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PROJECT:

2023 Georgia Power Portfolio Residential Program Evaluation Report

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ILLUME

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ILLUME Advising, LLC (ILLUME) is a wholly women-owned consultancy that provides holistic human-centered and equitable research, evaluation, market assessment, and technical advisory services to administrators and regulators of energy efficiency and clean energy programs. ILLUME measures the impacts of energy efficiency and clean energy programs and provides strategic guidance for improving program design and delivery. We support clients as they aim to leverage emerging technology, empathy-focused research, data analytics, and customer-centric design strategies to build cleaner, safer, and more resilient energy infrastructure and, ultimately, healthier, and more sustainable communities. Founded in 2013, ILLUME's team includes a deep bench of more than 40 consultants leveraging data science, social science, technical services, and strategic consulting to support our clients in meeting their energy and climate goals.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYM/ABBREVIATION	DEFINITION
AMI	Advanced Metering Infrastructure
ARCA	Appliance Recycling Centers of America
CDD	Cooling degree days
CF	Coincidence factor
CFM	Cubic feet per minute
CI	Confidence Interval
COP	Coefficient of performance
DHW	Domestic hot water
DOE	US Department of Energy
DSM	Demand-side management
EASE	Energy Assistance for Savings & Efficiency
EFLH	Effective full-load hours
eHER	Email Home Electric Report
EISA	Energy Independence and Security Act
EM&V	Evaluation, measurement, and verification
ETDF	Energy to demand factor
FPL	Federal Poverty Line
HDD	Heating degree day
HEIP	Home Energy Improvement Program
HER	Home Electric Report
HOU	Hours of use
ISR	In-service rates
kW	Kilowatt
kWh	Kilowatt-hour
MW	Megawatt
MWh	Megawatt-hour
NTG, NTGR	Net-to-gross, net-to-gross ratio
PCT	Participant cost test
QC	Quality control
RCT	Randomized control trial
RIM	Ratepayer impact measure test
RR	Realization Rate
RR+	Refrigerator Recycling Plus
Temp✓	“TempCheck,” also referred to as Thermostat Demand Response
TMY3	Typical meteorological year
TRC	Total resource cost test
TRM	Technical Reference Manual
UCT	Utility cost test

ACRONYM/ABBREVIATION	DEFINITION
UEC	Unit Energy Consumption
UES	Utility Energy Services
UMP	Uniform Methods Project
US	United States

RESIDENTIAL PROGRAM PORTFOLIO SUMMARY

Georgia Power's demand-side management (DSM) 2023 – 2025 portfolio contains seven programs offered to its residential customers.[1] ILLUME Advising along with contractors Brightline Group and Cadmus Group (the evaluation team) conducted a comprehensive evaluation of these residential programs based on 2023 program activities. The results of this evaluation will inform program implementation strategies for the remainder of this cycle as well as planning for the 2026 – 2028 cycle.

The ILLUME team developed evaluation plans for each program, each including activities specific for that program. The evaluations consisted of program staff and implementer interviews, customer and contractor surveys and interviews, engineering and statistical analysis, and on-site visits. These activities provided the inputs needed to verify savings and estimate impacts attributable to program interventions (net impacts).

Conclusions and Recommendations

In 2023, the programs achieved nearly 69,000 MWh and 32 MW verified net savings. These savings represent 61% and 87% of Georgia Power's 2023 energy and demand savings goals, respectively (Table 1 and Table 2).

Table 1. 2023 MWh Goals and Progress Against Goals

PROGRAM	NET SAVINGS GOAL	REPORTED NET SAVINGS	VERIFIED NET SAVINGS	% OF GOAL VERIFIED
Specialty Lighting	30,705	45,949	3,608	12%
Home Energy Improvement Program (HEIP)	31,073	10,773	8,321	27%
Energy Assistance for Savings and Efficiency (EASE)	10,391	10,647	7,790	75%
Refrigerator Recycling Plus (RR+)	6,367	2,587	1,111	17%
Residential Behavioral	33,596	48,971	47,992	143%
TOTAL	112,132	118,927	68,822	61%

[a] *Georgia Power does not report kWh savings for the Thermostat Demand Response program (Temp ✔).*

[1] The HopeWorks program was not evaluated this program cycle and is not represented in Table 1 or similar tables and summaries throughout the report. Results from the EASE evaluation will be applied to HopeWorks as applicable as HopeWorks was not independently evaluated.

Table 2. 2023 MW Goals and Progress Against Goals

PROGRAM	GOAL	REPORTED NET SAVINGS	VERIFIED NET SAVINGS	% OF GOAL VERIFIED
Specialty Lighting	2.3	12.4	0.4	17%
Home Energy Improvement Program (HEIP)	7.4	2.5	2.3	31%
Energy Assistance for Savings and Efficiency (EASE)	2.0	3.1	2.4	119%
Refrigerator Recycling Plus (RR+)	0.8	0.4	0.2	28%
Residential Behavioral	6.3	5.1	8.5	136%
Temp✓	18.5	139.5	18.5	100%
TOTAL	**37.3**	**163**	**32.3**	**87%**

Several drivers contributed to the differences between the savings reported by Georgia Power and the verified net savings determined through the evaluation. Below calls out the most substantive drivers.

Changes in market conditions. Two programs were impacted by changes in market conditions: Specialty Lighting and Refrigerator Recycling+ (RR+).

Energy Independence and Security Act (EISA) federal lighting standards effectively ended the sale of inefficient general standard lamps in the United States, thus impacting savings for most bulbs distributed or incentivized after July 2023. EISA took effect well after planning and approval of the Specialty Lighting program; therefore, the program planned for and claimed savings as planned and approved. Given this, savings associated with most bulbs incentivized or distributed through the Specialty Lighting Program after July 1, 2023 were negatively impacted.

Refrigerators and freezers picked up through the program are trending toward newer, more efficient models, which have lower Unit Energy Consumption (UEC) than appliances recycled in prior years' evaluations. These factors resulted in lower per-unit savings values. Further, like many appliance recycling programs across the country, this program experienced vendor issues, which significantly affected participation and progress towards goals in 2023.

Net-to-gross (NTG) assumptions. The verified net results also reflect differences in planned and evaluated NTG ratios (NTGRs) for Specialty Lighting, Home Energy Improvement Program (HEIP), and RR+ (Table 3).

This evaluation included a concerted focus on measuring NTG for income-qualified (IQ) programs, specifically the Energy Assistance for Savings & Efficiency (EASE) program. Georgia Power historically applied a 100% NTG for IQ programs. The evaluation found deeming NTG for IQ at 100% is appropriate, and that the program funding and interventions are driving these customers' decisions to adopt energy efficiency measures.

Table 3. 2023 Residential Portfolio Planned and Evaluated NTGRs

PROGRAM	PLANNED NTGR	EVALUATED NTGR
Specialty Lighting	94%	25%

PROGRAM	PLANNED NTGR	EVALUATED NTGR
Home Energy Improvement Program (HEIP)	95%	71%
Energy Assistance for Savings and Efficiency (EASE)	100%	100%
Refrigerator Recycling Plus (RR+)	63%	51%
Residential Behavioral	100%	100%
Temp✓	100%	100%

Measure-Specific Adjustments. Throughout each evaluation, the team identified measure-specific savings adjustments. Most adjustments were based on differences in measure-level planning assumptions compared with what occurred through the program's activities. As examples, the evaluation verified lower energy savings for insulation installed through EASE within single-family homes due to insulation levels observed through on-site visits and desk reviews that were inconsistent with recorded insulation levels. Conversely, the evaluation found higher savings for dehumidifiers rebated through Georgia Power's Online Marketplace (Online Marketplace) due to differences in capacity assumptions (with dehumidifiers rebated having higher capacities than assumed) and found higher energy savings for smart thermostats for 2023 participants.

