2024-2025 Washington Home Energy Report Program Evaluation, Verification & Measurement Report

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Glossary of Terms

The following terms are used throughout this report.

Ex-ante savings – Claimed savings reported by utility prior to program evaluation.

Ex-post savings – Verified savings reported by an evaluator after the energy impact evaluation has been completed.

Pre-treatment – Period that ended prior to the intervention date for the customer (e.g., pre-treatment billing periods are billing periods that ended prior to treatment).

Post-treatment – Period starting after the intervention date for the customer (e.g., post-treatment billing periods are billing periods that started after treatment).

Treatment – Program activity that sent customers home energy reports with the goal of altering their energy usage.

Control – Program design that withholds home energy reports from designated customers for the purpose of comparing their energy use with treated customers. This comparison is the basis for determining savings that result from treatment.

1 Executive Summary

This report presents the results of the Evaluation, Measurement, and Verification (EM&V) of Pacific Power's Home Energy Reports (HER) Program in Washington for the 2024 and 2025 program years. The evaluation assessed program energy impacts, cost-effectiveness, and customer experiences using program tracking data, historical billing records, and surveys of participating and control group customers. Program savings were estimated using industry-standard billing regression techniques applied to randomized control trial (RCT) cohorts and matched comparison groups, consistent with Uniform Methods Project guidance.

1.1 Program Impacts

The evaluation found that the HER program produced positive, verifiable energy savings in both program years, with total evaluated savings of 3.21 GWh in 2024 and 3.65 GWh in 2025. The overall realization rate across the two-year period was 93 percent, indicating strong alignment between claimed and evaluated savings (see Table 1-1). Annual realization rates of 81 percent in 2024 and 107 percent in 2025 fall within accepted industry ranges for behavioral energy efficiency programs.

Table 1-1: Program Energy Savings (kWh) and Realization Rate

Year	Claimed Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
2024	3,953,070	3,209,705	81%
2025	3,409,556	3,648,726	107%
Total	**7,362,626**	**6,858,431**	**93%**

Program performance varied by cohort. The Remix Email 2020 and Expansion Email & Paper 2021 waves generated consistent, statistically significant savings in both years, with the Expansion Email & Paper 2021 wave achieving the highest per-household savings and percentage reductions. In contrast, the Expansion Email 2023 wave did not produce measurable savings during the evaluation period, even after additional analytical steps were taken to establish a valid control group. This finding suggests that newer cohorts or email-only delivery formats may require additional refinement to achieve comparable impacts.

Although average savings per household were modest, generally less than two percent of annual electricity use, these reductions scaled effectively across a large customer base, resulting in substantial program-level savings at relatively low cost.

1.2 Cost Effectiveness

The HER program passed/did not pass all applicable cost-effectiveness tests, including the Total Resource Cost (TRC), PacifiCorp Total Resource Cost (PTRC), and Utility Cost Test (UCT). Because participation does not require customer expenditures, the Participant Cost Test (PCT) also passed by definition. These results confirm that the program delivers energy savings in a cost-effective manner and remains a valuable component of Pacific Power's demand-side management portfolio.

1.3 Process Evaluation Findings

Survey results indicate high levels of customer engagement and satisfaction. Most participants reported reading the reports, finding them easy to understand, and valuing the information provided. Many customers indicated that receiving HERs improved their perception of Pacific Power. However, differences in self-reported energy-saving behaviors between treatment and control groups were modest, suggesting that HERs operate within a broader context of market awareness and overlapping energy efficiency influences.

Use of the online HER portal was limited, with many customers unaware of its availability. Among those who accessed the portal, satisfaction and perceived usefulness were high, indicating an opportunity to enhance engagement and confidence in report accuracy through improved outreach.

1.4 Conclusions

Overall, the evaluation finds that Pacific Power's HER program in Washington continues to deliver reliable, cost-effective energy savings, with strongest performance observed in established waves and combined delivery formats. The program's RCT-based design supports robust impact estimation, and customer feedback indicates successful implementation. Future program success will depend on reinforcing high-performing approaches, refining newer cohorts, and strengthening customer engagement tools to sustain and enhance savings over time.

2 Home Energy Reports Program Description

Pacific Power began implementation of the Home Energy Reports (HERs) program in 2012. The purpose of the program is to provide residential customers with information that encourages them to adopt behaviors that reduce their home energy use. Each household receives periodic reports which contain personalized information about their power use and comparisons it to similar households' energy use. The reports also include information about Pacific Power's Home Energy Savings programs to encourage additional home improvements that will further reduce energy usage.

Program participants are cohorts that assigned to "waves" of treated customers that are matched with control group customers who consume similar amounts to energy.

Pacific Power contracts with a third-party implementer, Bidgely, to manage the program. Table 2-1 summarizes the participant cohorts included in the HER program in the Pacific Power Washington service area during 2024-2025.

Table 2-1: HERs Wave Summary

Wave	Treatment Start Date	Treatment Group Size		Control Group Size	
		Original Treatment Customer Count[1]	Number at EOY 2025	Original Control Customer Count	Number at EOY 2025
Remix Email 2020	Variable. Most in January 2020 or prior	25,000	13,752	10,000	5,517
Remix Paper 2020	Variable. Most in February 2020 or prior	21,000	13,096	10,000	6,208
Expansion Email & Paper 2021	Variable. Most between May 2021 and August 2021	14,183	6,767	8,951	4,105
Expansion Email 2023	November 2023	10,776	6,400	10,776[a]	7,864[a]
Total		**70,960**	**40,015**	**28,951[a]**	**15,830[a]**

[a]Control members in Expansion Email 2023 are non-unique and comprised of control customers from the other three waves.

[1] With variable intervention dates, defining the number of treatment customers at the start is problematic since new customers are added throughout the program year. the evaluator estimated the number of original treatment customers as the number of customers treated during the evaluation period with billing data at the start of the first year of treatment.

The evaluator estimated HER program savings using a matched control group of untreated residences in Pacific Power's service territory. The evaluator analyzed each of the waves treated during the 2024 and 2025 program years. The results from both program years are summarized on a calendar year basis (i.e., January through December). Table 2-2 describes the evaluation period for each wave and reporting period.

Table 2-2: Summary of Wave Organization

Wave	Intervention Date	Pre-Period	Post-Period (Calendar Year)
Remix Email 2020	Variable. 68% treated in January 2020	1/1/2019 – 12/31/2019	2024: 1/1/2024 to 12/31/2024 2025: 1/1/2025 to 12/31/2025
Remix Paper 2020	Variable. 58% treated in February 2020		
Expansion Email & Paper 2021	Variable. Most treated between May 2021 and August 2021	5/1/2020-4/30/2021	2024: 1/1/2024 to 12/31/2024 2025: 1/1/2025 to 12/31/2025
Expansion Email 2023	November 2023	10/1/2022-9/30/2023	2024: 1/1/2024 to 12/31/2024 2025: 12/1/2025-12/31/2025

2.1 Program Background

Since 2012, the HER program has been sending Home Energy Reports to Pacific Power residential customers. From 2012 through 2017, Oracle Utilities Opower served as the implementation contractor and delivered the HERs to customers. In 2018, the HER program transitioned to a new implementation contractor, Bidgely. For the 2018-2019 program, Bidgely maintained the treatment and control group assignments that Oracle Utilities Opower had established. All treatment and control group customers belonged to one of three cohorts (*waves*) of customers:

- *Legacy wave* received first report in 2012.
- *Expansion wave* received first report in 2014.
- *Refill wave* received first report in 2015.

In 2020, two new randomized cohorts were created that included treatment and control customers from the original waves identified as *Remix Email 2020* and *Remix Paper 2020*. In 2021, an additional cohort was created (*Expansion Email & Paper 2021*) from

customers not included in the original pre-2020 cohorts established by Opower. In 2023, another cohort was created (*Expansion Email 2023*) from customers not included in the previous waves. The control group customers for Expansion Email 2023 were drawn from previous control group customers. The four waves that are included in this evaluation for which there were claimed savings include:

- *Remix Email 2020* (email only reports)
- *Remix Paper 2020* (paper only reports)
- *Expansion Email & Paper 2021* (email and paper reports)
- *Expansion Email 2023* (email only report during this evaluation period)

2.2 Data Provided

Pacific Power provided the evaluator with the following data to support the analysis:

- Pre- and post-treatment monthly electric billing data for treated customers and comparison monthly billing data for untreated customers. Billing data was drawn from January 2018 through December 2025.
- Treated and untreated customers' account move-in and account move-out dates.

The program implementer provided the following data for the analysis:

- A customer dataset that identified the wave, the treatment or control group assignment, and the quantity of reports each customer received annually.

2.3 Evaluation Objectives

The evaluator identified the following research objectives for the 2024 and 2025 HER program evaluation:

- Evaluate program savings impacts to gain insight on program performance.
- Assess customers' satisfaction with the HER program and awareness of their individual energy consumption and other energy efficiency programs.

3 Impact Evaluation Approach

The evaluator analyzed each cohort treated during the 2024 and 2025 program years using participant and control group billing data. The evaluator used pre-period (before the household starts receiving home energy reports) and post-period (after household starts receiving home energy reports) data to estimate program impact for each wave, in accordance with the Uniform Methods Project (UMP) behavioral chapter by the National Renewable Energy Laboratory[2]. The work effort was divided into four distinct steps:

1. Data preparation and cleaning, including true-up and calendarization.
2. Validity testing of remaining treatment and control groups during the baseline period.
3. Estimate monthly and annual billed consumption differences between treatment and control groups via regression modeling.
4. Estimate program attrition.

The evaluator explored seven linear regression models as part of the impact evaluation of the HER program. Each approach involved panel linear regression models to estimate energy savings for the treatment group. The explored methods required monthly billing data for the program participants and a comparable counterfactual (control) group.

The following types of Linear Fixed Effects Regression (LFER) models were explored during the evaluation of this program: Difference in Difference (D-in-D) with monthly controls, D-in-D with weather controls, and multiple Post-Program Regression (PPR) models. A mix of D-in-D and PPR models were selected as the best models depending on the wave. The PPR model is a panel regression model that calculates the differences between treatment and control consumption in the post-program period. It includes controls on lagged energy use for the same calendar month of the pre-program period to include in the model any small systematic differences in pre-treatment usage trends between the participant and control groups.

The evaluator presents savings estimates in three formats for each program year:

- Daily and annual energy savings per home
- Annual percent savings per home
- Program-level savings

[2] https://www.nrel.gov/docs/fy18osti/70472.pdf

3.1 Step 1: Data Preparation and Cleaning

This section describes the data cleaning steps that the evaluator performed to prepare for the billing analysis.

Customers' monthly billing periods are not all the same. For example, one customer's June bill may run from May 16th to June 17th, while another customer's bill may run from May 20th to July 5th. To make the monthly billing data consistent between participants and to represent each month accurately, the evaluator calendarized the data into monthly bills. Calendarization is the process of correcting monthly billing data to match calendar dates. For example, if 15 days in a billing period belonged to June and 15 days belonged to July; 50 percent of the billed usage would be attributed to June and 50 percent to July. The proportionated usage and number of days in each calendar month are then summed to generate a calendarized usage value and the number of billed days for that month. The following equation was used to calculate monthly usage by calendar month:

Equation 3-1: Monthly Billing Data Calculation

$$Monthly\ usage_m = \sum_{i}^{n} \left(\frac{Usage_i}{Billing\ days_i} \times Month\ days_i \right)$$

Where:

i = *First bill containing the month of interest.*

n = *Last bill containing the month of interest.*

m = *The month of interest.*

$Monthly\ usage$ = *The calendarized monthly usage for a given month.*

$Usage$ = *The bill's total usage.*

$Month\ days$ = *The number of days belonging to the month of interest m in the bill.*

$Billing\ days$ = *The total number of days in the billing period.*

After calendarization was completed, an average daily usage value was calculated by dividing the monthly usage by the number of billed days in a month. Additionally, data was filtered using the following criteria:

- Customers from other residential programs were removed.
- Removed all customers without intervention dates, a treatment number, or a wave.
- Removed customers that were present in both the treatment and control groups.
- Removed treatment customers that were in multiple waves, keeping their first wave.

- Removed control customers that had email addresses for email treatments that were in treatment group.
- Removed bills overlapping the intervention date.
- Months that were present after a customer's move out date were excluded from analysis.
- Months that were present prior to a customer's move in date were excluded from analysis.
- Customer months in which average daily usage exceeded 3 * the interquartile range in kWh were excluded from analysis (removed daily usage bills above 129 kWh). This level of consumption is unrealistic for residential households; thus, the evaluator stipulates that the data is erroneous for these outliers.
- Bills that were greater than 90 days before calendarization and less than 10 days after calendarization were removed.
- Pre-treatment data was limited to the 12 months prior to the treatment start date for each wave.
- Customers without at least 9 of the 12 months of pre-period data, as well as at least 6 of the 12 months of post-period data were removed prior to the regression.

Table 3-1 displays the original and final number of HER participants and non-participants used in the calculation of the methodologies below.

Table 3-1: Treatment and Control Customers

Wave	Weighted Treatment Customer Count		Weighted Control Customer Count	
	2024	2025	2024	2025
Remix Email 2020	14,327	12,942	5,632	5,066
Remix Paper 2020	13,689	12,371	6,457	5,853
Expansion Email & Paper 2021	7,408	6,438	4,465	3,889
Expansion Email 2023	7,001	5,726	7,252	6,445
Total	**42,425**	**37,478**	**23,806**	**21,254**

Note: Weighted customers are the sum of all billing days in the post-period for all participants for the given program year/wave divided by 365.25

After data preparation and cleaning, the evaluator performed validity testing for all evaluated waves. The details of this step are provided in the next section.

3.2 Step 2: Validity Testing

The method for evaluation requires that the control group remains statistically valid for each treatment group. Validity is tested by examining billing data in the pre-treatment period for customers in the treatment and control groups. Each month of data is tested for statistically significant differences between the treatment and control groups using a simple two-tailed T-test.

The evaluator tested the control group validity of each treatment wave by completing T-tests for the average daily usage in each of the pre-period months between the treatment and control groups, then tested pre-period usage for differences at the 90 percent confidence interval for each of the 12 pre-period months. The evaluator considered control groups to pass the validity test 9 or more of the months do not show a significant difference between the energy use of treatment and control groups.

When any waves do not pass equivalency testing, the evaluator performs propensity score matching (PSM) to create a post-hoc control group comprised of participants that have not received home energy reports. The 2023 Expansion Email wave did not pass equivalency testing, therefore PSM was performed by finding customers within the control group that most closely resembled the seasonal usage of the treatment group allowing for replacement of control customers. This is further discussed in section 3.2.1. The other RCT waves were left intact.

3.2.1 Validity testing for Expansion Email 2023 Wave

Initially, the evaluator found that the 2023 Expansion Email wave did not pass equivalency testing between the pre-period control and treatment groups. The control group for the Expansion Email 2023 wave is wholly comprised of control members from the 2020 Remix Email, 2020 Remix Paper, and 2021 Expansion Email & Paper groups so this result was not surprising. The reason for this not being surprising is control groups in a Randomized Controlled Trial should be selected based on similar power consumptions in the pre-period between the control and treatment group. By using what appeared to be about an even number of control members from each of the 2020 Remix Email, 2020 Remix Paper, and 2021 Expansion Email & Paper groups the 2023 Expansion Email wave appears not to have had a control group that was similar to the treatment group in energy consumption and therefore did not pass equivalency testing.

