley Elementary	1	28	29
Southern	ID	Perrine Elementary	1	25	26
Southern	ID	Richfield School	1	16	17

PARTICIPATION TABLE

Southern Region

Region	State	School	Teachers	Students	Total
Southern	ID	Robert Stuart Middle School	3	270	273
Southern	ID	Rock Creek Elementary	2	53	55
Southern	ID	Sawtooth Elementary	3	70	73
Southern	ID	Shoshone Elementary School	2	34	36
Southern	ID	Stricker Elementary	3	81	84
Southern	ID	Summit Elementary School	12	329	341
Southern	ID	Vera C. O'Leary Middle School	2	276	278
Southern	ID	Wendell Middle School	1	80	81
Southern	ID	West Minico Middle School	2	189	191
Southern	ID	Wood River Middle School	1	90	91
		Total	65	2712	2777

PARTICIPATION TABLE

Western Region

Region	State	School	Teachers	Students	Total
Western	ID	Barbara Morgan Elementary School	1	76	77
Western	ID	Cambridge Elementary	1	20	21
Western	ID	Carberry Elementary School	5	122	126
Western	ID	Emmett Middle School	1	140	141
Western	ID	Garden Valley School	1	20	21
Western	ID	Horseshoe Bend Elementary	1	18	19
Western	ID	Mccain Middle School	1	115	116
Western	ID	Park Intermediate	5	113	118
Western	ID	Parma Middle School	1	77	78
Western	ID	Riggins Elementary	1	15	16
Western	ID	Shadow Butte Elementary	1	25	26
Western	ID	Sweet-Montour Elementary	1	13	14
Western	ID	Tech Trep Academy	1	1	2
Western	ID	Treasure Valley Classical Academy	2	55	57
Western	ID	Weiser Middle School	1	118	119
Western	ID	Westside Elementary	4	108	112
		Total	27	1036	1063

PARTICIPATION TABLE

Western Region

Region	State	School	Teachers	Students	Total
Western	OR	Aiken Elementary School	1	52	53
Western	OR	Burnt River School	1	6	7
Western	OR	Four Rivers Community School	1	30	31
Western	OR	Henry L Slater Elementary School	3	61	64
Western	OR	Keating Elementary School	1	9	10
Western	OR	May Roberts Elementary School	1	23	24
Western	OR	Rockville Elementary School	1	3	4
Western	OR	Vale Elementary School	2	44	46
Western	OR	Willowcreek Elementary School	1	21	22
		Total	12	249	261

PARTICIPANT LETTERS

Teacher Letters

McCall-Donnelly
SCHOOL DISTRICT
"Developing Lifelong Learners *Today*"

Barbara R. Morgan Elementary School
125 S. Samson Trail, McCall, ID 83638
Phone: (208) 634-2219 Fax: (208) 634-4695
vberg@mdsd.org / dgeibel@mdsd.org / cbutler@mdsd.or

January 17, 2023

Dear Idaho Power,

Thank you so much for the power saving kits. We appreciate the time you spent boxing up the supplies and shipping them to us. We enjoyed the online portion of homework. You're clearly very knowledgeable about power saving resources.

Thank you again for taking the time to talk to about saving power and resources. I believe we can benefit from your company's guidance and look forward to working with this program again. In the meantime, please let me know if you need any additional information.

Sincerely,

Rachel Sievers
5th Grade Science Teacher
Barbara Morgan Elementary School

PARTICIPANT LETTERS

Teacher Letters

BIRCH ELEMENTARY

6900 Birch Lane
Nampa, ID 83687
(208) 461-5960 fax (208) 461-5957
Lisa Jauregui, Principal

January 25, 2023

Dear Idaho Power,

Thank you so much for providing this program for implementation in our classroom. The lessons were well thought out and easy to use. I also liked the experiments that you have included. Many of them coincide with one of our Science standards. I appreciate having the google slides made for each lesson.

The online activities were so much better this year. We didn't have the problems we had last year accessing homework activities. The students were engaged during the lessons. We were able to work through the homework lessons together. The new workbooks were colorful and interesting to the students. I think they were a great improvement from years past.

The students were very excited to take the kits home, and most reported that they had a great time working with family as they installed and completed the workbook that went with the kit. They were also surprised about how easy it was to save energy. I don't think they had realized just how much energy they were wasting on a daily basis. Both the teacher and the students learned something new about conserving energy.

I appreciate you allowing us to be part of this program.

Thanks so much!

Sincerely,

Mrs Lookhart

Juilana Lookhart
juilana.lookhart@vallivue.org

PARTICIPANT LETTERS

Teacher Letters

Shoshone Elementary

61 East Highway 24
Shoshone, Idaho 83352

Phone: 208-886-2381
Fax: 208-886-2778
Email: www.shoshonesd.org

Dear Idaho Power,

Thank you so much for providing the Wise program for me and my class. It was so easy for me to use, and the lessons were fun, and applicable. My students were engaged and interested. They enjoyed doing the workbook and were willing to take the assessments at the end of each lesson. They were very excited about the kits! They were eager to share what they learned with their families.

I hope to be able to participate in this program for many years to come!

Thank you,

Natalie Olsen
Shoshone Elementary
4th Grade Teacher

Focus, Empower, Succeed!

PARTICIPANT LETTERS

Teacher Letters

Vale Elementary

RESPECT • CITIZENSHIP • RESPONSIBILITY • FAIRNESS • CARING • TRUSTWORTHINESS

5/22/23

Attention Idaho Power Energywise sponsors,

This is my second third year using the Energywise program with fourth grade students. It is a generous and excellent program. The content is deep for fourth graders, and I feel like I never get to spend the time I would like making sure my kids understand the more abstract parts of it, but it is such a tremendous opportunity for my kids and their families. It causes my students and their parents to have conversations about their energy consumption and the natural resources which have to be managed in our area. We are blessed to live in an area with hydroelectric power. Thank you for all you do, and thank you for letting my be a part of this educational adventure.

Sincerely,

Cassie Young
Vale Elementary School

403 E. Street West · Vale, OR 97918 · Ph. 541-473-3291 · Fax. 541-473-3294 · http://ves.valesd.org