Cost-Effectiveness

Overall portfolio level cost-effectiveness, inclusive of all Georgia Power's residential programs evaluated, was 0.80 using the Total Resource Cost (TRC) test. The Residential Specialty Lighting and RR+ Programs had a considerable impact on the overall portfolio cost-effectiveness. Removing these two programs from the calculation would bring the portfolio-level TRC results to 0.98. This report reflects the cost-effectiveness results of all evaluated residential programs, which excludes HopeWorks. Georgia Power expects the cost-effectiveness results for HopeWorks to be like EASE in future years. The below table summarizes the cost-effectiveness tests for all residential programs. Table 4 below includes cost-effectiveness results for all evaluated programs.

Table 4. 2023 Residential Portfolio Cost-Effectiveness Results

PROGRAM	PAC	RIM	TRC
Specialty Lighting	0.29	0.15	0.30
Home Energy Improvement Program (HEIP)	0.77	0.29	0.83
Energy Assistance for Savings and Efficiency (EASE)	0.44	0.18	1.10
Refrigerator Recycling Plus (RR+)	0.12	0.09	0.30
Residential Behavioral	1.45	0.30	1.44
Temp✓	0.08	0.08	0.12

Looking Forward

The evaluation team identified several overarching program-specific findings and opportunities to drive continued progress.

- **HEIP** had lower than anticipated participation in 2023 in part due to implementation vendor changes and the time required for the program to gain traction due to that change. Additionally, thermostats provided through the Online Marketplace lagged behind planned values due to start-up time. Participation in 2024 and 2025 will likely be more indicative of program performance moving forward.
- **RR+** was not a large contributor to savings in 2023 and constituted about six percent of residential portfolio energy goals. Opportunities for this program will primarily rely on its cost-effectiveness given newer refrigerator and freezer stock in the market, and potential to recycle small appliances, which have similar per-unit savings values as refrigerators and freezers.
- **Residential Behavioral**, which represented about 30% of portfolio savings goals, showed relatively strong performance in 2023 in terms of reported and verified savings compared with goals. Newer waves may result in increased savings over time but may be offset by older waves' decreasing impacts.
- **EASE** savings targets are relatively low compared with other programs, representing 9% of residential portfolio goals; however, the evaluation found savings aligned well with planned savings, and the program was cost-effective. Further, research with customers and public housing authorities found this program is very well received and influential in encouraging the adoption of high-efficiency equipment. There may be opportunities to expand the EASE program and improve its reach to customers in need.
- **Online Marketplace**, which is a delivery channel (not a certified program), incentivized measures across Specialty Lighting and HEIP. Looking forward to the next program cycle, it may be worthwhile to develop participation and savings goals separate for Online Marketplace. While some measures overlap with HEIP, the program design, including customer targeting, engagement, and experience, are very different, as is the implementation approach for meeting goals.

Looking forward into the next program cycle, the evaluation team also identified market and measure-specific opportunities for Georgia Power's consideration.

- **Thermostat** participation was not as high as anticipated; however, the general population survey showed opportunity for additional participation, with about a quarter of customers having smart or wi-fi enabled thermostats (37% of owners and 14% renters). Thermostats also provide a mechanism for increasing demand savings through Temp✓.
- **Heat pumps** were planned for low participation through the HEIP program, but have considerable future energy and demand savings opportunities, especially given potential federal funding and tax credits available. In addition to increased savings through the HEIP program, there are potential opportunities as a midstream market offering as well. If growing participation in these measures is of interest, it will be important to begin to build contractor relationships in preparation for the next program cycle, as well as assess market baselines to inform future evaluation efforts (e.g., attribution of heat pump savings to Georgia Power initiatives).
- **Upfront cost concerns** and inflation continue to be a significant barrier to participation; these considerations were seen in both HEIP program research and the general population survey. Georgia Power should identify financial support pathways (e.g., increased incentives, financing options) and messaging strategies to meet customers where they are financially and boost participation.

Addressing up-front cost concerns will be increasingly important if Georgia Power looks to identify deeper savings (and higher cost) projects, as well as more costly larger-saving measures.

- **Renters** are a relatively untapped market for Georgia Power. This group represents just over a third of Georgia Power's residential population per the US Census and constituted nearly 60% of general population survey respondents, indicating their prevalence within Georgia Power's service territory. They are significantly less likely to be aware of, or participate in, Georgia Power's programs, evidenced in both the general population survey as well as low incidence of renters within participant surveys.

Finally, it is important to note that meeting increased savings goals requires time and investment to develop the market and partnerships that will enable success, as well as refine outreach and implementation strategies. This is particularly true should Georgia Power choose to move forward with more contractor-driven program designs (e.g., midstream programs) and/or opt to have a more concerted focus on specific markets (e.g., manufactured homes, renters, IQ, multifamily). Depending on how Georgia Power opts to focus its next cycle, the company should reasonably expect the need to take part of the remainder of this current cycle to "build" toward the next, as well as realistically determine the cost and time needed to meet future cycle goals.

The remaining chapters present the evaluation results of each of the six evaluated residential programs (Residential Behavioral, Temp✓, Residential Specialty Lighting, HEIP, EASE, and RR+) followed by a summary of program and portfolio cost-effectiveness results. Each of the program-specific appendices include more detailed information on impact and NTG approach as well as supplemental process evaluation findings.

1. RESIDENTIAL BEHAVIORAL PROGRAM

The Residential Behavioral program, implemented by Uplight in 2023, provides electronic and/or paper Home Electric Reports (HERs) to customers that are selected through a randomized controlled trial (RCT) opt-out design. HERs compare customers' electric energy usage to similar homes, compare customers' current usage to past usage, cross-promote other Georgia Power programs, and provide energy-saving tips. In addition to HERs, customers receive high bill alerts and have access to an Insights portal where they can update their home profile.[2] Customers who start receiving reports at the same time are grouped together in a "wave." In 2023, Georgia Power had nine waves, which started receiving reports from 2014 to 2022.

The Residential Behavioral program achieved 47,992 MWh adjusted verified net energy and 8,527 kW summer peak demand savings in 2023 (Table 5). Treatment customers reduced their household energy use by an average of 0.89% of their baseline energy usage. Treatment customers saved an average of 125 kWh per household per year. Based on the adjusted energy and peak demand savings, the program achieved 143% of its energy savings and 136% of its summer peak demand savings goals.

Table 5. 2023 Residential Behavioral Savings

	NET SAVINGS GOAL	REPORTED NET SAVINGS	VERIFIED NET SAVINGS	% OF VERIFIED NET TO GOAL
Electric Energy Savings (MWh)	33,596	48,971	47,992[a]	143%
Summer Peak Demand Reduction (kW)	6,258	5,058[b]	8,527[a,c]	136%

[a] *Statistically significant, $p < 0.10$.*

[b] *The implementer multiplied the ETDF over half a year, while the evaluation team multiplied it over a whole year.*

[c] *The evaluation team is treating the energy to peak demand factor ETDF used to calculate demand as a constant. The ETDF is a ratio of average peak demand during the peak period to total annual electric energy use.*

The evaluation team surveyed 220 Behavioral program participants, about half (109) from waves that received paper and email HERs and about half (111) that received email HERs (eHER) only. Awareness of the HER is high among survey respondents (87%). Respondents are generally satisfied with the report and find the sections informative. The report encouraged a portion of customers to take action to save energy. There are some differences between customers who received paper and email reports versus those that received the report through email only. There is a slightly better recall of the HER from customers who received paper and email reports and more of these customers read the report in detail. The respondents who recalled receiving a high bill alert were generally satisfied with about half taking action to reduce energy after receiving the alert.