Therefore, the evaluator performed propensity score matching (PSM) to filter the control group in the 2023 wave to a smaller subset of members that had more similar seasonal usage.

3.3 Step 3: Linear Regression Modeling

The evaluator ran seven regression models and determined which model resulted in the best fit to the billing data. The evaluator compared the R-squared values and p-values for each model for each wave. The chosen model for each wave optimized high R-squared values and lower p-values across both years.

The evaluator used the same model for both years of each wave for consistency across estimates within each wave. While some chosen models lack a p-value less than 0.05, they are nearly at the 0.10 significance level and due to nearly all models showing an indication of savings in the Remix Email 2020, Remix Paper 2020, and Expansion Email & Paper 2021 waves the p-value being slightly higher was a reasonable trade-off for calculating savings with the same models across years within waves and showed practical significance. This is further discussed in section 4.3.

Table 3-2: Adjusted R-squared Values for regression models[3]

Wave	Year	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Remix Email 2020	2024	0.00	0.51	0.14	0.66	0.66	**0.65**	0.65
	2025	0.00	0.51	0.13	0.65	0.65	**0.62**	0.62
Remix Paper 2020	2024	0.00	0.35	0.26	0.63	0.63	**0.63**	0.63
	2025	0.01	0.35	0.26	0.62	0.62	**0.60**	0.60
Expansion Email & Paper 2021	2024	0.00	0.64	0.08	0.73	**0.73**	0.71	0.71
	2025	0.00	0.64	0.07	0.73	**0.73**	0.69	0.69
Expansion Email 2023	2024	0.00	0.60	0.07	0.67	0.73	0.82	**0.82**
	2025	0.00	0.59	0.06	0.66	0.72	0.77	**0.77**

The following sections summarize the model specification the evaluator used to estimate impact savings for the program.

3.3.1 Regression Models

The evaluator used models 5, 6, and 7 depending on the wave to calculate savings for the HER program. Model 5 was used for Expansion Email & Paper 2021; Model 6 was used for the Remix Email 2020 and Remix Paper 2020 waves; Model 7 was used for the Expansion Email 2023 wave. There was not a single model that performed best for all waves and all years in regard to having the highest adjusted R^2.

Model 5 is a fixed effects model that aims to control the noise for each customer while modeling the post-period variable, post-period interaction with time, the treatment interacted with post-period variable, and the treatment interacted with the post-period and

[3] Bolded indicates this is the model that was used to calculate final savings.

time variables to generate a regression coefficient that represents average daily usage differences between control and treatment.

Model 6 relies on modeling interaction between time and the treatment effect to generate a regression coefficient that represents the average daily usage savings in each month post-treatment.

Model 7 relies on modeling the interaction between time, weather, and the treatment effect to generate a regression coefficient that represents the average daily usage savings in each month post-treatment.

Model 6 is a PPR-type model that combines both cross-sectional and time series data in a panel dataset. This model uses only the post-program data, with lagged energy use for the same calendar month of the pre-program period acting as a control for any small systematic differences between the participant and control customers.

In addition, the evaluator used Heating Degree Days (HDD) and Cooling Degree Days (CDD) in model 7 to account for any weather-related effects not captured by the monthly dummy variables or each customer's average pre-period seasonal usage. The above models are highlighted in more detail below.

3.3.1.1 Model 5: Fixed-Effects Difference-in-Difference

The fixed-effects linear regression model specification contains customer-specific dummy variables to account for exogenous heterogeneity that cannot be explicitly controlled for and is not relevant to the estimation of program savings. The specification of customer specific effects allows the model to capture much of the baseline differences across customers while obtaining reliable estimates of the impact of the home energy reports.

The evaluator fits a monthly fixed effects panel regression model to estimate daily consumption differences between treatment and control households in each month. The model specifications used in this analysis are described below.

Equation 3-2: Fixed-Effects Difference-in-Difference (D-in-D) Panel Regression Model Specification (Model 5)

$$ADC_{it} = \alpha_0 + \beta_1(Post)_{it} + \beta_2(Post \times Month)_{it} + \beta_3(Treatment \times Post)_{it} + \beta_4(Treatment \times Post \times Month)_{it} + \varepsilon_{it}$$

Where,

ADC_{it} = Estimated average daily consumption (dependent variable) in home i during period t

$Post_{it}$ = Dummy variable indicating whether period t was in pre- or post-period

$Treatment_i$ = Dummy variable indicating whether household *i* was in treatment group or control group

$Month_{it}$ = Dummy variable indicating month during period t

ε_{it} = Customer-level random error

α_0 = The model intercept for home i

β_{1-4} = Coefficients determined via regression

The coefficients β_3 and β_4 represent the average change in consumption between the treatment group and the control group in the post-period. Monthly energy savings (kWh) are then calculated using the following equation:

Equation 3-3: Monthly Energy Savings (kWh)

$$Monthly\ kWh\ Savings = -1 * \beta_{4t} * days_t * participants_t$$

Where:

t = a given month in the program year,

β_{4t} = the regression coefficient for the treatment effect of month t in the post-period

$days_t$ = the number of days in the given month

$participants_t$ = the number of active participants in month t

Because the regression equation predicts average daily usage as a function of the treatment effect, and the treatment indicator has been coded as "1", the regression coefficient for the treatment effect of a given month should be negative if savings occurs. Therefore, multiplying the savings calculation by -1 will correct the sign of the results.

3.3.1.2 Model 6: Post Period Regression with time

The evaluator evaluated the following PPR model:

Equation 3-4: PPR Model (Model 6)

$$Usage_{imy} = \beta_0 + \sum_{m=1}^{12}\sum_{y=1}^{n} I_{my} * \beta_{myp} * \left(AvgPre_{ip}\right) + \tau_{my} * treatment_{imy} + \beta_1 * Month + \varepsilon_{imy}$$

Where:

$Usage_{imy}$ = Customer i's average daily energy usage in bill month m in year y

β_0 = Intercept of the regression equation

I_{my} = An indicator variable equal to one for each monthly bill month m, year y, and zero otherwise

β_{myp} = The coefficient on the bill month m, year y indicator variable interacted with pre-period p, where p represents the post-period month m minus 12 months

β_1 = The coefficients on Month

$AvgPre_{ip}$ = Average daily usage for customer i in the pre-treatment period p, where p represents the post-treatment month m minus 12 months

$treatment_{imy}$ = The treatment indicator variable. Equal to one when the treatment is in effect for the treatment group. Zero otherwise. Always zero for the control group.

τ_{my} = The estimated treatment effect in usage per day per customer.

ε_{imy} = The error term.

Energy use in calendar month m of the post-program period is framed as a function of both the participant variable and energy use in the same calendar month of the pre-program period. The underlying logic is that systematic differences between participants and controls will be reflected in differences in their past energy use, which is highly correlated with their current energy use. This model estimates the monthly fixed effect and its interaction with pre-program energy use. These interaction terms allow pre-program usage to have a different effect on post-program usage in each calendar month.

Monthly savings were calculated using the following equation:

Equation 3-5 Monthly Energy Savings (kWh) for PPR Model

$$Monthly\ kWh\ Savings = Treatment\left(\tau_{my}\right) * Days\ in\ Month$$

3.3.1.3 Model 7: Post Period Regression with Weather Model Specification

The PPR with weather model is specified in Equation 3-6 below (Model 7):

Equation 3-6: PPR Model (Model 7)

$$Usage_{imy} = \beta_0 + \sum_{m=1}^{12}\sum_{y=1}^{n} I_{my} * \beta_{myp} * \left(AvgPre_{ip}\right) + \tau_{my} * treatment_{imy} + \beta_1 * HDD_{imy} + \beta_2 * CDD_{imy} + \beta_3 * HDD_{imy} * treatment_{imy} + \beta_4 * CDD_{imy} * treatment_{imy} + \varepsilon_{imy}$$

Where:

$Usage_{imy}$ = Customer i's average daily energy usage in bill month m in year y

β_0 = Intercept of the regression equation

I_{my} = An indicator variable equal to one for each monthly bill month m, year y, and zero otherwise

β_{myp} = The coefficient on the bill month m, year y indicator variable interacted with pre-period p, where p represents the post-period month m minus 12 months

β_1, β_2 = The coefficients on Heating Degree Days and Cooling Degree Days

$AvgPre_{ip}$ = Average daily usage for customer i in the pre-treatment period p, where p represents the post-period month m minus 12 months

$treatment_{imy}$ = The treatment indicator variable. Equal to one when the treatment is in effect for the treatment group. Zero otherwise. Always zero for the control group.

HDD_{imy} = Heating Degree Days for customer i in month m.

CDD_{imy} = Cooling Degree Days for customer i in month m.

τ_{my} = The estimated treatment effect in usage per day per customer independent of weather.

β_3, β_4 = The coefficients on Heating Degree Days and Cooling Degree Days interacted with the treatment indicator variable. This measures the treatment effect as a function of HDD and CDD (i.e., the change in usage per day due to treatment per HDD/CDD).

ε_{imy} = The error term.

Similar to model 6, energy use in calendar month m of the post-program period is framed as a function of both the participant variable and energy use in the same calendar month of the pre-program period. The underlying logic is that systematic differences between participants and controls will be reflected in differences in their past energy use, which is highly correlated with their current energy use. This model estimates the monthly fixed effect and its interaction with pre-program energy use. These interaction terms allow pre-program usage to have a different effect on post-program usage in each calendar month.

Regional temperature data was obtained from the National Oceanic and Atmospheric administration using the closest weather stations determined by customer zip code. Using the historical weather data, the evaluator calculated HDD and CDD for use in the regression analysis. HDDs are calculated as temperature values under the heating

setpoint (60°F), while CDDs are calculated as temperature values over the cooling setpoint (63°F). The setpoint values for HDDs and CDDs were determined by running regressions with multiple setpoints from 55°F through 75°F. The evaluator chose the setpoint combination with the highest adjusted R-squared value, demonstrating the best fit for the data.

Monthly savings were calculated using the following equation:

Equation 3-7 Monthly kWh Savings for PPR Model

$$\begin{aligned} &Monthly\ kWh\ Savings \\ &\quad = Treatment\ (\tau_{my}) * Days\ in\ Month + Treatment{:}\ HDD\ (B_3) * HDD\ in\ Month \\ &\quad + Treatment{:}\ CDD\ (B_4) * CDD\ in\ Month \end{aligned}$$

3.3.2 Additional Regression Models Tested

The following section summarizes the additional four regression models that the evaluator explored to estimate impact savings for the program. These models had lower adjusted R-squared values than the model the evaluator selected for the analysis or had a worse combination of statistical significance and adjusted R-squared values.

3.3.2.1 Fixed-Effects Difference-in-Difference (D-in-D) Models

The additional four D-in-D model variations have different combination of variables and interaction effects among variables:

Equation 3-8: Simple Difference-in-Difference (D-in-D) Panel Regression Model Specification (Model 1)

$$ADC_{it} = \alpha_0 + \beta_1(Post)_{it} + \beta_2(Treatment)_{it} + \varepsilon_{it}$$

Equation 3-9: Simple Fixed Difference-in-Difference (D-in-D) Panel Regression Model Specification (Model 2)

$$ADC_{it} = \alpha_0 + \beta_1(Post)_{it} + \beta_2(Treatment * Post)_{it} + \varepsilon_{it}$$

Equation 3-10: Simple Difference-in-Difference (D-in-D) with Weather Panel Regression Model Specification (Model 3)

$$\begin{aligned} ADC_{it} = \alpha_0 &+ \beta_1(Post)_{it} + \beta_2(Treatment)_{it} + \beta_3(HDD)_{it} + \beta_4(CDD)_{it} + \beta_5(Treatment * Post)_{it} \\ &+ \beta_6(Post * HDD)_{it} + \beta_7(Post * CDD)_{it} + \beta_8(Treatment * Post * HDD)_{it} \\ &+ \beta_8(Treatment * Post * CDD)_{it} + \varepsilon_{it} \end{aligned}$$

Equation 3-11: Fixed Difference-in-Difference (D-in-D) with Weather Panel Regression Model Specification (Model 4)

$$ADC_{it} = \alpha_0 + \beta_1(Post)_{it} + \beta_2(HDD)_{it} + \beta_3(CDD)_{it} + \beta_3(Treatment * Post)_{it} + \beta_4(Post * HDD)_{it} + \beta_5(Post * CDD)_{it} + \beta_6(Treatment * Post * HDD)_{it} + \beta_7(Treatment * Post * CDD)_{it} + \varepsilon_{it}$$

3.4 Double Count Savings Approach

The evaluator removed customers who participated in Home Energy Savings program from this analysis to isolate the effect of HERs treatment from any savings generated from the Home Energy Savings program. This ensured that savings from the Home Energy Savings program were not included in the evaluated savings of the HER program. Savings from that program are reported separately.

3.5 Step 4: Attrition Analysis Approach

The number of treatment and control households is affected by move-outs and opt-outs (known collectively as 'attrition'). If a household's final bill was at the end of the evaluated post-period, it is considered a move out and bills occurring after move-out were removed from the analysis. Customers who opt-out, however, remain in the regression analysis, as the program savings estimate is the "intent-to-treat" savings. It remains useful to estimate attrition to gather information on persistence of savings.

The evaluator summarized the cumulative level of both treatment and control move-outs over the program life by month, wave, and treatment/control status for each program year. This information can be useful for Pacific Power and the implementer for the potential need for future wave expansions for the HER program.

4 Impact Evaluation Results

Impact results are presented for each wave, for each year. Both household and total program savings are reported. Total program savings were calculated by multiplying the average annual household savings by the weighted treatment customer count for each wave for each year. The evaluator also calculated the average annual percent savings for each wave for each year by dividing the average annual energy savings for the treatment group by the average annual energy consumption of the control group for each wave for each year.

4.1 Data Preparation and Cleaning

The evaluator prepared and cleaned billing data provided by Pacific Power prior to running regressions. The following table represents the unique number of customers per wave and treatment group throughout the billing cleaning stages.