[2] Customers receive high bill alerts when their bills are projected to be $30 or 30% higher than the previous month.

Chapter One

Residential Behavioral Program

Program Savings Overview

The Residential Behavioral program was successful from a customer experience standpoint and exceeded both their energy and demand savings goals.

The program achieved 47,992 MWh adjusted verified net energy savings and 8,527 kW summer peak demand savings in 2023, achieving 143% and 136% of their goals for energy and demand savings, respectively. According to customer surveys, customers are satisfied with the reports and have good recollection of them.

	Last cycle	This cycle
Number of waves evaluated	6 waves	9 waves
Energy realization rate	96%	98%
Average household savings	.69%	.89%

Conclusions & Recommendations

CONCLUSION 1

Every HER wave achieved an increase in savings as a percentage of baseline energy usage compared to the last evaluation. The increase in the percentage of baseline energy usage saved ranged from 0.03% to 0.91%. This shows that waves that were new in the last evaluation are ramping up and that older waves are maintaining strong savings.

RECOMMENDATION

Continue to monitor savings from older waves, as older waves may decrease in savings after several years. Expect newer waves (2021, 2022) to ramp up in savings in the next year or two.

CONCLUSION 2

Customers who receive paper and email reports have higher recall of the report and read it in more detail. Statistically significantly more customers in the paper and email waves recall receiving a HER (91%), compared to those in the email only waves (83%). However, email only waves still produce strong savings.

RECOMMENDATION

To better understand drivers of readership, conduct interviews to learn about what customers liked about the report and which medium they preferred and why.

CONCLUSION 3

Customers like high bill alerts and they are effective at changing behavior. Of the survey respondents who recalled receiving a high bill alert, most were satisfied with them and over half (57%) take action to reduce their energy use after receiving the alert.

RECOMMENDATION

Continue offering high bill alerts as a part of the Residential Behavioral program to all customers regardless of how they receive the HER.

Program Overview

The Residential Behavioral program provides paper and electronic HERs to select Georgia Power customers. HERs detail the customer's electric energy usage—including their historical consumption data as well as a comparison to other households—and provide low-cost and no-cost tips to save energy. Customers participating in the program may receive a physical paper report through the mail, while others with a valid email address may receive an eHER. HERs also promote and encourage participation in other Georgia Power Energy Efficiency programs. As part of this program, customers also have access to an Insights portal where they can update their home profile and receive high bill alerts which they receive when their bill is projected to be $30 or 30% higher than the previous month.

The program uses a randomized controlled trial (RCT) design by randomly assigning customers to a treatment or control group. Participants in the treatment group receive a HER while participants in the control group do not. Georgia Power distributed HERs to nine groups, or "waves," of customers beginning in 2014. Every wave was sent six email reports and some waves received between two and six paper reports as well. See Appendix 2A. Residential Behavioral Program Design and Delivery Details for a more detailed summary of the program delivery and design.

Program Participation and Achievements

The Residential Behavioral program saved a total of 47,992 MWh and an average household savings of 0.89% per household in 2023. Table 6 summarizes savings for the program, which represents the adjusted verified net savings using the impact evaluation results (realization rates (RRs)) calculated from the evaluation period data (see the Impact Evaluation Findings section for more details).

The program achieved 143% of its kWh goal and 136% of its kW goal for the summer peak demand.

Table 6. 2023 Residential Behavioral Savings

	NET SAVINGS GOAL	REPORTED NET SAVINGS	% OF GOAL
Electric Energy Savings (MWh)	33,596	48,971	143%
Summer Peak Demand Reduction (kW)	6,258	5,058	136%

Table 7 below outlines the energy (MWh) savings achieved by wave. Note that the table below references savings for the evaluation period (August 2022 to July 2023), not 2023 values, and therefore the total savings will not match Table 6 (see the Impact Evaluation Findings section for more details).

Table 7. 2023 Verified Adjusted Net Energy Savings and Demand Savings by Wave during the Evaluation Period

WAVE	TREATED HOUSEHOLDS	% OF BASELINE USAGE SAVED	ADJUSTED VERIFIED NET ENERGY SAVINGS (MWh)
2014 Legacy Wave	5,067	1.43%	891[a]
2016 Legacy Income-Qualified Wave	12,534	1.31%	2,128[a]
2018 Legacy Wave	47,670	1.12%	10,859[a]
2020 Standard Wave	39,428	1.15%	7,127[a]
2020 Digital Transformation Wave	52,501	1.45%	12,332[a]
2020 Digital Only Wave	17,544	0.87%	2,456[a]
2021 Standard Wave	41,541	0.30%	2,111[a]
2021 Digital Only Wave	62,249	0.96%	5,335[a]
2022 Electric Income-qualified Wave	93,270	0.34%	2,967[a]

[a] *Statistically significant, $p < 0.10$.*

Methodology

Research Questions and Activity Overview

The evaluation sought to address the following process and impact research questions.

Process evaluation questions focused on treatment customer awareness of the HERs, customer readership and behavior change because of the HER, customer recall and experience with the high bill alerts, and satisfaction with the HER and Georgia Power overall.

Impact evaluation questions focused on calculating the savings attributable to the HERs, how the program performed against goals, and how the HERs affected participation in other energy efficiency programs.

Table 8 summarizes the activities completed to address these research questions followed by a detailed description of the approach to complete the impact and process evaluations.

Table 8. 2023 Residential Behavioral Program Evaluation Activities

EVALUATION ACTIVITY	COMPLETED
Program staff and implementer interviews	2
Participant surveys	220
Residential general population survey	350 across multiple res. programs
Billing analysis	✓
Cross-program participation and uplift analysis	✓
Demand savings analysis	✓

Impact Evaluation Findings

Key findings include:

- The total unadjusted net savings in the evaluation period (August 2022 to July 2023) were 46,516 MWh. After removing double-counted savings from cross program participation, the total adjusted net program savings in the evaluation period were 46,223 MWh.
- On average, each household saved 0.89% of their baseline energy usage during the evaluation period.

The following sections describe the results from the equivalency checks, regression analysis, uplift and cross-program participation analysis, demand savings analysis, and RR analysis.

Equivalency Check Results

The evaluation team performed an equivalency check of the energy usage patterns of the treatment and control groups of each wave in the year preceding the report rollout to confirm that the data in each case were consistent with an RCT evaluation approach. All waves passed equivalency checks. See Appendix 2C. Residential Behavioral Program Algorithms, and Assumptions for more detailed information on the method and result of this analysis.

Regression Analysis Results

We estimated that the Residential Behavioral program saved 46,516 MWh of electricity in the evaluation period (August 2022 to July 2023) (Table 9). In general, industry research suggests that participants of residential behavior-change programs save between 1.2% and 2.2% of household electric usage per year.

Most waves exhibit a one- or two-year ramp-up period, with savings continuing at the ramped-up level for at least the following five years.[3,4] All legacy waves as well as the 2020 Standard Wave and the 2020 Digital Transformation Wave have average household savings that are over 1% of their baseline energy usage. The 2020 Digital Only Wave as well as the waves in 2021 and 2022 all have savings under 1% of baseline energy usage. The 2014 Legacy Wave still shows some of the highest percent of baseline savings despite being nine years past its launch.

The newer waves should start to experience a "ramp-up" effect of behavioral programs, whereby savings initially increase at a high rate and then remain at a steady rate.[5,6]

We see similar trends comparing the 2020 waves from the last evaluation. For example, the 2020 Standard Wave saved 0.42% of baseline energy usage in the 2020 evaluation, while in 2023 it saved 1.15% of baseline energy usage. In the same way, the new waves that now have a lower percent of baseline energy usage saved, such as the 2022 Electric Income-qualified Wave (0.34%), are expected to increase after they "ramp up" and then stay relatively consistent for the following years after that. All waves that were evaluated in the 2020 evaluation show an increased percent of baseline savings in 2023. Generally, this increase is smaller for older waves, such as an increase of 0.10% for the 2014 Legacy Wave, and larger for newer waves, such as an increase of 0.73% for the 2020 Standard Wave.

These savings values do not adjust for cross-program participation savings from participation in other Georgia Power offerings; we calculated those adjustments through a cross-program participation analysis and present the results in a subsequent section.

[3] M. Khawaja and J. Stewart, "Long-Run Savings and Cost-Effectiveness of Home Energy Report Programs" Waltham, MA: Cadmus (2014). https://www.cadmusgroup.com/wp-content/uploads/2014/11/Cadmus_Home_Energy_Reports_Winter2014.pdf

[4] Sussman, R., and M. Chikumbo, "Behavior Change Programs: Status and Impact." American Council for an Energy-Efficient Economy (2016). https://aceee.org/sites/default/files/publications/researchreports/b1601.pdf

[5] M. Khawaja and J. Stewart, "Long-Run Savings and Cost-Effectiveness of Home Energy Report Programs" Waltham, MA: Cadmus (2014). https://www.cadmusgroup.com/wp-content/uploads/2014/11/Cadmus_Home_Energy_Reports_Winter2014.pdf

[6] Sussman, R., and M. Chikumbo, "Behavior Change Programs: Status and Impact." American Council for an Energy-Efficient Economy (2016). https://aceee.org/sites/default/files/publications/researchreports/b1601.pdf

Table 9. 2023 Electric Savings by Wave (kWh) during the Evaluation Period

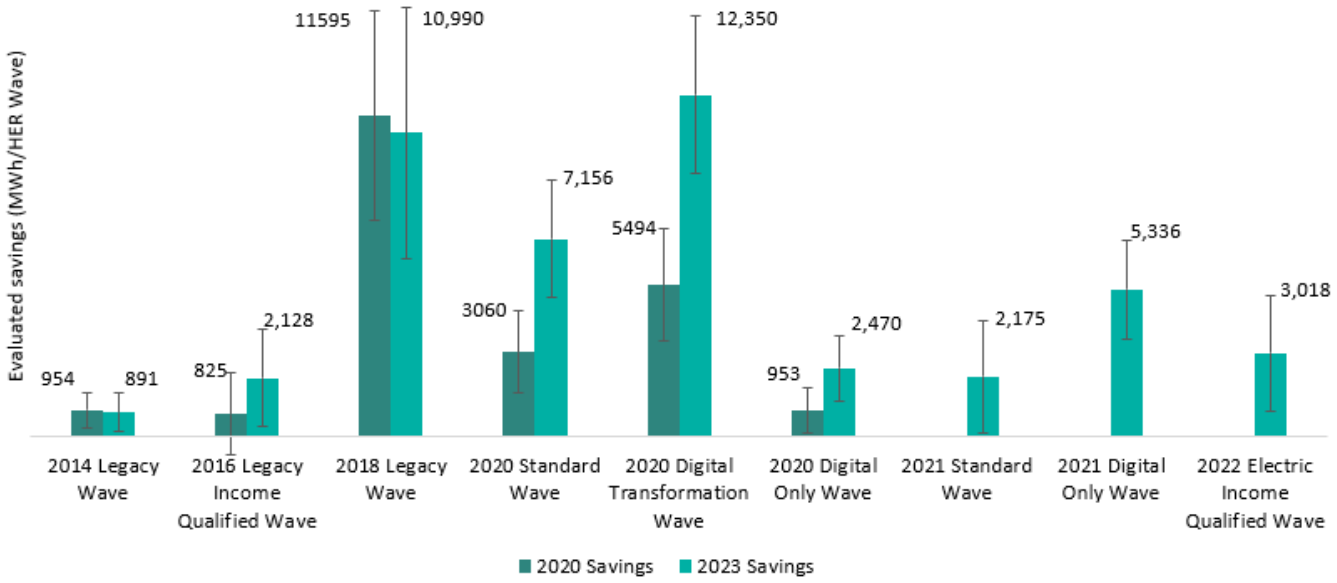
WAVE	TREATED HOUSEHOLDS	VERIFIED kWh	90% CI[a] kWh	% OF BASELINE USAGE	PER HOUSEHOLD VERIFIED kWh
2014 Legacy Wave	5,067	891,298[b]	187,960/1,594,638	1.43%	175.9
2016 Legacy Income-qualified Wave	12,534	2,128,487[b]	351,704/3,905,270	1.31%	169.8
2018 Legacy Wave	47,670	10,990,157[b]	6,445,409/15,534,905	1.12%	230.5
2020 Standard Wave	39,428	7,155,995[b]	5,030,716/9,281,273	1.15%	181.5
2020 Digital Transformation Wave	52,501	12,350,498[b]	9,503,357/15,197,638	1.45%	235.2
2020 Digital Only Wave	17,544	2,470,431[b]	1,308,525/3,632,338	0.87%	140.8
2021 Standard Wave	41,541	2,175,136[b]	150,002/4,200,270	0.30%	52.3
2021 Digital Only Wave	62,249	5,335,559[b]	3,553,112/7,118,006	0.96%	85.7
2022 Electric Income-qualified Wave	93,270	3,018,175[b]	925,905/5,110,446	0.34%	32.4
Total	**371,804[c]**	**46,515,736[c]**			

[a] *Confidence Interval*
[b] *Statistically significant, $p < 0.10$.*
[c] *Note totals may not add up due to rounding.*

Since the program is an RCT design, the savings calculated during the program evaluation period are the unbiased, best estimates of true savings values. The evaluation team reported confidence intervals for all waves and for all waves used the point estimate as the best estimate of savings. However, we cannot rule out that the savings are a different value within the confidence interval. For example, the 2021 Standard Wave confidence interval for electric savings ranges from 150 MWh to 4,200 MWh, yet the evaluation team reports the center point (2,175 MWh) as the evaluated savings. The evaluation team applied the same approach across all waves.

The 2014 Legacy Wave and 2018 Legacy Wave show a similar energy savings to the 2020 evaluation (Figure 1). The 2020 Digital Only Wave shows a higher amount of energy savings, although the difference between this evaluation and the 2020 evaluation is not statistically significant. Notably, the 2016 Legacy Income-qualified Wave did not show statistically significant energy savings in the 2020 evaluation and now it does. The 2020 Standard Wave and the 2020 Digital Transformation Wave both show statistically significantly higher energy savings than in the 2020 evaluation. This is likely because these waves were newer at the time of the 2020 evaluation and in 2023 have now fully "ramped up." It is also possible that the COVID-19 pandemic affected customers in these waves such that the HER was less effective at that time and has become more effective.