Table 4-1: Treatment and Control Customer Count After Restrictions

Wave	Restriction Detail	Treatment Customer Count	Control Customer Count
Remix Email 2020	Start	25,000	10,000
	Removing customers from other programs	23,459	9,369
	Remove all treatments without intervention date	22,990	9,369
	Remove customers in both treatment and control groups	22,893	9,273
	Remove treatment customers in multiple waves, keeping their first wave.	22,892	9,273
	Removed/adjusted duplicated IDs into one entry for waves	22,892	9,273
	After merging with billing data	22,892	9,273
	Removed bills with more than 90 days duration.	22,892	9,273
	Removed data without wave listed	22,892	9,273
	Removed bills without a treatment group	22,892	9,273
	Removed bills that occur after move-out	22,892	9,273
	Removed bills that occur before move-in	22,892	9,273
	Removed outlier bills above 3 * IQR according to daily usage.	22,892	9,273
	Remove bills overlapping the intervention date	22,892	9,273
	After removing dual assignment users	22,892	9,041
	Calendarized data and removed bills with less than 10 days.	22,892	9,041
	Only keep pre-period and post-period in program year(s) with 9 months pre and 6 months post	14,735	5,790

Wave	Restriction Detail	Treatment Customer Count	Control Customer Count
Remix Paper 2020	Start	21,000	10,000
	Removing customers from other programs	19,834	9,424
	Remove all treatments without intervention date	19,741	9,424
	Remove customers in both treatment and control groups	19,688	9,354
	Remove treatment customers in multiple waves, keeping their first wave.	19,687	9,354
	Removed/adjusted duplicated IDs into one entry for waves	19,687	9,354
	After merging with billing data	19,687	9,354
	Removed bills with more than 90 days duration.	19,687	9,354
	Removed data without wave listed	19,687	9,354
	Removed bills without a treatment group	19,687	9,354
	Removed bills that occur after move out	19,687	9,354
	Removed bills that occur before move in	19,687	9,354
	Removed outlier bills above 3 * IQR according to daily usage.	19,687	9,354
	Remove bills overlapping the intervention date	19,687	9,354
	After removing dual assignment users	19,687	9,314
	Calendarized data and removed bills with less than 10 days.	19,687	9,314
	Only keep pre-period and post-period in program year(s) with 9 months pre and 6 months post	14,066	6,628
Expansion Email & Paper 2021	Start	13,629	8,733
	Removing customers from other programs	13,119	8,417
	Remove all treatments without intervention date	12,741	8,417
	Remove customers in both treatment and control groups	12,073	7,700
	Remove treatment customers in multiple waves, keeping their first wave.	11,839	7,700
	Removed/adjusted duplicated IDs into one entry for waves	11,824	7,700
	After merging with billing data	11,823	7,700
	Removed bills with more than 90 days duration.	11,823	7,700
	Removed data without wave listed	11,823	7,700
	Removed bills without a treatment group	11,823	7,700
	Removed bills that occur after move out	11,823	7,699
	Removed bills that occur before move in	11,823	7,699
	Removed outlier bills above 3 * IQR according to daily usage.	11,823	7,699
	Remove bills overlapping the intervention date	11,823	7,699
	After removing dual assignment users	11,823	7,610
	Calendarized data and removed bills with less than 10 days.	11,823	7,610
	Only keep pre-period and post-period in program year(s) with 9 months pre and 6 months post	7,430	4,564

Wave	Restriction Detail	Treatment Customer Count	Control Customer Count
Expansion Email 2023	Start	10,630	10,711
	Removing customers from other programs	10,013	9,984
	Remove all treatments without intervention date	9,528	9,984
	Remove customers in both treatment and control groups	9,461	9,647
	Remove treatment customers in multiple waves, keeping their first wave.	9,323	9,647
	Removed/adjusted duplicated IDs into one entry for waves	9,310	9,647
	After merging with billing data	9,306	9,647
	Removed bills with more than 90 days duration.	9,306	9,647
	Removed data without wave listed	9,306	9,647
	Removed bills without a treatment group	9,306	9,647
	Removed bills that occur after move out	9,306	9,647
	Removed bills that occur before move in	9,306	9,647
	Removed outlier bills above 3 * IQR according to daily usage.	9,306	9,647
	Remove bills overlapping the intervention date	9,306	9,647
	After removing dual assignment users	9,306	9,514
	Calendarized data and removed bills with less than 10 days.	9,306	9,514
	Only keep pre-period and post-period in program year(s) with 9 months pre and 6 months post	7,906	8,512
	After Propensity Score matching to create valid control group	7,835	4,466

The evaluator conducted calendarization adjustments for each monthly bill. The resulting dataset contained adjusted monthly bill reads with associated consumption and bill duration for each month the customer remained active.

After data preparation and cleaning, the evaluator performed validity testing for all evaluated waves. The details of this step are provided in the next section.

4.2 Validity Testing Results

After data preparation and cleaning, the evaluator tested the remaining customers for statistically significant differences in usage between the treatment and control groups for each of the 12 pre-period months in each wave. As shown in the tables below, all waves had valid control groups. Table 4-2 through Table 4-5 include differences and statistical significance between each wave's treatment and control groups for each of the 12 months in the pre-period.

Table 4-2: Remix Email 2020 Wave T-Test Results

Pre-Period Month	Treatment Group Average Daily Usage (kWh)	Control Group Average Daily Usage (kWh)	Average Daily Usage Difference (kWh)	P-value	Statistically Significant Difference[4]
Jan	55.54	55.98	-0.44	0.35	-
Feb	58.72	59.23	-0.51	0.33	-
Mar	47.83	48.03	-0.20	0.60	-
Apr	32.32	32.37	-0.05	0.84	-
May	30.88	30.97	-0.10	0.68	-
Jun	35.06	35.19	-0.13	0.64	-
Jul	39.55	39.68	-0.13	0.67	-
Aug	40.39	40.53	-0.14	0.64	-
Sep	33.46	33.55	-0.09	0.71	-
Oct	38.15	38.33	-0.18	0.53	-
Nov	50.01	50.22	-0.21	0.61	-
Dec	54.58	54.99	-0.41	0.36	-

The p-values for the Remix Email 2020 wave indicate that no statistically significant differences were found in daily usage between the treatment and control group for any of the 12 pre-period months. Therefore, the control group is valid for this wave.

Table 4-3: Remix Paper 2020 Wave T-Test Results

Pre-Period Month	Treatment Group Average Daily Usage (kWh)	Control Group Average Daily Usage (kWh)	Average Daily Usage Difference (kWh)	P-value	Statistically Significant Difference[4]
Jan	64.02	63.89	0.13	0.73	-
Feb	69.00	68.97	0.03	0.94	-
Mar	54.75	54.83	-0.08	0.79	-
Apr	35.58	35.54	0.05	0.81	-
May	32.19	32.16	0.02	0.91	-
Jun	35.40	35.38	0.02	0.94	-
Jul	39.16	39.24	-0.09	0.75	-
Aug	39.80	39.88	-0.08	0.76	-
Sep	34.61	34.60	0.01	0.96	-
Oct	42.76	42.75	0.01	0.96	-
Nov	57.39	57.44	-0.05	0.87	-
Dec	63.08	62.71	0.36	0.33	-

[4] statistically significant if $p<0.05$

The p-values for the Remix Paper 2020 wave indicate that no statistically significant differences were found in daily usage between the treatment and control group for any of the 12 pre-period months. Therefore, the control group is valid for this wave.

Table 4-4: Expansion Email & Paper 2021 Wave T-Test Results

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Statistically Significant Difference[5]
Jan	42.31	41.62	0.68	0.20	-
Feb	41.44	41.02	0.42	0.42	-
Mar	33.31	32.84	0.47	0.25	-
Apr	26.35	25.99	0.36	0.26	-
May	23.49	23.22	0.27	0.36	-
Jun	26.77	26.50	0.27	0.41	-
Jul	33.05	32.71	0.35	0.38	-
Aug	33.08	32.84	0.24	0.53	-
Sep	26.27	26.01	0.26	0.41	-
Oct	28.41	28.06	0.35	0.29	-
Nov	39.09	38.69	0.40	0.41	-
Dec	43.01	42.73	0.28	0.60	-

The p-values for the Expansion Email & Paper 2021 wave also indicates the control group is valid for this wave.

[5] statistically significant if $p<0.05$

The Expansion Email 2023 wave did not pass the initial T-test Results. Here are the original T-test results:

Table 4-5: Expansion Email 2023 Wave T-Test Results

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Statistically Significant Difference
Jan	48.82	48.91	-0.09	0.85	-
Feb	45.47	45.85	-0.38	0.40	-
Mar	39.01	39.50	-0.48	0.20	-
Apr	30.28	30.79	-0.51	0.07	-
May	27.57	28.22	-0.65	0.01	*
Jun	30.82	31.73	-0.91	0.00	*
Jul	36.07	37.14	-1.07	0.00	*
Aug	33.50	34.36	-0.86	0.01	*
Sep	26.55	27.00	-0.45	0.07	-
Oct	27.78	28.56	-0.79	0.00	*
Nov	45.14	45.30	-0.15	0.72	-
Dec	52.23	51.59	0.64	0.21	-

Five months of 12 pre-period months showed a statistically significant difference for this wave. The evaluator provides the allowance of up to three months of the 12 pre-period months to be rejected and still pass validity testing. Therefore, the control group is invalid for this wave.

Due to this, the evaluator needed to use a modelling technique called propensity score matching (PSM) to relate control customers to treatment customers. PSM works by giving each customer a single “similarity score” based on their characteristics (in this case seasonal usage) and then pairing treated customers with untreated customers who have nearly the same score. This makes the two groups comparable, so any difference in outcomes is more likely due to the treatment rather than pre-existing differences. The goal is to minimize losses of treatment customers, so the evaluator allows replacement for control customers when determining the matches. The following table represents the results of the T-test post matching:

Table 4-6: Expansion Email 2023 Wave Post Matching T-Test Results

Pre-Period Month	Treatment Group Average Daily Usage (kWh/day)	Control Group Average Daily Usage (kWh/day)	Average Daily Usage Difference (kWh/day)	P-value	Statistically Significant Difference
Jan	48.79	49.08	-0.29	0.55	-
Feb	45.45	45.95	-0.50	0.27	-
Mar	38.43	38.87	-0.44	0.25	-
Apr	29.82	30.03	-0.20	0.46	-
May	27.24	27.29	-0.05	0.86	-
Jun	30.53	30.56	-0.03	0.92	-
Jul	35.75	35.88	-0.13	0.71	-
Aug	33.21	33.28	-0.07	0.82	-
Sep	26.23	26.09	0.14	0.58	-
Oct	27.34	27.83	-0.50	0.05	-
Nov	44.61	44.83	-0.22	0.61	-
Dec	52.20	51.83	0.36	0.48	-

4.3 Linear Regression Modeling Results

This section details the regression results of each of the evaluated waves. All waves in 2020 and 2021 were evaluated using their original RCT control groups. The 2023 wave was evaluated by using the control group from propensity score matching.

As discussed in the evaluation approach section, savings are directly determined through model parameters, the coefficients are defined again in Table 4-6 by model type.

Table 4-6: Regression Parameters

Variable	Model	Parameter	Interpretation
Treatment * post	5	β_3	Average change in consumption between customer and treatment group in the post-period
Treatment * post * Month	5	β_4	Average change in consumption between customer and treatment group in the post-period per month
Treatment	6	τ_{my}	Average daily usage in the post-period
Treatment	7	τ_{my}	Average daily usage in the post-period
Treatment * HDD	7	β_3	Average daily usage in the post-period per HDD
Treatment * CDD	7	β_4	Average daily usage in the post-period per CDD

Per-home results and percent savings by month and by program year are presented for each of the analyzed waves. Joint savings attributable to Pacific Power programs were removed to avoid double counting.

Models were selected based primarily on the model with the highest adjusted R-squared, while also achieving model continuity between years (choosing same model type for each wave), and using statistical significance to achieve the best and most sensible comparison across years. For more details on model selection refer back to section 3.3.

The evaluator found the Remix Email 2020 and Expansion Email & Paper 2021 waves for 2024 and 2025 had positive savings that were statistically significant. The Remix Paper 2020 for 2024 also showed positive savings with statistical significance. The model for Remix Paper 2020 for 2025 showed positive savings but was not statistically significant at the conventional 5 percent ($p < 0.05$) level. Despite this, all the tested models for that wave in 2025 consistently showed positive estimated savings (some with statistical significance). This is meaningful and practically significant, and thus the evaluator used the estimate from the chosen model to calculate savings. It is important to keep in mind that the value being estimated (energy savings in kWh) is very small relative to all the noise in the models, and thus the consistency in seeing positive savings across numerous model types is a crucial consideration when determining the estimate to use.

4.3.1 Remix Email 2020 Wave Results

Table 4-7 displays the annual energy savings (kWh) per treatment customer for the Remix Email 2020 wave by program year. The savings are positive and statistically significant at the 90 percent level for both 2024 and 2025.

Table 4-7: Regression Estimates for Remix Email 2020 Wave
Annual Household Savings

Year	Annual Household Estimated Savings (kWh)	90% Confidence Interval (kWh)
2024	74.2	29.3 – 119.2
2025	131.9	84.1 -179.7

Table 4-8 and Table 4-9 display the regression coefficients for each program year.

Table 4-8: Remix Email 2020 Wave 2024 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
(Intercept)	11.22	0.22	0.00	10.87	11.58
Treatment	-0.20	0.06	0.00	-0.31	-0.10
Feb	0.25	0.30	0.40	-0.24	0.74
Mar	-2.11	0.30	0.00	-2.60	-1.61
Apr	-4.70	0.31	0.00	-5.21	-4.19
May	-4.41	0.31	0.00	-4.92	-3.91
Jun	-3.12	0.30	0.00	-3.62	-2.62
Jul	1.09	0.31	0.00	0.58	1.60
Aug	-2.31	0.31	0.00	-2.82	-1.80
Sep	-5.30	0.31	0.00	-5.82	-4.79
Oct	-3.20	0.31	0.00	-3.70	-2.69
Nov	-2.19	0.30	0.00	-2.69	-1.70
Dec	-2.26	0.30	0.00	-2.75	-1.76
Pre-period Usage	0.85	0.00	0.00	0.85	0.86
Feb: Pre-period Usage	-0.24	0.00	0.00	-0.25	-0.23
Mar: Pre-period Usage	-0.22	0.01	0.00	-0.23	-0.21
Apr: Pre-period Usage	-0.04	0.01	0.00	-0.05	-0.03
May: Pre-period Usage	-0.07	0.01	0.00	-0.08	-0.06
Jun: Pre-period Usage	-0.05	0.01	0.00	-0.06	-0.04
Jul: Pre-period Usage	0.01	0.01	0.25	0.00	0.02
Aug: Pre-period Usage	-0.07	0.01	0.00	-0.08	-0.06
Sep: Pre-period Usage	-0.04	0.01	0.00	-0.05	-0.03
Oct: Pre-period Usage	-0.19	0.01	0.00	-0.20	-0.18
Nov: Pre-period Usage	-0.11	0.01	0.00	-0.12	-0.10
Dec: Pre-period Usage	-0.05	0.00	0.00	-0.05	-0.04

Table 4-9: Remix Email 2020 Wave 2025 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
(Intercept)	10.60	0.22	0.00	10.23	10.96
Treatment	-0.36	0.07	0.00	-0.47	-0.25
Feb	0.72	0.31	0.02	0.21	1.23
Mar	-0.84	0.31	0.01	-1.35	-0.33
Apr	-3.85	0.32	0.00	-4.38	-3.31
May	-4.04	0.32	0.00	-4.57	-3.51
Jun	-1.62	0.32	0.00	-2.14	-1.09
Jul	0.81	0.32	0.01	0.28	1.34
Aug	-0.19	0.32	0.56	-0.72	0.34
Sep	-3.08	0.33	0.00	-3.62	-2.54
Oct	-2.19	0.32	0.00	-2.72	-1.66
Nov	-0.78	0.31	0.01	-1.29	-0.26
Dec	-0.40	0.36	0.27	-0.98	0.19
Pre-period Usage	0.83	0.00	0.00	0.82	0.83
Feb: Pre-period Usage	-0.13	0.00	0.00	-0.14	-0.13
Mar: Pre-period Usage	-0.19	0.01	0.00	-0.20	-0.18
Apr: Pre-period Usage	-0.05	0.01	0.00	-0.07	-0.04
May: Pre-period Usage	-0.03	0.01	0.00	-0.04	-0.02
Jun: Pre-period Usage	0.01	0.01	0.03	0.00	0.03
Jul: Pre-period Usage	0.00	0.01	0.83	-0.01	0.01
Aug: Pre-period Usage	-0.01	0.01	0.05	-0.02	0.00
Sep: Pre-period Usage	0.01	0.01	0.43	-0.01	0.02
Oct: Pre-period Usage	-0.17	0.01	0.00	-0.18	-0.16
Nov: Pre-period Usage	-0.19	0.01	0.00	-0.20	-0.18
Dec: Pre-period Usage	-0.19	0.01	0.00	-0.20	-0.18

The chosen model was a good fit for both years, as seen by the Adjusted R-squared in Table 4-10.