Figure 1. 2020 and 2023 Program Savings by Wave during the Evaluation Period



**Error bars represent a 90% confidence interval.*

Uplift and Cross-Program Participation Savings Results

Customers who receive HERs may participate in other energy efficiency programs (e.g., appliance recycling or equipment rebates) at higher rates than their respective control groups. Program theory suggests that receiving reports with messaging about energy use and cross-program promotions leads to increased participation in other programs.

Since other residential programs claim savings (and count all participants and measures), there is a risk of double-counting savings from participation if they are captured in HER net savings and claimed by other programs.

To account for this cross-participation, we (1) assessed the lift in other program participation due to the Residential Behavioral program treatment (participant uplift), and (2) removed the co-generated savings from the Residential Behavioral program to avoid double-counting savings across the portfolio (savings adjustment), which is consistent with industry convention. The convention of removing savings from the Residential Behavioral program is intended to avoid double-counting savings, but not to diminish the uplift benefit of HER.

Below provides the results of the uplift and participation savings analysis.

Program Uplift

The Residential Behavioral program produced negligible lift in program participation overall (formally, 0.05%, but not statistically significant with $p = 0.19$), but it varied distinctly by wave. Table 10 details the participation lift between treatment and control customers. Only two waves have statistically significant results, as noted by the footnote on the wave name.

Between August 2022 and July 2023, the largest percentage lift at the program level occurred in the Online Marketplace for the 2018 Legacy Wave (0.22%, $p < 0.1$). The 2021 Standard and 2020 Digital Only waves participation lift for the RR+ program was also high (0.1%, $p < 0.1$). Per marketing schedules provided by Uplight, both the Online Marketplace and the RR+ program were promoted consistently on both HER and eHER reports throughout the evaluation period.

Table 10. 2023 Program Uplift by Wave during the Evaluation Period

WAVE	TREATMENT PARTICIPATION RATE	CONTROL PARTICIPATION RATE	PARTICIPATION LIFT
2014 Legacy Wave	1.54%	1.47%	0.07%
2016 Legacy Income-qualified Wave	0.98%	1.13%	-0.15%
2018 Legacy Wave [a]	1.93%	1.54%	0.40%
2020 Standard Wave [a]	1.56%	1.38%	0.18%
2020 Digital Transformation Wave	1.65%	1.64%	0.01%
2020 Digital Only Wave	1.53%	1.48%	0.05%
2021 Standard Wave	2.06%	1.99%	0.07%
2021 Digital Only Wave	1.80%	1.71%	0.09%
2022 Electric Income-qualified Wave	0.85%	0.83%	0.02%

[a] *Statistically significant, $p < 0.10$.*

Cross-Program Participation Savings

Table 11 shows electric savings that can be attributed to participation in other Georgia Power Energy Efficiency programs.[7] The team found higher savings from other energy efficiency programs among treatment customers than control customers (i.e., positive cross-program participation savings). In total, across all waves and programs the treatment group saved 293,166 kWh more than the control group due to participation in other energy efficiency programs. Table 11 includes a per-home value for comparison to average per-home savings from the Residential Behavioral program, though only a subset (~5%) of treatment households participated in energy efficiency programs.

[7] The cross-program participation savings analysis does not include the upstream portion of Georgia Power's lighting program since it does not track detailed participation data such as respondent names and billing account numbers. Because adjustments to electric savings due to other programs are small, this omission should not affect the total claimed savings significantly.

Table 11. 2023 Cross-Program Participation Electric Savings % of Total Wave Savings During the Evaluation Period

WAVE	CROSS PROGRAM PARTICIPATION SAVINGS		% OF TOTAL BEHAVIORAL WAVE PROGRAM SAVINGS
	PER HOME (kWh)	TOTAL (kWh)	
2014 Legacy Wave	-0.69	-3,500	-0.39%
2016 Legacy Income-qualified Wave	-1.02	-12,822	-0.60%
2018 Legacy Wave	2.75	131,124	1.19%
2020 Standard Wave	0.73	28,771	0.40%
2020 Digital Transformation Wave	0.36	18,829	0.15%
2020 Digital Only Wave	0.84	14,772	0.60%
2021 Standard Wave	1.55	64,381	2.96%
2021 Digital Only Wave	0.00	111	0.00%
2022 Electric Income-qualified Wave	0.55	51,500	1.71%
Total	**0.79**	**293,166**[a]	**0.63%**

[a] *Note totals may not add up due to rounding.*

To account for double-counted savings, we adjust savings at the wave level if the treatment group participated at a higher rate. We did not adjust modeled savings results for the 2014 Legacy or 2016 Legacy Income-qualified waves as the treatment group participated in other residential energy efficiency programs at a lower rate than the control group. As discussed in the Program Uplift section above, the rate of participation between treatment and control groups differs at the wave level. Table 12 shows the adjustment to the program savings by wave after removing the double-counted savings.

Table 12. 2023 Adjusted Program Savings

WAVE	EVALUATION PERIOD UNADJUSTED VERIFIED NET SAVINGS (kWh)	EVALUATION PERIOD ADJUSTED VERIFIED NET SAVINGS (kWh)
2014 Legacy Wave	891,298	891,298
2016 Legacy Income-qualified Wave	2,128,487	2,128,487
2018 Legacy Wave	10,990,157	10,859,033
2020 Standard Wave	7,155,995	7,127,224
2020 Digital Transformation Wave	12,350,498	12,331,669
2020 Digital Only Wave	2,470,431	2,455,660
2021 Standard Wave	2,175,136	2,110,755
2021 Digital Only Wave	5,335,559	5,335,448
2022 Electric Income-qualified Wave	3,018,175	2,966,675
Total	**46,515,736[a]**	**46,222,570[a]**

[a] *Note totals may not add up due to rounding.*

Demand Reduction

In addition to energy (kWh) savings, the evaluation team calculated summer peak demand savings (kW) for the Residential Behavioral program (Table 13). The evaluation team did this by calculating a total energy to peak demand factor (ETDF) and applying it to the total unadjusted kWh savings. We used NREL's ResStock 2018 TMY aggregated residential time series data for the state of the Georgia to calculate the ratio of average demand during the peak summer period to total energy usage.[8,9]

Table 13 displays the program level demand reduction estimate for 2023. The evaluation team did not report demand savings values at the wave level, as this does not consider differences between waves, unless Advanced Metering Infrastructure (AMI) data is used to calculate demand savings.

[8] NREL. *ResStock—US Residential Sector Circa 2018—TMY3 Data from Georgia*. October 2021 Dataset. Accessed 3/5/2024: https://data.openei.org/s3_viewer?bucket=oedi-data-lake&prefix=nrel-pds-building-stock%2Fend-use-load-profiles-for-us-building-stock%2F2021%2Fresstock_tmy3_release_1%2Ftimeseries_aggregates%2Fby_state%2Fstate%3DGA%2F

[9] The evaluation team defined the summer peak period as 2:00-7:00pm June through September, on non-holiday weekdays. The Residential Behavioral program evaluation uses a different approach to determine peak demand, including using a different summer peak period definition than other program evaluations completed this cycle to better align with the program implementer's approach to estimating demand savings. All other evaluations define summer peak as 4:00-5:00 pm during July weekdays.

Table 13. 2023 Demand Reduction Savings

ENERGY TO PEAK DEMAND FACTOR (ETDF)	TOTAL VERIFIED UNADJUSTED ENERGY SAVINGS (kWh)	TOTAL DEMAND REDUCTION (kW)
0.000177679	47,991,814	8,527

Realization Rate

Electric Energy Savings

After completing regression analyses to measure savings and adjusting estimates for cross-program participation, the evaluation team calculated an overall RR based on the evaluation period (August 2022 to July 2023). Overall, the evaluation team found evaluated energy savings (kWh) to be closely aligned with implementer reported savings. The RR for energy savings across the evaluation period is 98%, as shown in Table 14.

Table 14. 2023 Electric Energy Realization Rate (RR)

	EVALUATION PERIOD REPORTED SAVINGS	EVALUATION PERIOD VERIFIED SAVINGS	EVALUATION PERIOD ADJUSTED VERIFIED SAVINGS	OVERALL REALIZATION RATE
Electric Energy Savings (kWh)	47,226,365	46,515,736	46,222,570	98%

Summer Peak Demand Reduction

The implementer did not report demand savings until July 2023, so Table 15 below shows the 2023 reported savings values, rather than the evaluation period values.

The implementer-reported demand savings value is different from the verified savings value for two reasons.

First, the implementer used a different ETDF than what the evaluation team calculated (noted in Table 15). Georgia Power provided the implementer with the ETDF that Georgia Power used to calculate their demand savings goal. Both the implementer and the evaluation team's ETDF values are a ratio of total demand savings to total energy savings. Differences between these values can come from differences in the total energy savings that is used to calculate this ratio, as well as differences in assumptions that are made when determining the demand savings used to calculate this ratio.[10]

Second, and most importantly, the implementer multiplied the ETDF over six months, based on when they started reporting demand savings, instead of by the entire year. The evaluation team multiplied the evaluated ETDF over 12 months of energy savings, which resulted in greater demand savings. Again, the energy to peak

[10] The evaluation team defined the summer peak period as 2:00-7:00pm June through September, on non-holiday weekdays.

demand factor is the ratio of average demand during the peak summer period to total energy usage for an entire year; thus, the correct way to use the ETDF is by multiplying it by 12 months of kWh savings.

Table 15 outlines these differences, as well as the resulting RR of 169%.

Table 15. 2023 Summer Peak Demand Reduction Realization Rate (RR)

	ENERGY TO PEAK DEMAND FACTOR (ETDF)	NUMBER OF MONTHS IN CALCULATION	2023 SUMMER PEAK DEMAND REDUCTION (kW)	REALIZATION RATE
Reported value	0.000186287	6	5,058	169%
Evaluated value	0.000177679	12	8,527	

Process Evaluation Results

Key findings include:

- Most survey respondents recall receiving the HER, with slightly better recall from customers in waves that receive both paper and email reports.
- Survey respondents who received both paper and email reports were more likely to read the HER in detail compared to those who only received the report in email.
- Most survey respondents are satisfied with high bill alerts.
- For most survey respondents, their impression of Georgia Power was positive before they participated in the program, and it remains the same since receiving the HERs.

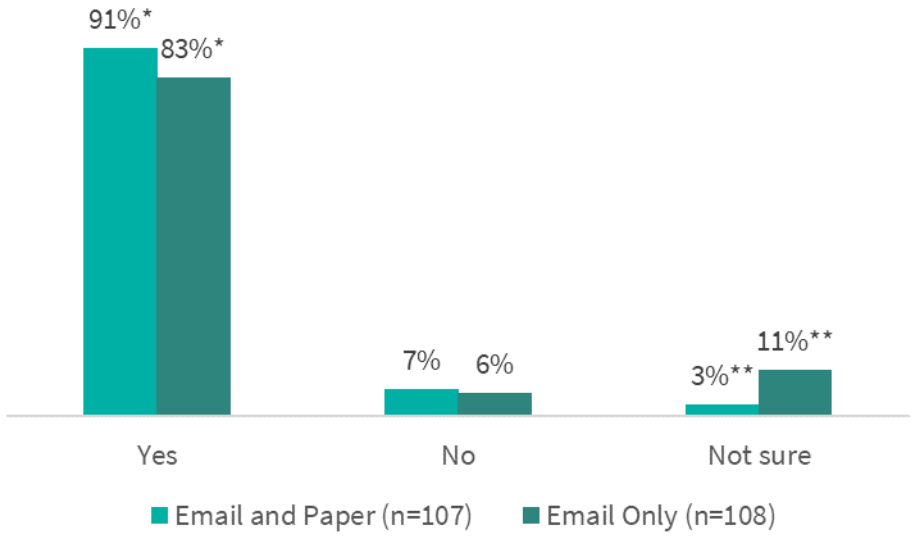
Participant Feedback

The evaluation team surveyed 220 customers who participated in the program; 109 who received paper and email reports and 111 who received email only reports. The survey was fielded August to September 2023. The following sections describe the results related to program awareness, interaction and implementation, high bill alerts, and satisfaction.

Program Awareness

Most customers recall receiving the HER with slightly better recall from those that received paper and email reports. Most (87%) respondents remember receiving the HER either by mail or email. Customers who received both paper and email reports have better recall than those who received the HER via email only, as 91% of those who received both paper and email reports recalled receiving the HER whereas 83% of those received them in email only recalled receiving the HER. Further, more email only customers (11%, Figure 2) than paper and email customers (3%) responded that they were not sure if they had received a HER. These results were statistically significant.

Figure 2. 2023 HER Program Recollection

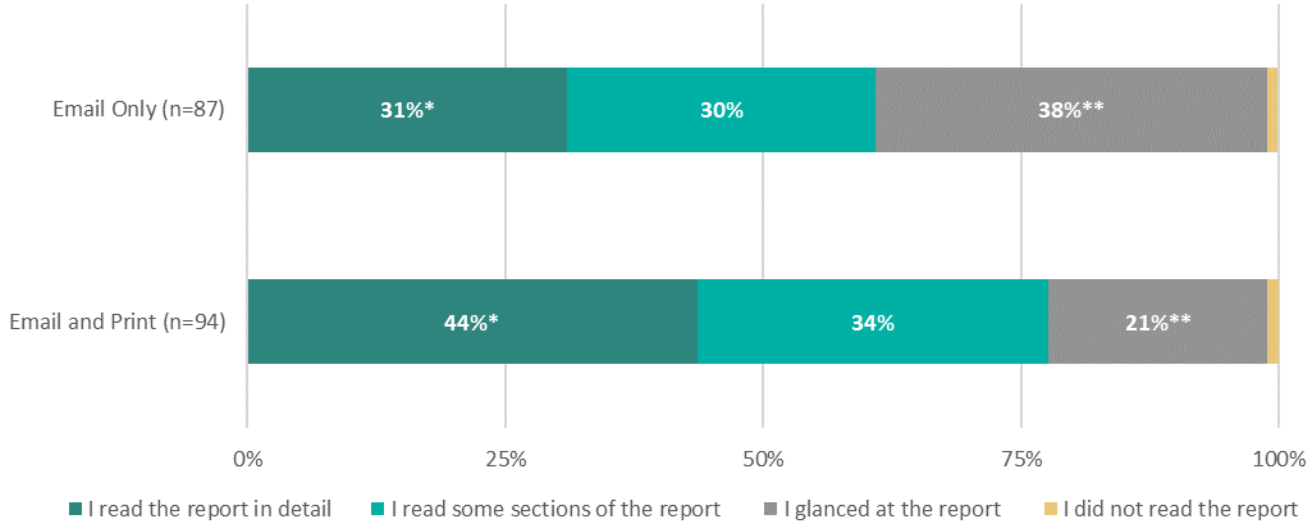


Source: Participant Survey. B3. The Home Electric Report shows graphs on your home's energy usage, how it compares with energy usage in similar homes, and energy-saving tips. Do you remember receiving this report?
**Difference between groups is statistically significant, p < 0.05 **Difference between groups is statistically significant p < 0.10*

Program Interaction and Implementation

Customers who receive paper and email reports were more likely to read the report in detail compared to those who received them via email only. Nearly half of respondents who received paper and email reports (44%, Figure 3) responded that they read the report in detail compared to about a third (31%) of those who received it in email only. Further, more respondents that received the report in email only reported that they glanced at the report (38%) compared to those who received paper and email reports (21%). This could be due to how people engage with emails compared to paper documents or due to better readability in the paper HER compared to the email version. There were more email only respondents who identified that they either glanced at the report or did not read the report because they didn't think the information looked useful (32%) compared to those that received paper and email reports (10%). These results were statistically significant.