Table 4-10: Remix Email 2020 Wave Model Fit

Year	Adjusted R^2	F Statistic	Number of Observations	Weighted Treatment Customer Count
2024	0.65	18,090	238,498	14,327
2025	0.62	14,071	219,825	12,942

The percentage of ex-post energy savings for the Remix Email 2020 wave is reported in Table 4-11.

Table 4-11: Remix Email 2020 Wave Ex-Post Percentage Annual kWh Savings

Year	Annual Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
2024	74.2	15,311.17	0.48%
2025	131.9	15,189.25	0.89%

Table 4-12 includes the total energy savings for this wave. The number of customers used to calculate total ex-post energy savings (kWh) is the weighted treatment customer count in the post-period multiplied by the annual household savings.

Table 4-12: Remix Email 2020 Wave Total Program Year Savings

Year	Annual Household Savings (kWh)	Weighted Treatment Customer Count	Total Program Savings (kWh)	90% Confidence Interval (kWh)
2024	74.2	14,327	1,063,494	419,749 - 1,707,239
2025	131.9	12,942	1,706,864	1,087,832 - 2,325,896

The Remix Email 2020 wave displayed 0.48 percent and 0.89 percent annual household savings for 2024 and 2025, respectively. Average annual household savings for treated customers in the Remix Email 2020 wave was 74.2 and 131.9 kWh for 2024 and 2025, respectively. Household savings estimates were extrapolated using the number of weighted treatment customers active in the post-period. The Remix Email 2020 wave saved 1,063,494 kWh in 2024 and 1,706,864 kWh in 2025.

4.3.2 Remix Paper 2020 Wave Results

Table 4-13 includes the regression-estimated annual savings (kWh) per treated customer for 2024 and 2025. The evaluator found positive, statistically significant savings at the 90 percent level for 2024, and practically significant savings in 2025 (see section 4.3 for more explanation). Table 4-14 and Table 4-15 provide the regression coefficients from the analyses.

Table 4-13: Regression Estimates for Remix Paper 2020 Wave Annual Household Savings

Year	Annual Household Estimated Energy Savings (kWh)	90% Confidence Interval (kWh)
2024	64.7	21.9 – 107.4
2025	36.7	(-8.5) – 82.0

Table 4-14: Remix Paper 2020 Wave 2024 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
(Intercept)	14.79	0.27	0.00	14.34	15.24
Treatment	-0.18	0.06	0.00	-0.28	-0.08
Feb	-0.38	0.38	0.32	-1.00	0.25
Mar	-3.96	0.39	0.00	-4.59	-3.32
Apr	-6.68	0.39	0.00	-7.31	-6.04
May	-6.50	0.37	0.00	-7.10	-5.89
Jun	-7.20	0.36	0.00	-7.79	-6.62
Jul	-4.38	0.36	0.00	-4.96	-3.79
Aug	-6.88	0.36	0.00	-7.46	-6.29
Sep	-10.35	0.38	0.00	-10.97	-9.74
Oct	-5.79	0.39	0.00	-6.43	-5.15
Nov	-4.18	0.38	0.00	-4.80	-3.55
Dec	-3.99	0.38	0.00	-4.62	-3.35
Pre-period Usage	0.82	0.00	0.00	0.81	0.82
Feb: Pre-period Usage	-0.24	0.01	0.00	-0.25	-0.23
Mar: Pre-period Usage	-0.22	0.01	0.00	-0.23	-0.21
Apr: Pre-period Usage	-0.06	0.01	0.00	-0.07	-0.04
May: Pre-period Usage	-0.09	0.01	0.00	-0.10	-0.08
Jun: Pre-period Usage	-0.04	0.01	0.00	-0.05	-0.02
Jul: Pre-period Usage	0.05	0.01	0.00	0.04	0.06
Aug: Pre-period Usage	-0.04	0.01	0.00	-0.05	-0.03
Sep: Pre-period Usage	-0.01	0.01	0.30	-0.02	0.00
Oct: Pre-period Usage	-0.19	0.01	0.00	-0.20	-0.18
Nov: Pre-period Usage	-0.09	0.01	0.00	-0.10	-0.08
Dec: Pre-period Usage	-0.03	0.01	0.00	-0.04	-0.02

Table 4-15: Remix Paper 2020 Wave 2025 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
(Intercept)	12.81	0.28	0.00	12.34	13.27
Treatment	-0.10	0.06	0.11	-0.20	0.00
Feb	1.15	0.39	0.00	0.51	1.80
Mar	-1.26	0.40	0.00	-1.91	-0.61
Apr	-4.80	0.40	0.00	-5.46	-4.14
May	-5.85	0.38	0.00	-6.48	-5.23
Jun	-4.91	0.37	0.00	-5.52	-4.30
Jul	-3.11	0.37	0.00	-3.72	-2.51
Aug	-4.02	0.37	0.00	-4.63	-3.41
Sep	-6.95	0.39	0.00	-7.59	-6.31
Oct	-3.39	0.40	0.00	-4.05	-2.73
Nov	-1.61	0.39	0.00	-2.26	-0.97
Dec	-1.20	0.45	0.01	-1.93	-0.47
Pre-period Usage	0.81	0.00	0.00	0.80	0.81
Feb: Pre-period Usage	-0.15	0.01	0.00	-0.16	-0.14
Mar: Pre-period Usage	-0.21	0.01	0.00	-0.22	-0.20
Apr: Pre-period Usage	-0.10	0.01	0.00	-0.11	-0.08
May: Pre-period Usage	-0.07	0.01	0.00	-0.08	-0.06
Jun: Pre-period Usage	0.00	0.01	0.59	-0.01	0.02
Jul: Pre-period Usage	0.01	0.01	0.22	0.00	0.02
Aug: Pre-period Usage	0.00	0.01	0.64	-0.01	0.01
Sep: Pre-period Usage	0.00	0.01	0.61	-0.01	0.02
Oct: Pre-period Usage	-0.20	0.01	0.00	-0.21	-0.19
Nov: Pre-period Usage	-0.20	0.01	0.00	-0.21	-0.19
Dec: Pre-period Usage	-0.20	0.01	0.00	-0.21	-0.18

The chosen model was a good fit for both years, as seen by the Adjusted R-squared in Table 4-16.

Table 4-16: Remix Paper 2020 Wave Model Fit

Year	Adjusted R^2	F Statistic	Number of Observations	Weighted Treatment Customer Count
2024	0.628	16,910	240,255	13,689
2025	0.596	13,650	222,374	12,371

The percentage of ex-post energy savings (kWh) of the Remix Paper 2020 wave is reported in Table 4-17. For 2024, the average annual savings were estimated at 64.7 kWh per person. For 2025, the average annual savings were estimated at 36.7 kWh per person.

Table 4-17: Remix Paper 2020 Wave Ex-Post Percentage Annual kWh Savings

Evaluation Period	Annual Savings Per Home (kWh/year)	Annual Control Group Usage Per Home (kWh/year)	Annual Percent Savings Per Home
2024	64.7	16,195.3	0.40%
2025	36.7	15,773.2	0.23%

Table 4-18 includes the total energy savings for this wave by year. The number of customers used to calculate total ex-post energy savings (kWh) is the number of weighted treatment customers in the post-period multiplied by the annual household savings.

Table 4-18: Remix Paper 2020 Wave Total Program Year Savings

Evaluation Period	Annual Savings Per Home (kWh)	Weighted Treatment Customer Count	Program Year Savings (kWh)	90% Confidence Interval (kWh)
2024	64.7	13,689	885,241	299,631 - 1,470,851
2025	36.7	12,371	454,398	(-105,240) – 1,014,035

This wave displayed a 0.40 percent savings in 2024, and 0.23 percent savings for 2025. The Remix Paper 2020 wave saved 885,241 kWh and 454,398 kWh in 2024 and 2025, respectively.

4.3.3 Expansion Email & Paper 2021 Wave Results

Table 4-19 displays the annual energy savings per treatment customer for the Remix Email 2020 wave by program year. The savings are positive and statistically significant at the 90 percent level.

Table 4-20 and Table 4-21 display the regression coefficients for each program year.

Table 4-19: Regression Estimates for Expansion Email & Paper 2021 Wave Annual Household Savings

Year	Annual Household Estimated Savings (kWh)	90% Confidence Interval (kWh)
2024	170.2	103.9 – 236.5
2025	231.0	160.6 – 301.5

Table 4-20: Expansion Email & Paper 2021 Wave 2024 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
Post - period	0.50	0.07	0.00	0.38	0.62
Feb	-2.36	0.13	0.00	-2.58	-2.14
Mar	-11.00	0.13	0.00	-11.22	-10.78
Apr	-17.61	0.13	0.00	-17.82	-17.39
May	-20.11	0.13	0.00	-20.33	-19.89
Jun	-16.61	0.13	0.00	-16.83	-16.40
Jul	-9.82	0.13	0.00	-10.04	-9.60
Aug	-10.98	0.13	0.00	-11.20	-10.76
Sep	-17.66	0.13	0.00	-17.88	-17.45
Oct	-15.94	0.13	0.00	-16.16	-15.72
Nov	-5.11	0.13	0.00	-5.33	-4.89
Dec	-0.25	0.13	0.07	-0.46	-0.03
Treatment and Post-period	2.42	0.19	0.00	2.11	2.73
Feb: Treatment and Post-period	-4.22	0.24	0.00	-4.61	-3.83
Mar: Treatment and Post-period	-4.08	0.24	0.00	-4.47	-3.69
Apr: Treatment and Post-period	-3.15	0.24	0.00	-3.54	-2.76
May: Treatment and Post-period	-2.25	0.24	0.00	-2.64	-1.86
Jun: Treatment and Post-period	-1.73	0.24	0.00	-2.12	-1.34
Jul: Treatment and Post-period	-0.42	0.24	0.08	-0.81	-0.03
Aug: Treatment and Post-period	-3.68	0.24	0.00	-4.07	-3.28
Sep: Treatment and Post-period	-3.00	0.24	0.00	-3.39	-2.61
Oct: Treatment and Post-period	-4.09	0.24	0.00	-4.49	-3.70
Nov: Treatment and Post-period	-4.35	0.24	0.00	-4.75	-3.96
Dec: Treatment and Post-period	-3.80	0.24	0.00	-4.19	-3.40

Table 4-21: Expansion Email & Paper 2021 Wave 2025 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
Post - period	0.19	0.08	0.01	0.06	0.32
Feb	-1.06	0.13	0.00	-1.28	-0.84
Mar	-10.43	0.13	0.00	-10.65	-10.21
Apr	-17.38	0.13	0.00	-17.60	-17.16
May	-19.67	0.13	0.00	-19.89	-19.45
Jun	-15.76	0.13	0.00	-15.98	-15.54
Jul	-9.87	0.13	0.00	-10.10	-9.65
Aug	-9.97	0.13	0.00	-10.19	-9.75
Sep	-16.79	0.13	0.00	-17.02	-16.57
Oct	-15.52	0.13	0.00	-15.74	-15.30
Nov	-5.59	0.13	0.00	-5.82	-5.37
Dec	-0.77	0.14	0.00	-1.00	-0.54
Treatment and Post-period	1.78	0.19	0.00	1.47	2.10
Feb: Treatment and Post-period	-1.02	0.25	0.00	-1.43	-0.62
Mar: Treatment and Post-period	-2.90	0.25	0.00	-3.31	-2.50
Apr: Treatment and Post-period	-3.02	0.25	0.00	-3.43	-2.62
May: Treatment and Post-period	-1.42	0.25	0.00	-1.83	-1.02
Jun: Treatment and Post-period	0.51	0.25	0.04	0.10	0.91
Jul: Treatment and Post-period	-0.90	0.25	0.00	-1.31	-0.50
Aug: Treatment and Post-period	-1.41	0.25	0.00	-1.81	-1.00
Sep: Treatment and Post-period	-0.97	0.25	0.00	-1.38	-0.57
Oct: Treatment and Post-period	-3.29	0.25	0.00	-3.70	-2.89
Nov: Treatment and Post-period	-6.21	0.25	0.00	-6.62	-5.80
Dec: Treatment and Post-period	-8.22	0.28	0.00	-8.68	-7.76

The chosen model was a good fit for both years, as seen by the Adjusted R-squared in Table 4-22.

Table 4-22: Remix Email 2020 Wave Model Fit

Year	Adjusted R^2	F Statistic	Number of Observations	Weighted Treatment Customer Count
2024	0.749	66	278,494	7,408
2025	0.739	60	262,565	6,438

The percentage of ex-post energy savings (kWh) of the Expansion Email & Paper 2021 wave is reported in Table 4-23.

Table 4-23: Expansion Email & Paper 2021 Wave Ex-Post Percentage Energy Savings

Year	Annual Savings Per Home (kWh)	Annual Control Group Usage Per Home (kWh)	Annual Percent Savings Per Home
2024	170.2	12,043.54	1.41%
2025	231.0	11,944.05	1.93%

Table 4-24 includes the total energy savings for this wave by year. The number of customers used to calculate total ex-post energy savings is the number of weighted treatment customers in the post-period multiplied by the annual household savings.

Table 4-24: Expansion Email & Paper 2021 Wave Total Program Year Savings

Year	Annual Savings Per Home (kWh)	Weighted Treatment Customer Count	Program Year Savings (kWh)	Program Year Savings 90% Confidence Interval (kWh)
2024	170.2	7,408	1,260,970	769,653 -1,752,286
2025	231.0	6,438	1,487,464	1,033,839 - 1,941,090

The Expansion Email & Paper 2021 wave displayed 1.41 percent and 1.93 percent annual household savings for 2024 and 2025, respectively. Average annual household savings for treated customers in the Expansion Email & Paper 2021 wave was 170.2 kWh and 231 kWh for 2024 and 2025, respectively. The Expansion Email & Paper 2021 wave saved 1,260,970 kWh in 2024 and 1,487,464 kWh in 2025.

4.3.4 Expansion Email 2023 Wave Results

Table 4-25 displays the modelled annual energy savings per treatment customer for the Expansion Email 2023 wave by program year. The savings are negative and statistically significant at the 90 percent confidence level. Treatment of this wave did not result in any savings. Table 4-26 displays the regression coefficients for 2024, and Table 4-27 displays the regression coefficients for 2025.

Table 4-25: Regression Estimates for Expansion Email 2023 Wave Annual Household Savings

Year	Annual Household Estimated Savings (kWh)	90% Confidence Interval (kWh)
2024	-126.9	(-228.7) – (-25.2)
2025	-134.9	(-259.6) – (-10.2)

Table 4-26: Expansion Email 2023 Wave 2024 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
(Intercept)	-3.30	0.72	0.00	-4.49	-2.11
Treatment	0.04	0.13	0.79	-0.19	0.26
Feb	2.78	0.32	0.00	2.25	3.31
Mar	3.24	0.40	0.00	2.57	3.90
Apr	3.07	0.52	0.00	2.22	3.92
May	4.42	0.62	0.00	3.40	5.43
Jun	5.12	0.78	0.00	3.84	6.41
Jul	6.31	1.26	0.00	4.23	8.38
Aug	5.15	0.98	0.00	3.54	6.76
Sep	4.92	0.79	0.00	3.63	6.22
Oct	4.08	0.50	0.00	3.26	4.89
Nov	3.46	0.33	0.00	2.92	4.01
Dec	3.13	0.26	0.00	2.70	3.56
Pre-period Usage	0.95	0.00	0.00	0.94	0.95
HDD	0.27	0.02	0.00	0.23	0.31
CDD	0.02	0.07	0.77	-0.10	0.14
Feb: Pre-period Usage	-0.12	0.00	0.00	-0.13	-0.12
Mar: Pre-period Usage	-0.19	0.00	0.00	-0.20	-0.19
Apr: Pre-period Usage	-0.12	0.01	0.00	-0.13	-0.11
May: Pre-period Usage	-0.11	0.01	0.00	-0.12	-0.11
Jun: Pre-period Usage	-0.08	0.00	0.00	-0.08	-0.07
Jul: Pre-period Usage	0.00	0.00	0.74	-0.01	0.01
Aug: Pre-period Usage	-0.03	0.00	0.00	-0.04	-0.02
Sep: Pre-period Usage	-0.01	0.01	0.05	-0.02	0.00
Oct: Pre-period Usage	-0.08	0.01	0.00	-0.09	-0.07
Nov: Pre-period Usage	-0.21	0.00	0.00	-0.21	-0.20
Dec: Pre-period Usage	-0.25	0.00	0.00	-0.25	-0.24
Treatment: HDD	0.00	0.01	0.78	-0.01	0.01
Treatment: CDD	0.03	0.01	0.02	0.01	0.05

Table 4-27: Expansion Email 2023 Wave 2025 Regression Results

Coefficient	Estimate	Std Error	P Value	5%	95%
(Intercept)	0.38	0.86	0.66	-1.04	1.80
Treatment	0.57	0.17	0.00	0.30	0.85
Feb	1.11	0.24	0.00	0.70	1.51
Mar	2.30	0.50	0.00	1.48	3.13
Apr	1.50	0.62	0.02	0.47	2.53
May	2.74	0.78	0.00	1.45	4.03
Jun	6.08	1.12	0.00	4.24	7.93
Jul	7.83	1.46	0.00	5.44	10.22
Aug	7.10	1.28	0.00	5.00	9.19
Sep	5.46	0.99	0.00	3.84	7.08
Oct	2.25	0.56	0.00	1.32	3.18
Nov	3.01	0.42	0.00	2.32	3.69
Dec	4.19	0.42	0.00	3.50	4.88
Pre-period Usage	0.89	0.00	0.00	0.89	0.90
HDD	0.18	0.03	0.00	0.13	0.23
CDD	-0.31	0.09	0.00	-0.46	-0.17
Feb: Pre-period Usage	0.01	0.00	0.09	0.00	0.01
Mar: Pre-period Usage	-0.15	0.00	0.00	-0.16	-0.14
Apr: Pre-period Usage	-0.12	0.01	0.00	-0.13	-0.11
May: Pre-period Usage	-0.08	0.01	0.00	-0.09	-0.07
Jun: Pre-period Usage	-0.01	0.01	0.20	-0.02	0.00
Jul: Pre-period Usage	-0.01	0.01	0.01	-0.02	-0.01
Aug: Pre-period Usage	0.04	0.01	0.00	0.03	0.05
Sep: Pre-period Usage	0.04	0.01	0.00	0.03	0.05
Oct: Pre-period Usage	-0.05	0.01	0.00	-0.07	-0.04
Nov: Pre-period Usage	-0.26	0.00	0.00	-0.27	-0.25
Dec: Pre-period Usage	-0.34	0.00	0.00	-0.35	-0.33
Treatment: HDD	-0.03	0.01	0.00	-0.04	-0.01
Treatment: CDD	0.05	0.02	0.01	0.02	0.07

The model was a good fit for the data, as seen by the Adjusted R-square in Table 4-28.

Table 4-28: Expansion Email 2023 Wave Model Fit

Year	Adjusted R^2	F Statistic	Number of Observations	Weighted Treatment Customer Count
2024	0.823	30,200	182,008	7,001
2025	0.773	19,240	158,347	5,726

The percentage of ex-post energy savings (kWh) of the Remix Paper 2020 wave is reported in Table 4-29. Due to the negative savings, the evaluator assigned 0 annual savings per customer in PY2024 and PY2025 for the Expansion Email 2023 wave.

Table 4-29: Expansion Email 2023 Wave Ex-Post Percentage Annual kWh Savings

Year	Annual Savings Per Home (kWh)	Annual Control Group Usage Per Home (kWh)	Annual Percent Savings Per Home
2024	0.00	12,775.76	0.00%
2025	0.00	12,683.39	0.00%

Table 4-30 includes the total energy savings for this wave. The number of customers used to calculate total ex-post energy savings is the number of weighted treatment customers in the post-period multiplied by the annual household savings.

Table 4-30: Expansion Email 2023 Wave Total Program Year Savings

Year	Annual Savings Per Home (kWh)	Weighted Treatment Customer Count	Program Year Savings (kWh)	Program Year Savings (kWh) 5% CI	Program Year Savings (kWh) 95% CI
2024	0.00	7,001	0.00	0.00	0.00
2025	0.00	5,726	0.00	0.00	0.00

The Expansion Email 2023 wave did not generate any annual household savings for 2024 and 2025. Therefore, the average annual household savings for treated customers in the Expansion Email 2023 wave was 0 kWh for 2024 and 2025.

4.3.5 Aggregated Waves Results

The following tables summarize each wave's annual household energy savings impact with 90 percent confidence intervals.

Table 4-31: 2024 Program Savings Summary

Wave	Weighted Customer Count	Annual Household Savings (kWh)	Annual Household 90% CI (kWh)	Program Savings (kWh)	Total Program Savings 90% CI (kWh)
Remix Email 2020	14,327	74.2	29.3 – 119.2	1,063,494	419,749 – 1,707,239
Remix Paper 2020	13,689	64.7	21.9 – 107.4	885,241	299,631 - 1,470,851
Expansion Email & Paper 2021	7,408	170.2	103.9 – 236.5	1,260,970	769,653 -1,752,286
Expansion Email 2023	7,001	0.00	0.00 – 0.00	0.00	0.00 – 0.00
Total	**42,425**	**75.7[a]**	**35.1[a] – 116.2[a]**	**3,209,705**	**1,489,033[a] – 4,930,376[a]**

[a]This number is found via a weighted average of each wave's value with weighted customer counts.

Table 4-32: 2025 Program Savings Summary

Wave	Weighted Customer Count	Annual Household Savings (kWh)	Annual Household 90% CI (kWh)	Program Savings (kWh)	Total Program Savings 90% CI (kWh)
Remix Email 2020	12,942	131.9	84.1 - 179.7	1,706,864	1,087,832 – 2,325,896
Remix Paper 2020	12,371	36.7	(-8.5) - 82.0	454,398	(-105,240) - 1,014,035
Expansion Email & Paper 2021	6,438	231.0	160.6 - 301.5	1,487,464	1,033,839 - 1,941,090
Expansion Email 2023	5,726	0.00	0.00 – 0.00	0.00	0.00 – 0.00
Total	**37,478**	**97.4[a]**	**53.8[a] – 140.9[a]**	**3,648,726**	**2,016,431[a] -5,281,021[a]**

[a]This number is found via a weighted average of each wave's value with weighted customer counts.

4.4 Attrition Analysis Results

The evaluator estimated the cumulative attrition rates of both treatment and control group customers who moved out of the service area by month, wave, and treatment/control status for each program year. The following table displays the total move-out rate aggregating all waves by year. Attrition since inception of each wave, in aggregation, equals approximately 40 percent. Attrition for the program years 2024 and 2025 is presented in Table 4-33.

Table 4-33: Program Move-out Rates

Period	Treatment Customer Count	Control Customer Count	Treatment Move-out Percent	Control Move-out Percent
2024	4,602	1,406	10%	7%
2025	3,427	1,247	8%	7%
Since Inception	**24,255**	**10,667**	**38%**	**40%**

Table 4-34 summarizes the move-out rates for each wave in 2024. The move-out rates for each wave range between about 6 percent and 19 percent, with the 2023 expansion email having the highest treatment move-out percentage. Table 4-35 summarizes the move-out rates for each wave in 2025. The move-out rates for each wave range between nearly six percent to 14 percent. Note that control group customers in the 2023 expansion email wave are not unique, and thus there is some overlap in control group customers for the 2023 wave and the other three waves control groups.

Table 4-34: 2024 Move-out Rates by Wave

Wave	Treatment Customer Start Count	Control Customer Start Count	Treatment Customer End Count	Control Customer End Count	Treatment Customer Move-out Count	Control Customer Move-out Count	Treatment Move-out Percent	Control Move-out Percent
Remix Email 2020	15,665	6,310	14,602	5,900	1,063	410	6.8%	6.5%
Remix Paper 2020	14,832	7,007	13,903	6,602	929	405	6.3%	5.8%
Expansion Email & Paper 2021	8,378	5,166	7,470	4,568	908	598	10.8%	11.6%
Expansion Email 2023	9,169	9,294[a]	7,443	8,542[a]	1,726	752[a]	18.8%	8.0%[a]

[a]Non-unique control customers, this wave's control customers are comprised of control customers from other waves.

Table 4-35: 2025 Move-out Rates by Wave

Wave	Treatment Customer Start Count	Control Customer Start Count	Treatment Customer End Count	Control Customer End Count	Treatment Customer Move-out Count	Control Customer Move-out Count	Treatment Move-out Percent	Control Move-out Percent
Remix Email 2020	14,602	5,900	13,752	5,517	852	386	5.8%	6.5%
Remix Paper 2020	13,903	6,602	13,096	6,208	809	394	5.8%	6.0%
Expansion Email & Paper 2021	7,470	4,568	6,767	4,105	711	467	9.4%	10.1%
Expansion Email 2023	7,443	8,542[a]	6,400	7,864[a]	1,055	684[a]	14.0%	7.9%[a]

[a]Non-unique control customers, this wave's control customers are comprised of control customers from other waves.

4.5 Discussion of Realization Rates

The HER program resulted in a realization rate of 93 percent during the evaluation period (see Table 4-36).

Table 4-36: Program Energy Savings (kWh) and Realization Rate

Year	Claimed Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
2024	3,953,070	3,209,705	81%
2025	3,409,556	3,648,726	107%
Total	**7,362,626**	**6,858,431**	**93%**

The difference between the claimed and evaluated annual energy savings per customer is likely the result of the following factors:

- **Model selection and statistical rigor**: The evaluator applied multiple regression models and selected the preferred specification based on a balance between adjusted R^2 and statistical significance (p-values), resulting in more robust and reliable savings estimates.
- **Seasonality and weather adjustments**: Many of the models incorporate monthly indicators to capture the strong seasonality in energy consumption; some specifications also include weather variables. In contrast, the ex-ante estimates did not account for weather effects. These enhancements improve model fit and provide a more accurate representation of energy use.

- **Exclusion of overlapping program participants**: The evaluator excluded customers who participated in other programs to avoid double counting of energy savings. This step helps isolate impacts attributable specifically to the HER program and reduces potential bias from overlapping program effects. In contrast, the ex-ante estimates did not explicitly account for such cross-program participation, which may have led to inflated savings estimates.
- **Control group validation and refined matching**: The evaluator conducted validity tests for the control group during the pre-period and implemented additional selection and matching procedures for the 2023 Email Expansion wave. In contrast, the ex-ante estimates did not account for these factors. As a result, no measurable savings were identified for this wave.

5 Process Evaluation

The evaluator surveyed Pacific Power customers who received HERs in 2024 and 2025 and a sample of customers designated as controls. Customers who received Home Energy Reports are referred to as the Treatment Group; customers who did not receive reports are referred to as Control Group. The survey was conducted in January 2026. A total of 276 survey customers completed the survey; Table 5-1 displays response rates.

Table 5-1: Summary of Email Survey Response

Metric	Treatment	Control	Total
Email Invite	5,000	5,000	10,000
Complete	106	169	276
Response rate	3%	3%	3%

The survey collected information about the program participants' experiences with the HERs and satisfaction with Pacific Power. The survey also inquired about the participants' use of Pacific Power's online energy portal and about energy-saving actions customers have taken (e.g., behavioral changes or installing energy efficient appliances and equipment).

5.1 Reading Home Energy Reports (Treatment Group)

Most respondents (91 percent) reported that they read most or all the HERs they received. (Table 5-2). There was not a significant change in response to this question over the past two evaluation cycles.

Table 5-2: How often did you read the Home Energy Reports?

Portion Read	2024-2025 Responses (n = 106)	2022-2023 Responses (n=73)	2020-2021 Responses (n=145)
All of the reports	64%	47%	58%
Most of the reports	27%	37%	30%
About half of the reports	2%	5%	6%
A few of the reports	4%	11%	5%
None of the reports	3%		1%

Additionally, twenty percent of survey respondents reported that someone else in their household had read the HERs.

5.2 Perceptions Regarding Home Energy Reports

Respondents provided feedback on how easy or difficult it was to understand the information in their HERs, how accurate and valuable they believed the information to be, and their satisfaction with the report. Most survey respondents (91 percent) found the information on their report easy to understand, rating ease of understanding either 4 or 5 (see Figure 5-1).