Figure 3. 2023 Interaction with HERs



Source: Participant Survey. D4. Which of the following statements best describes what you did with the last report you received?

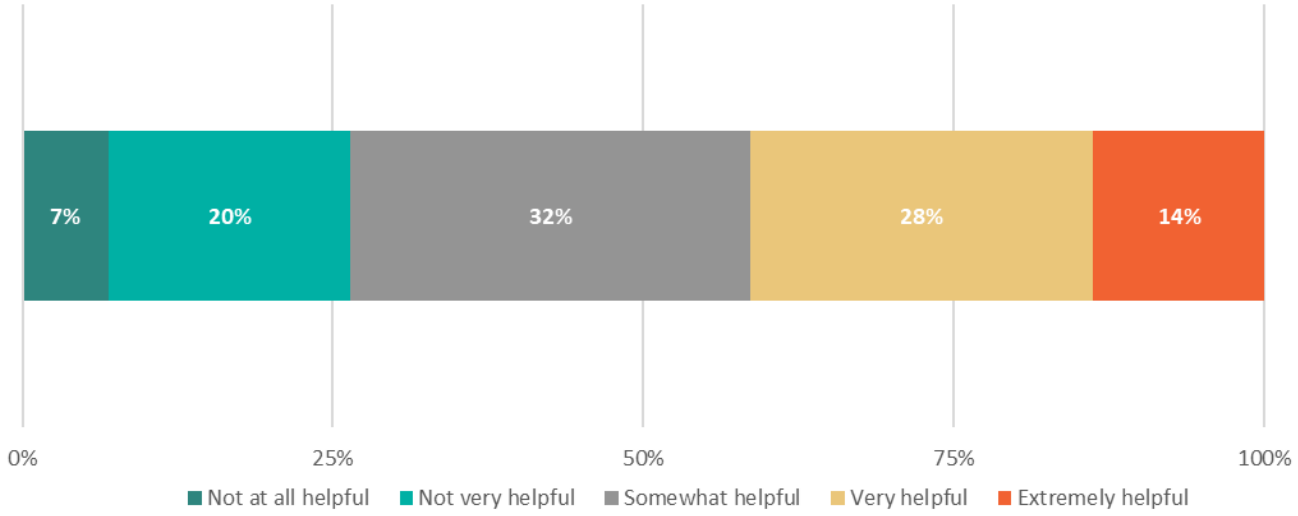
**Difference between groups is statistically significant, p < 0.05 **Difference between groups is statistically significant p < 0.10*

About half of respondents indicated that they took actions to improve the efficiency of their home after reading the last report (n=115). Similar proportions of paper and email respondents (45%) and email only respondents (51%) indicated that they took actions to improve the efficiency of their homes. When asked what actions they took, the most common responses were changing to more energy-efficient lighting such as LEDs, changing the thermostat setting, and improving home insulation.

High Bill Alerts

About half (51%) of all respondents recalled receiving high bill alerts from Georgia Power (n=214). Of those who recall receiving high bill alerts (n=109) and answered the question (n=87, Figure 4), about three-quarters of respondents found them to be at least somewhat helpful, with no statistical difference between email only and paper and email recipients (Figure 4).

Figure 4. 2023 Helpfulness of High Bill Alerts (n=87)

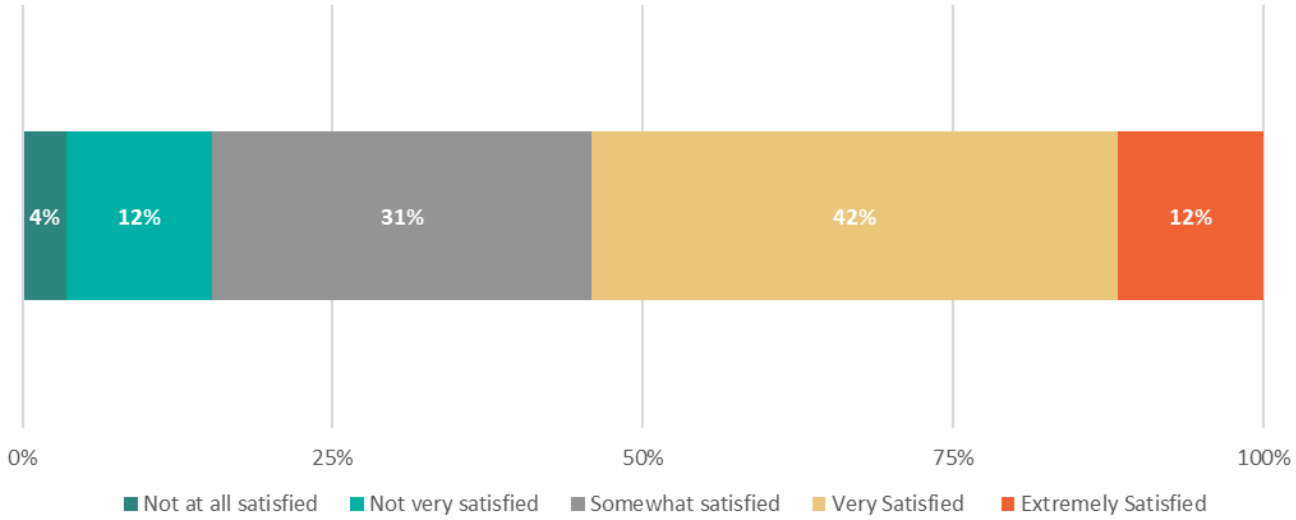


Source: Participant Survey. E30.How helpful are high bills alerts at helping you save energy?

High bill alerts encourage some recipients to act. Of respondents who indicated they have received high bill alerts, 57% have taken action to reduce their energy after receiving the alert. Seventy four percent of these respondents turned off lights, 71% adjusted their thermostat to save energy, 40% used cold water for washing clothes, and 47% unplugged or avoided using appliances.

Respondents are satisfied with high bill alerts regardless of how they receive their HER. Of those who recall receiving high bill alerts (n=109) and answered the question (n=85, Figure 5), most respondents indicated that they were at least somewhat satisfied with the high bill alerts. There were no statistically significant differences between those that receive paper and email reports and those that receive it in email only. When asked why they rated their satisfaction about the high bill alerts this way, the most common response was that it is helpful to receive the alerts (n=15). For those that reported lower levels of satisfaction, the most common response was that they are already aware that the bill will be high, such as in hot months (n=9).