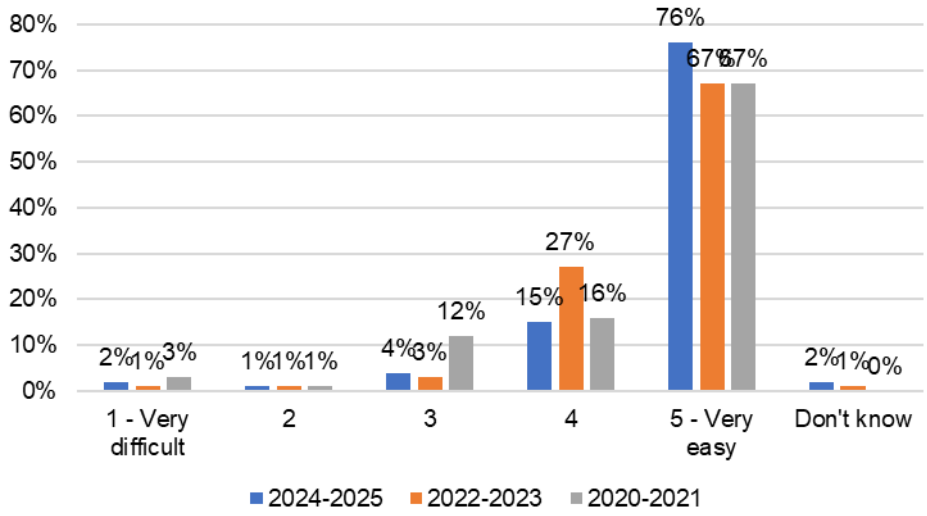

Figure 5-1: Ease of Understanding HER

When compared to the last two evaluation periods, there is a slightly higher response rate that HERs are *very easy* to understand.

5.3 Perceived Value of Information on Reports

Most respondents perceived the various components of the HERs to be valuable, with each of the five HER components receiving over 64 percent of responses rated as a 4 or 5 on a 5-point scale (see Figure 5-2).

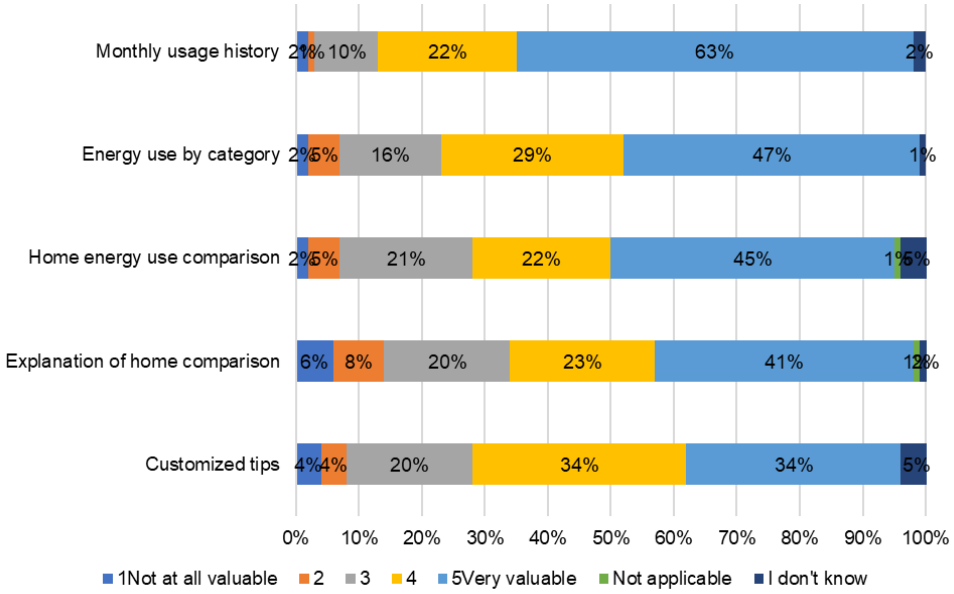

Figure 5-2: Rated Value of HER Information

5.4 Perceived Accuracy of Information on Home Energy Use

Survey respondents largely found the information on their home's energy use to be accurate (see Figure 5-3). Perception of accuracy has not changed appreciably since the past two program evaluations.

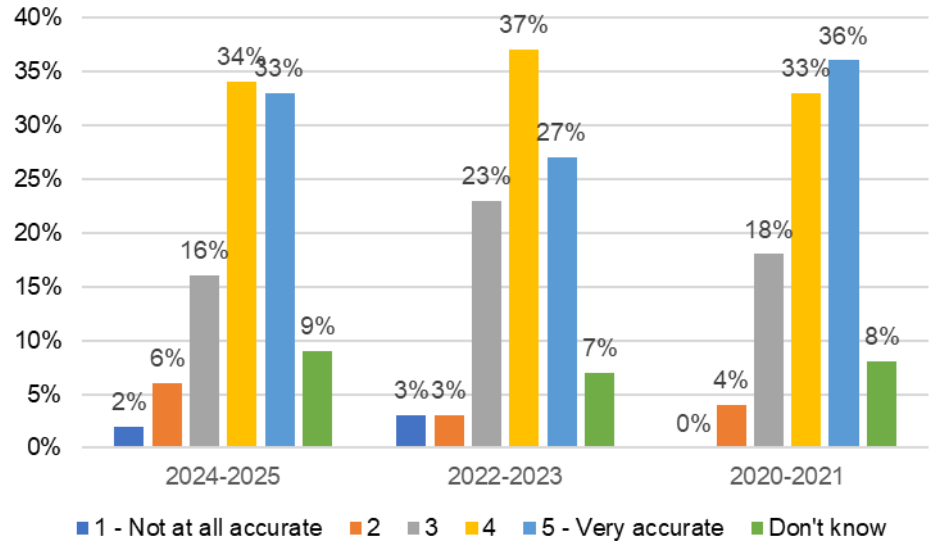

Figure 5-3: Rated Accuracy of HER Information

Of the eight percent of respondents who said the HER information was inaccurate (rated as a 1 or 2 on a 5-point scale) a few shared feedback suggesting they perceived the reports to not accurately reflect their specific conditions.

5.5 Satisfaction with HERs

Most respondents were satisfied with the method and frequency of report delivery, the information provided in them, and the information they receive about their home's energy use (see Figure 5-4).

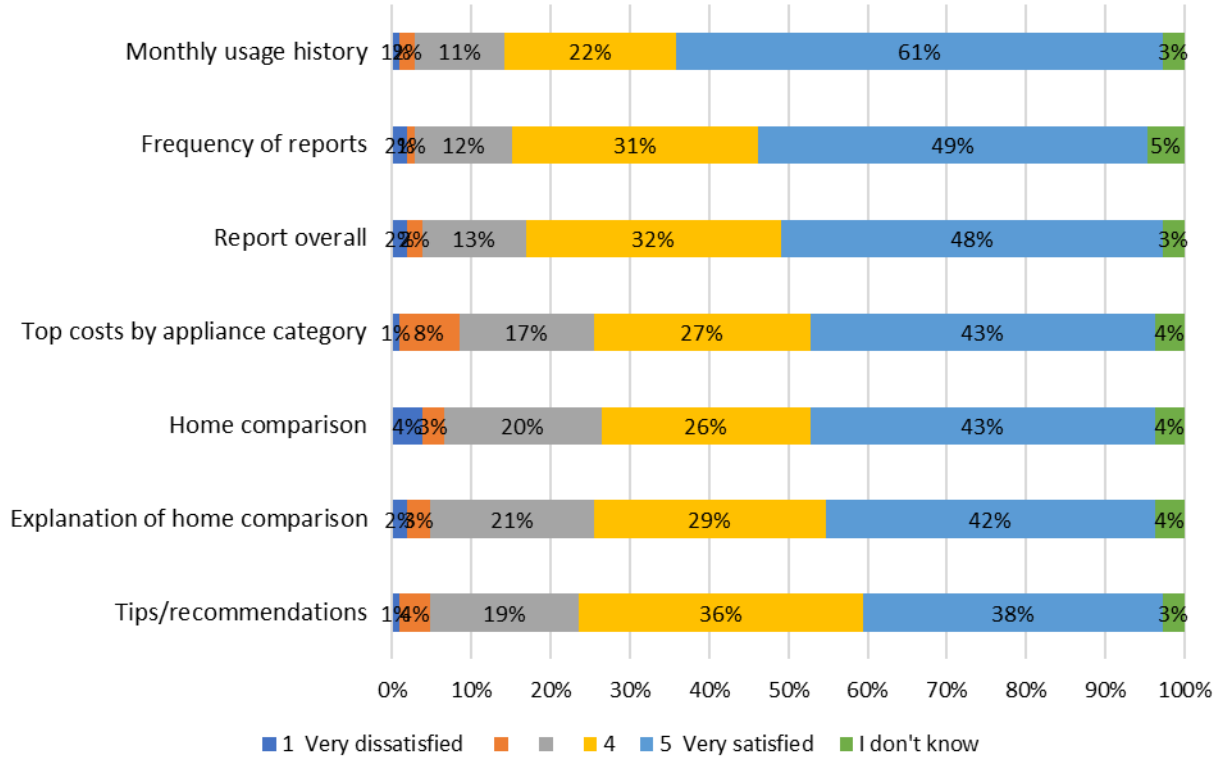

Figure 5-4: Satisfaction with HER Components

Twenty-two percent of Treatment participants recalled logging onto Pacific Power's online Home Energy Reports portal (see Table 5-3). Most of the customers that indicated logging onto the online portal indicated they were satisfied with the information provided and agreed the website was easy to navigate and provided interesting, helpful, easy to understand information (see Figure 5-5).

Table 5-3: Reported Portal Use

Response to Portal Use	Percent
Within the last 30 days	12%
More than 30 days ago	10%
Do not recall ever visiting the portal	77%

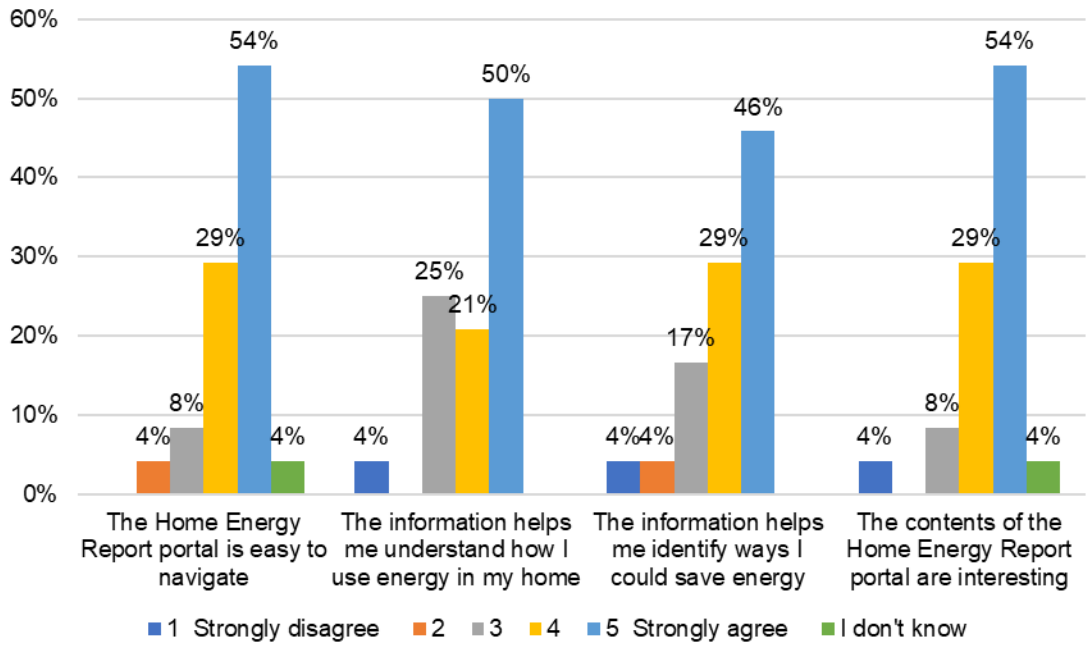

Figure 5-5: HER Participant Online Portal Experience (n=24)

Most respondents who said they had not logged on to the portal indicated they were not aware of the portal or did not know how to access it. Table 5-4 displays reasons customers noted for not having logged onto the portal.

Table 5-4: Primary Reason why Customers had not *logged onto Portal*

Reason	Percentage (n = 88)
Was not aware of the portal	57%
Did not know how to access the portal	9%
Did not think the portal would provide useful information	7%
Did not have the time to use the portal	6%
Not interested in my energy use	6%
Experienced technical difficulties trying to access the portal	9%
I don't know	7%

5.5.1 Opinion Toward Pacific Power

Respondents provided feedback on whether and how receiving the HER had affected their opinion of Pacific Power. Twenty percent indicated that receiving the report had

changed their opinion of Pacific Power[6]. Of those who indicated receiving the report changed their opinion, 95 percent indicated it had improved their opinion (see Table 5-5).

Table 5-5: Rated Change in Satisfaction with Pacific Power

Rating	Percentage (n = 15)
5 - Greatly improved	57%
4	38%
3	0%
2	0%
1 - Greatly worsened	5%

5.5.2 Beliefs and Attitudes Relating to Energy Efficiency

Survey respondents generally endorsed positive beliefs and attitudes about energy efficiency. Respondents in the Treatment Group agreed with various statements about energy efficiency in levels comparable to those of Control Group customers. Customers were asked to indicate on a scale from 0 (strongly disagree) to 10 (strongly agree) their alignment with several statements about energy use. Figure 5-6 compares the average response for Treatment and Control customers for each statement.

[6] 64 percent said the HER program didn't change their opinion of Pacific Power;16 percent said they didn't know if it had changed their opinion.

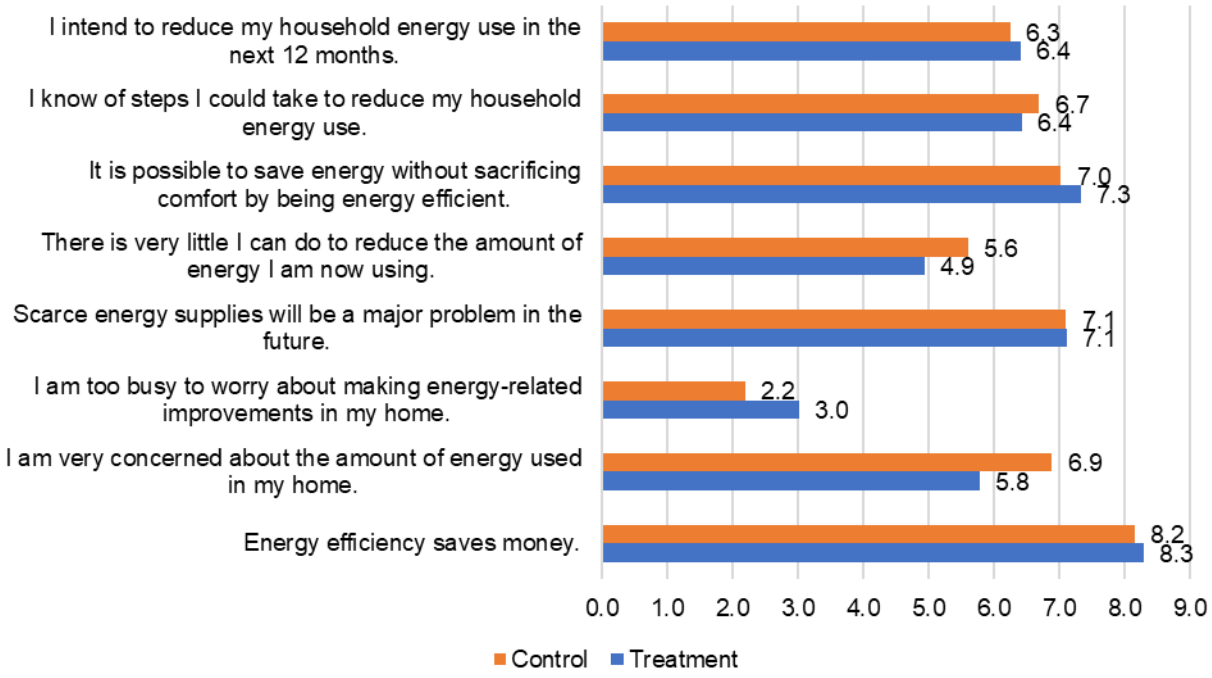

Figure 5-6: Treatment vs Control Groups
Energy Efficiency Beliefs and Attitudes

5.5.3 Energy Saving Behavior

Fifty-two percent of Treatment Group customers reported that they had changed their behavior because of the reports they received. The survey asked respondents if they had adopted any actions that were recommended in the tips section of the reports. Table 5-6 summarizes a comparison of Treatment and Control customers' responses.

Table 5-6: Treatment vs Control Groups
Behaviors Included in Tips Section of Reports

Action Taken	Treatment (n = 55)	Control (n = 59)
I use the power management features of my electronics.	19%	32%
I clean my air conditioner every year.	39%	46%
I turn off appliances when I am not home.	52%	46%
I turn off equipment in my home office on the weekends.	28%	9%
I program my thermostat to save energy when I'm away from home.	69%	55%
I don't let hot water run during routine tasks.	48%	61%
I use a fan instead of my air conditioner sometimes.	46%	50%
I use remote-controlled sockets to turn appliances off when not in use.	7%	7%
I run ceiling fans in reverse during the winter.	28%	18%
I let dishes air dry.	52%	61%
I reduce the temperature I use to dry my clothes.	17%	34%
I make sure refrigerator had minimum clearance to allow operating at maximum efficiency.	33%	34%
I installed a dimmer switch to control lighting levels.	13%	13%
I turned off game consoles when not in use instead of leaving in stand-by mode.	19%	23%
I use an electric kettle instead of a pot on the stove.	24%	30%
I use countertop appliances.	37%	45%
I use stove burners that are the right size for my pans.	54%	66%

Figure 5-7 provides a graphic comparison of the treatment and untreated groups' responses about energy saving behaviors. Control Group customers response was stronger than Treatment Group response for most behaviors that were promoted in the reports.

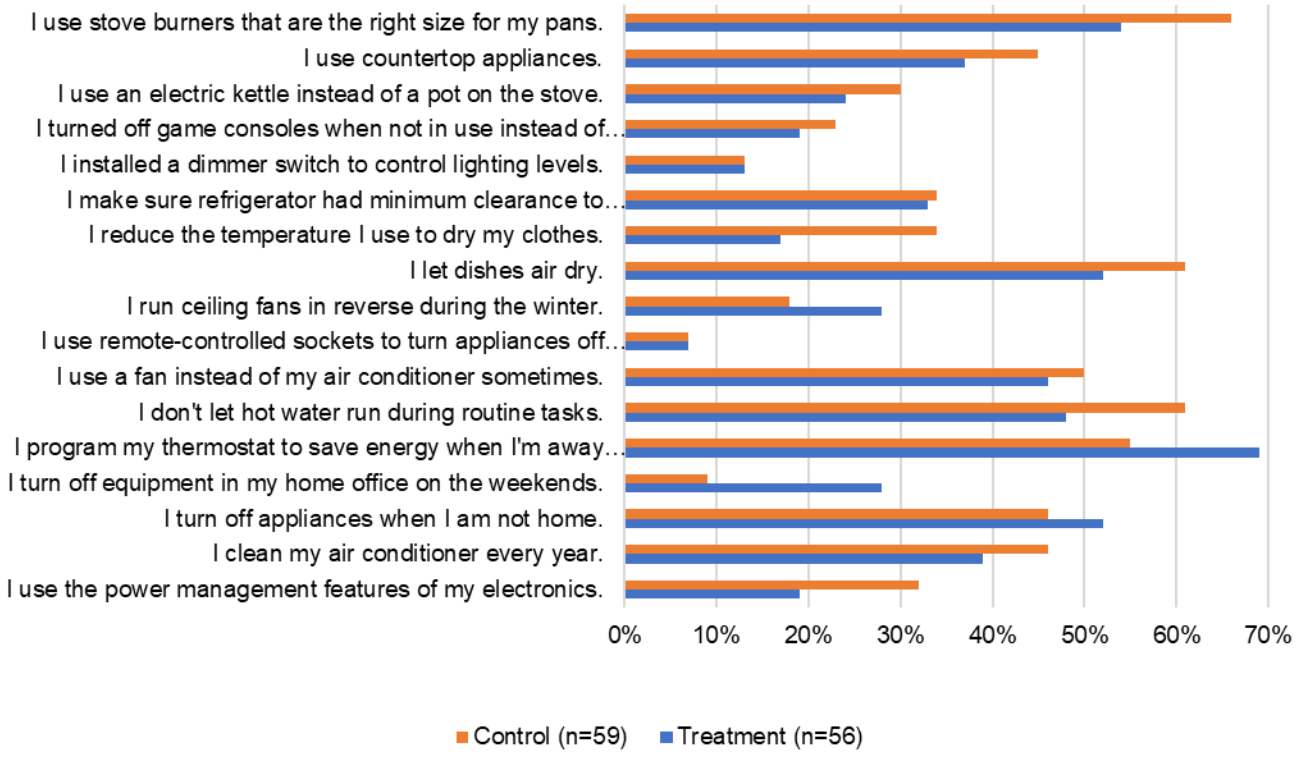

Figure 5-7: Treatment vs Control Groups
Behaviors Included in Tips Section of Reports

5.5.4 Energy Saving Purchases

Fifty-five percent of Treatment Group customers said they had installed one or more energy efficient items in 2024 or 2025, and 65 percent of these respondents said the information in the reports had been important in their decision-making to make the purchase(s). Larger percentages of Control Group customers responded that they had purchased energy-efficient products in most categories. Table 5-7 provides Treatment and Control Group responses, and Figure 5-8 provides a visual comparison of responses from each group.

Table 5-7: Treatment vs Control Groups
Energy Efficient Purchases

Energy Efficient Purchase	Treatment (n=106)	Control (n=78)
None of the above	45%	42%
Low flow faucet aerators or showerheads	16%	18%
Energy efficient windows or doors	13%	17%
Attic, floor, or wall insulation	13%	14%
ENERGY STAR clothes washer	13%	21%
ENERGY STAR clothes dryer	12%	18%
Smart thermostat (e.g., Nest, Lyric, Ecobee, Sensi)	11%	12%
ENERGY STAR refrigerator	11%	22%
ENEGY STAR central air conditioner	10%	6%
ENERGY STAR stand-alone freezer	8%	4%
ENERGY STAR heat pump	7%	13%
Other (Please specify)	7%	9%
ENERGY STAR heat pump water heater	5%	5%
Advanced power strips	3%	14%
ENERY STAR room air conditioner	3%	3%

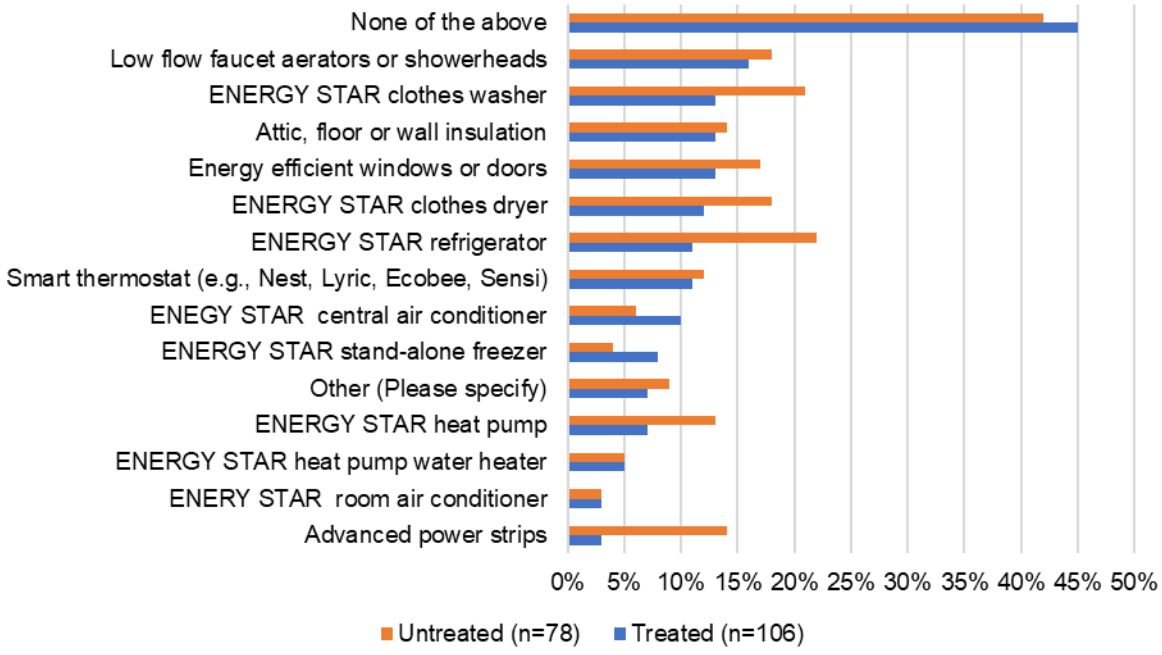

Figure 5-8: Treatment vs Control Groups
Energy Efficient Purchases

5.5.5 Demographics

The survey collected demographic data on respondents. See Table 5-8 and Table 5-9 for details. Most respondents were white, over-55, English speaking, homeowners with some post-secondary education.

Table 5-8: Respondent Home Characteristics

Response	All Respondents (n = 180)	Treated (n = 106)	Untreated (n = 75)
Home Ownership			
Own	89%	90%	88%
Rent	11%	10%	12%
Average Monthly Electricity Bill			
$0 - $50	7%	9%	4%
$51 - $100	17%	16%	18%
$101 - $150	20%	21%	17%
$151 - $200	28%	28%	26%
$201 - $250	13%	14%	10%
$251 - $300	6%	5%	8%
$301 or more	4%	3%	5%
Don't know	2%	1%	3%

Table 5-9: Respondent Demographics

Response	All Respondents	Treatment (n = 106)	Control (n = 72)
Primary Language			
English	93%	94%	91%
Spanish	5%	4%	6%
Vietnamese	1%	0%	1%
Prefer not to say	2%	2%	1%
Age			
25-34 years old	2%	1%	4%
35-44 years old	8%	7%	9%
45-54 years old	14%	17%	10%
55-64 years old	22%	22%	22%
65 years old or older	28%	29%	26%
Prefer not to answer	20%	17%	23%
Education			
Less than high school	3%	3%	4%
High school graduate/GED	25%	25%	25%
Associates degree, vocation/school, or some college	22%	20%	25%

Response	All Respondents	Treatment (n = 106)	Control (n = 72)
Four-year college degree	20%	19%	21%
Graduate or professional degree	25%	26%	22%
Don't know	5%	7%	3%
Prefer not to answer	3%	3%	4%
Race or Ethnicity			
Asian	1%	1%	1%
Black/African American	1%	1%	
Caucasian/White	70%	69%	72%
Hispanic or Latino	14%	13%	15%
Native American or Alaska Native	3%	2%	5%
Middle Eastern or North African	1%	1%	1%
Other	1%	3%	1%
Prefer not to answer	3%	13%	3%

6 Cost-Effectiveness Results

AEG estimated the cost-effectiveness results for the Washington Home Energy Savings Program based on 2024 and 2025 costs provided by Pacific Power and energy savings estimates provided by this evaluation. The program passed the Total Resource Cost Test (TRC), the PacifiCorp Total Resource Cost Test (PTRC), and the Utility Cost Test (UCT). The Participant Cost Test (PCT) passes but cannot be calculated as there are no costs to the participant.

6.1 Cost Effectiveness Inputs

Program inputs used in the cost effectiveness analysis are included in *Table 6-1* through *Table 6-3*.

Table 6-1: Cost-Effectiveness Analysis Inputs

Parameter	2024	2025
Discount Rate		
Residential Line Loss		
Residential Energy Rate ($/kWh)		
Inflation Rate		
Measure Life		
NTG		
Realization Rate		

Table 6-2: Annual Program Level Costs, Nominal - PY2024-2025[7]

Program Year	Program Delivery	Utility The evaluation	Program Development	Incentives	Total Utility Budget
2024					
2025					
2024-2025					

Table 6-3: Program Savings

Program Year	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings at Site	Net to Gross Ratio	Net kWh Savings at Site	Measure Life
2024						
2025						
2024-2025						

[7] To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.

6.2 Cost-effectiveness Results

Cost-effectiveness results are reported in *Table 6-4* through *Table 6-6*.

Table 6-4: 2024-2025 Home Energy Reports Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder					
Total Resource Cost Test (TRC) No Adder					
Utility Cost Test (UCT)					
Participant Cost Test (PCT)					
Rate Impact Test (RIM)					
Lifecycle Revenue Impacts ($/kWh)					
Discounted Participant Payback (years)					

Table 6-5: Program Cost-Effectiveness Results – 2024

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder					
Total Resource Cost Test (TRC) No Adder					
Utility Cost Test (UCT)					
Participant Cost Test (PCT)					
Rate Impact Test (RIM)					
Lifecycle Revenue Impacts ($/kWh)					
Discounted Participant Payback (years)					

Table 6-6: Program Cost-Effectiveness Results – 2025

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder					
Total Resource Cost Test (TRC) No Adder					
Utility Cost Test (UCT)					
Participant Cost Test (PCT)					
Rate Impact Test (RIM)					
Lifecycle Revenue Impacts ($/kWh)					
Discounted Participant Payback (years)					

7 Conclusions and Recommendations

The evaluator offers the following conclusions and recommendations for consideration in planning future program cycles.

7.1 Conclusions

The Home Energy Reports (HER) program continues to deliver consistent, verifiable energy savings and remains a cost-effective behavioral resource in Pacific Power's Washington portfolio. The evaluation estimated total verified savings of 3.21 GWh in 2024 and 3.65 GWh in 2025, with an overall realization rate of 93 percent across the evaluation period. These results fall well within industry norms for HER programs and indicate that the program's claimed savings are generally well aligned with observed customer behavior.

Program impacts vary meaningfully by wave, delivery channel, and cohort maturity. Savings were driven primarily by the Remix Email 2020 and Expansion Email & Paper 2021 waves, with the 2021 Expansion wave demonstrating the highest per-home and percentage savings in both program years. In contrast, the Expansion Email 2023 wave did not produce measurable savings, even after the application of propensity score matching to establish a valid comparison group. This suggests that program effectiveness may be sensitive to customer selection, wave design, or the shorter treatment exposure period for newer cohorts.

The program's evaluation design and data infrastructure largely support robust impact estimation. Three of four evaluated waves retained statistically valid randomized control groups, allowing for the use of industry-standard billing regression methodologies. Although the Expansion Email 2023 wave required post-hoc matching, the overall evaluation approach aligns with Uniform Methods Project (UMP) guidance and produced stable, well-fitting models across waves and years.

HER savings appear modest on a per-household basis but scale effectively across large customer populations. Annual household savings ranged from approximately 0.2 to 1.9 percent, consistent with expectations for behavioral programs. When applied to tens of thousands of customers, these incremental reductions translated into substantial program-level savings, reinforcing the value of HERs as a low-cost, scalable efficiency strategy.

Customer engagement and satisfaction remain high, but behavioral differentiation between treatment and control groups is limited. Survey results indicate that most treated customers read the reports, find them easy to understand, and value the information provided. However, control group customers reported comparable—or in some cases higher—rates of energy-saving behaviors and purchases. This suggests that

while HERs are well received, their incremental influence on self-reported actions may be modest and increasingly influenced by broader market and policy factors.

Use of the online Home Energy Reports portal remains low and represents an underutilized program asset. Only about one-fifth of surveyed participants reported accessing the portal, with lack of awareness cited as the primary barrier. Among customers who did access the portal, satisfaction and perceived usefulness were high, indicating unrealized potential for deeper engagement and improved confidence in report accuracy.

Program attrition is consistent with expectations for a long-running residential behavioral program. Annual move-out rates of approximately 7–10 percent, and cumulative attrition of about 40 percent since program inception, are not unusual for programs of this type. Higher attrition in newer waves underscores the need for ongoing cohort replenishment and careful interpretation of longitudinal impacts.

7.2 Recommendations

Based on its evaluation, the evaluator recommends that Pacific Power consider the following actions.

Prioritize continuation and expansion of high-performing HER waves. Pacific Power should continue the HER program in Washington and prioritize resources toward delivery formats and cohorts that have demonstrated consistent savings—particularly the Expansion Email & Paper 2021 and Remix Email 2020 waves. These cohorts show stronger and more persistent impacts than newer email-only expansions.

Reassess the design and targeting strategy for future expansion waves. Given the lack of observed savings for the Expansion Email 2023 wave, Pacific Power should evaluate whether differences in customer selection, engagement timing, delivery format, or message content contributed to the absence of impact. Future expansion waves may benefit from revised targeting criteria, longer exposure periods before evaluation, or alternative engagement strategies.

Maintain the randomized controlled trial (RCT) framework for program evaluation. The RCT structure remains critical for producing defensible impact estimates and minimizing evaluation uncertainty. Pacific Power should continue to maintain distinct, wave-specific control groups for new cohorts to reduce reliance on post-hoc matching methods in future evaluations.

Increase emphasis on customer data accuracy and transparency. Some participants expressed skepticism regarding the accuracy of home comparisons and appliance-level information. Pacific Power and the implementation contractor should more clearly communicate how customers can update home characteristics and equipment details through the online portal and how those updates influence report content.

Actively promote and integrate the online HER portal into customer communications. Low portal awareness suggests an opportunity to improve engagement at relatively low cost. Integrating clearer portal call-to-action messaging within HERs, emails, or bill inserts may increase utilization and enhance customer understanding of their energy use.

Strengthen data management and quality control processes with the implementation contractor. Continued improvements in data tracking, report delivery records, and repeatable data extracts will support both program administration and future EM&V efforts. Clear documentation and version control of program data will reduce reconciliation issues and increase confidence in reported results.

Plan proactively for ongoing attrition and cohort replenishment. Given observed move-out rates, Pacific Power should continue to refresh treatment populations to sustain program scale and savings over time. Attrition patterns should be monitored by wave to inform future cohort sizing and expansion strategies.

Use survey findings cautiously and consider enhancements to future data collection. While survey results provide useful context on satisfaction and perceptions, low response rates limit the strength of behavioral inferences. Future evaluations may benefit from alternative engagement methods or incentives to improve response rates and representation.

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8 Appendix: Participant and Control Group Survey

1. Thank you for taking our customer survey. Do you recall receiving Home Energy Reports like the one below from Pacific Power? They include information about your home energy use and tips on how you can save energy. You would have received them either by email or mail.

    - Yes
    - No

2. About how many Home Energy Reports do you recall receiving during the year? Your best guess is fine. [Numeric response]

3. How often did you read the Home Energy Reports in 2024 and 2025?

    - I read all the reports
    - I read most of the reports
    - I read about half of the reports
    - I read a few of the reports
    - I haven't read any of the reports
    - I don't know

4. Why didn't you read more of the Home Energy Reports

    - Do not have the time
    - Not interested
    - The suggested tips were not applicable to my home
    - I did not find the information on the report to be valuable
    - I did not find the information in the report to be accurate
    - I didn't understand them
    - Other (Please specify)
    - I don't know

5. Has anyone else in your household read the reports?

    - Yes
    - No
    - Not applicable
    - don't know

6. Using the scale below, please rate how easy or difficult it is to understand the information in your Home Energy Reports. [1 = VERY DIFFICULT AND 5 = VERY EASY]

7. How accurate do you believe the information in your Home Energy Reports is about your home energy usage? [1=NOT AT ALL ACCURATE AND 5=VERY ACCURATE]

8. What do you think is inaccurate in your Home Energy Reports? [OPEN-ENDED]

9. How valuable are the following types of information included in your Home Energy Reports? [1=NOT AT ALL VALUABLE TO 5=VERY VALUABLE]

    - Home energy bill comparison
    - Explanation of home comparison
    - Monthly usage history
    - Customized tips
    - Energy costs by category

10. Please rate your satisfaction with the following aspects of the Home Energy Reports

    - Home comparison
    - Explanation of home comparison
    - Monthly usage history
    - Tips/recommendations
    - Top costs by appliance category
    - Frequency of reports
    - Report overall

11. How could we improve the Home Energy Reports? [OPEN-ENDED]

12. Have the Home Energy Reports changed your opinion of Pacific Power?

    - Yes
    - No
    - I don’t know

13. How have the Home Energy Reports changed your opinion of Pacific Power? [1 = GREATLY WORSENED, 5 = GREATLY IMPROVED]

14. Pacific Power offers its customers access to an online portal where you can see your home's energy usage along with insights and tips. In the past 12 months, have you accessed this online portal?

    - Yes, I visited the portal within the last 30 days
    - Yes, I visited the portal more than 30 days ago
    - No, I do not recall visiting the portal

15. Why haven't you visited the online portal? (Please select all that apply) [MULTISELECT]

    - Was not aware of the portal
    - Not interested in my energy use
    - Did not know how to access the portal
    - Did not think the portal would provide useful information
    - Did not have the time to use the portal
    - Experienced technical difficulties trying to access the portal
    - Other (Please describe)
    - Don't know

16. Using the scale below, how much do you agree or disagree with the following statements about the portal? [1 = 1 (Strongly disagree), 5 = 5 (Strongly agree),

    - The Pacific Power Home Energy Reports website was easy to navigate
    - The information helped me understand how I use energy in my home
    - The information helped me identify ways that I could save energy
    - The contents of the Pacific Power Home Energy Reports website are interesting

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17. Have you changed how you do things to save energy based on information you learned from your Home Energy Reports in 2024 or 2025?

    - Yes
    - No
    - I don't know

18. Which of the following have you started doing because of the Home Energy Reports you received?

    - I wash clothes using cold water.
    - I use the power management features of my electronics.
    - I clean my air conditioner every year.
    - I turn off appliances when I am not home.
    - I turn off equipment in my home office on the weekends.
    - I program my thermostat to save energy when I'm away from home.
    - I don't let hot water run during routine tasks.
    - I use remote-controlled sockets to turn appliances off when not in use.
    - I use a fan instead of my air conditioner sometimes.
    - I use remote-controlled sockets to turn appliances off when not in use.
    - I open curtains so the sun can heat my home during cold weather.

- I run ceiling fans in reverse during the winter.
- I let dishes dry air.
- I reduce the temperature I use to dry my clothes.
- I make sure refrigerator had minimum clearance to allow operating at maximum efficiency.
- I installed a dimmer switch to control lighting levels.
- I turned off game consoles when not in use instead of leaving in stand-by mode.
- I use an electric kettle instead of a pot on the stove.
- I use countertop appliances.
- I use stove burners that are the right size for my pans.
- Other

19. What did you do to change how you save energy?

    - [OPEN-ENDED]

20. Did you install these or any other energy saving products in 2024 or 2025? (Please select all that apply)

    - Smart thermostat (e.g., Nest, Lyric, Ecobee, Sensi)
    - Energy efficient windows or doors
    - Attic, floor, or wall insulation
    - Advanced power strips
    - Low flow faucet aerators or showerheads
    - ENEGY STAR central air conditioner
    - ENERY STAR room air conditioner
    - ENERGY STAR clothes dryer
    - ENERGY STAR clothes washer
    - ENERGY STAR refrigerator
    - ENERGY STAR stand-alone freezer
    - ENERGY STAR heat pump water heater
    - ENERGY STAR heat pump
    - Other (Please specify)

21. How important was the information on your Home Energy Reports when you decided to [1=NOT AT ALL IMPORTANT TO 5=VERY IMPORTANT]

    - Take new steps to save energy
    - Purchase energy efficient appliance(s) and/or equipment.

22. Did you get a rebate on the product you purchased?

ENERGY EFFICIENCY BEHAVIORS - CONTROL GROUP

23. Did you take any action to reduce energy use in your home in 2024 or 2025?

    - Yes
    - No
    - I don’t know

24. Which of the following have you started doing because of the Home Energy Reports you received?

    - I wash clothes using cold water.
    - I use the power management features of my electronics.
    - I clean my air conditioner every year.
    - I turn off appliances when I am not home.
    - I turn off equipment in my home office on the weekends.
    - I program my thermostat to save energy when I'm away from home.
    - I don't let hot water run during routine tasks.
    - I use remote-controlled sockets to turn appliances off when not in use.
    - I use a fan instead of my air conditioner sometimes.
    - I use remote-controlled sockets to turn appliances off when not in use.
    - I open curtains so the sun can heat my home during cold weather.
    - I run ceiling fans in reverse during the winter.
    - I let dishes air dry.
    - I reduce the temperature I use to dry my clothes.
    - I make sure refrigerator had minimum clearance to allow operating at maximum efficiency.
    - I installed a dimmer switch to control lighting levels.
    - I turned off game consoles when not in use instead of leaving in stand-by mode.
    - I use an electric kettle instead of a pot on the stove.
    - I use countertop appliances.
    - I use stove burners that are the right size for my pans.
    - Other

25. What did you do to change how you save energy? [OPEN-ENDED]

26. Did you install these or any other energy saving products in 2024 or 2025? (Please select all that apply)

    - Smart thermostat (e.g., Nest, Lyric, Ecobee, Sensi)
    - Energy efficient windows or doors
    - Attic, floor, or wall insulation
    - Advanced power strips
    - Low flow faucet aerators or showerheads
    - ENEGY STAR central air conditioner
    - ENERY STAR room air conditioner
    - ENERGY STAR clothes dryer
    - ENERGY STAR clothes washer
    - ENERGY STAR refrigerator
    - ENERGY STAR stand-alone freezer
    - ENERGY STAR heat pump water heater
    - ENERGY STAR heat pump
    - Other (Please specify)

27. How important was the information on your Home Energy Reports when you decided to [1=NOT AT ALL IMPORTANT TO 5=VERY IMPORTANT]

    - Take new steps to save energy
    - Purchase energy efficient appliance(s) and/or equipment.

28. Did you get a rebate on the product you purchased?

ENERGY ATTITUDES & BEHAVIORS - BOTH GROUPS

29. Did you take action to reduce energy use in your home before 2024?

    - Yes
    - No
    - I don’t know

30. What did you do to save energy before 2024? [OPEN ENDED]

31. In 2021 did your household enroll in a Time of Use energy plan with Pacific Power?

    - Yes
    - No
    - Don’t know

32. How much do you agree or disagree with the following statements? [0 = STRONGLY DISAGREE, 10 = STRONGLY AGREE]

- Energy efficiency saves money.
- I am not very concerned about the amount of energy used in my home.
- I am too busy to worry about making energy-related improvements in my home.
- Scarce energy supplies will be a major problem in the future.
- There is very little I can do to reduce the amount of energy I am now using.
- It is possible to save energy without sacrificing comfort by being energy efficient.
- I know of steps I could take to reduce my household energy use
- I intend to reduce my household energy use in the next 12 months

DEMOGRAPHICS

Finally, please answer a few questions about your household.

33. Do you rent or own your home?

    - Rent
    - Own
    - Prefer not to answer

34. Which of the following best describes your home?

    - Single-family home
    - Manufactured or mobile home
    - Duplex or triplex
    - Apartment in an apartment building or complex
    - Condominium or townhome
    - Other (Please specify)
    - I don’t know

35. When was your home built?

    - Before 1960
    - 1960-1979
    - 1980-1999
    - 2000-2009
    - 2010 or later
    - Don’t know

36. What is the main fuel used for heating your home?

- Electricity
- Natural Gas
- Propane
- Heating Oil
- Wood
- Don’t heat home
- Other (Please specify)
- I don’t know

37. What kind of water heating system do you have?

- Natural gas storage tank water heater
- Electric storage tank water heater
- Heat pump water heater
- Natural gas tankless water heater
- Electric tankless water heater
- Other (please specify)
- I don’t know

38. Approximately how much is your average monthly electric bill?

- $0-$50
- $51-$100
- $101-$150
- $151-$200
- $201-$250
- $251-$300
- $301-$350
- $351-$400
- $401-$450
- $450 or more
- Don’t know
- Prefer not to say

39. What is the primary language spoken in your home?

- English
- Spanish
- Chinese
- German
- Native American language
- Vietnamese
- Russian

- Tagalog
- Hmong
- Korean
- African language
- French
- Japanese
- Other (Please specify)
- Prefer not to answer

40. How would you characterize the community that you live in?

- Urban (relatively densely populated area)
- Rural (sparsely populated open area)
- Suburban (area outside downtown of city, primarily residential area)
- Other (Please specify)
- I don't know

41. How old are you?

- Under 18 years old
- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55-64 years old
- 65-74 years old
- 75-85 years old
- 86 years old or older
- Prefer not to answer

42. Which of the following best describes the highest level of education you've completed in school?

- Less than high school
- High school graduate/GED
- Associates degree, vocation/technical school, or some college
- Four-year college degree
- Graduate or professional degree
- I don't know
- Prefer not to answer

43. Part of our goal in this survey is to help Pacific Power ensure it is serving everyone in its territory. To help us better understand who Pacific Power is serving, we are interested in the ethnicity of survey respondents. I identify my ethnicity as… (Please Select All that Apply)

- Asian
- Black/African American
- Caucasian/White
- Hispanic or Latino
- Native American or Alaska Native
- Pacific Islander or Native Hawaiian
- Middle Eastern or North African
- Other (Please specify)
- Prefer not to answer

44. Including yourself, how many people are living in your household? [DROP DOWN BOX – 1-12, 13 or more, 99. Prefer not to answer – Establishes CUTOFF]

45. Is your annual household income over or under [CUTOFF]?

- Over
- Under
- I don’t know
- Prefer not to answer