Figure 5. 2023 Satisfaction with High Bill Alerts (n=85)

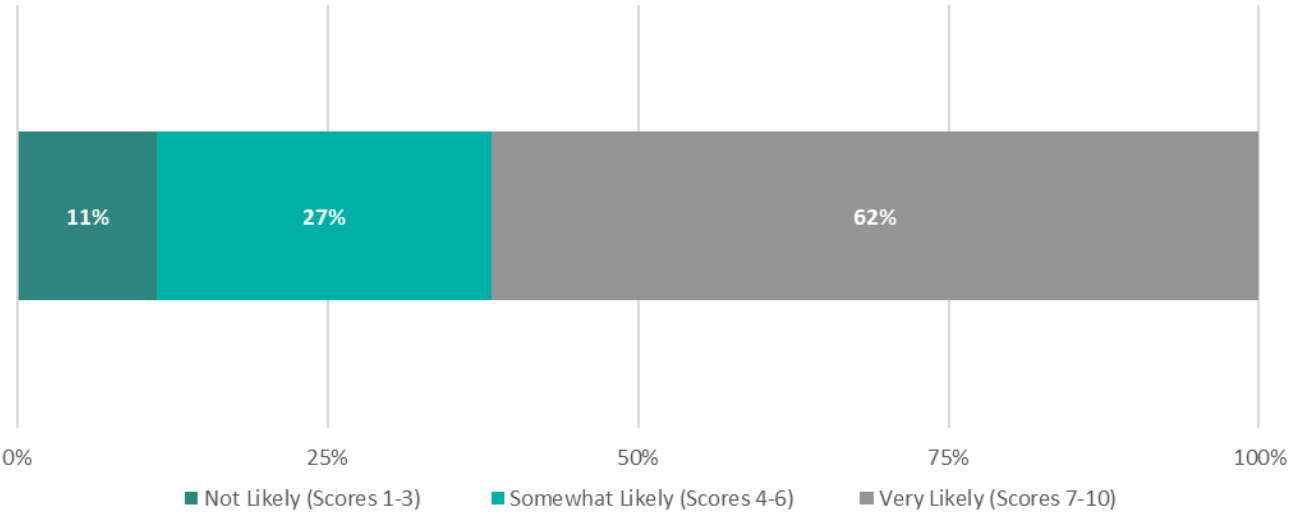


Source: Participant Survey. E31. Overall, how satisfied are you with the high bill alerts?

Program Satisfaction

Respondents are generally satisfied with the reports and the various report sections. Half of respondents (50%, Figure 6) responded that they would be highly likely to recommend Georgia Power's HERs to a friend or colleague. When asked if they would recommend the HER to a friend, 84% of respondents selected at least a score of five out of ten where one is not at all likely and ten is extremely likely.

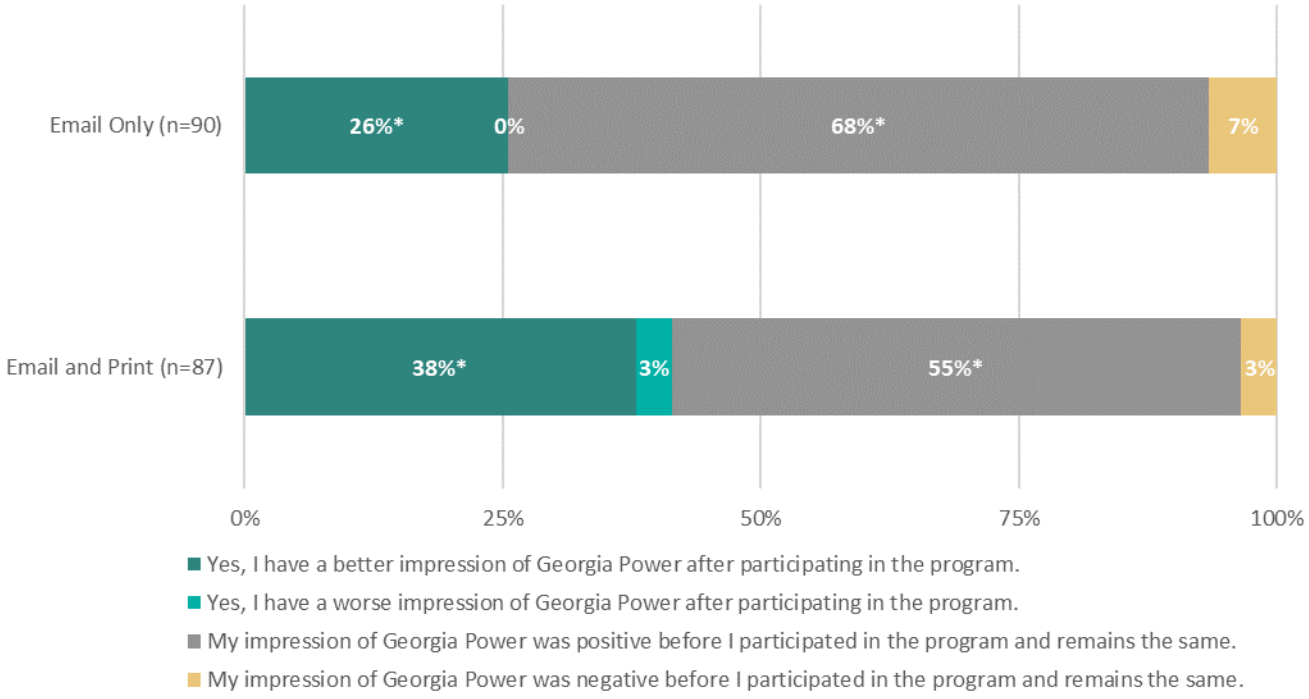
Figure 6. 2023 Likelihood to recommend HERs (n=186)



Source: Participant Survey. F9. If you could, how likely would you be to recommend Georgia Power's Home Electric Reports to a friend or colleague?

For most respondents, their impression of Georgia Power was positive before they participated in the program, and it remains the same since receiving the Home Electric Reports (62%, Figure 7). More paper and email respondents (38%) indicated that their impression of Georgia Power was better after participating in the program compared to the email only respondents (26%). However, more email only respondents (68%) indicated that their impression was positive before and remains the same compared to the paper and email respondents (55%).

Figure 7. 2023 Impression of Georgia Power



Source: Participant Survey. F10. Does your experience with Georgia Power's Home Electric Reports affect your opinion of Georgia Power?

**Difference between groups is statistically significant, p < 0.05 **Difference between groups is statistically significant p < 0.10*

CONCLUSIONS AND RECOMMENDATIONS

Conclusion 1: The Residential Behavioral program achieved an estimated 47,992 MWh of adjusted energy savings in 2023 as well as 8,527 kW summer peak demand reduction, achieving 143% of the kWh program goal as well as 136% of the kW program goal.

Energy savings were statistically significant from all waves. The 2020 Digital Transformation and 2014 Legacy waves show the highest savings as a percentage of baseline energy use.

RECOMMENDATIONS:

- **Continue to monitor wave savings,** particularly older waves such as the 2014 Legacy Wave that is still showing energy savings despite it being nine years since customers started receiving reports. It is possible that older waves may begin to ramp down savings. For newer waves, monitor savings as they will likely ramp up savings. Continue to monitor the income-qualified waves, especially the 2016 Legacy Income- Qualified Wave as last cycle it did not show statistically significant savings, but this cycle it does.

Conclusion 2: Customers who received both a paper and email report have higher recall of the report and read it in more detail, although email only waves still produce strong savings.

Customers who received both types of HERs reported higher levels of recall of the HER and were more likely to report that they read the HER in detail. However, the email only waves 2014 Legacy Wave and the 2020 Digital Transformation Wave show the highest savings as a percentage of baseline usage.[11]

RECOMMENDATIONS:

- **To better understand drivers of readership, consider conducting targeted research, including interviews with recipients, to learn more about the differences in these groups and their preferences and behaviors.** Conducting targeted research, including in-depth interviews with paper and email customers and email only customers, will allow for richer information on report preferences. This could also provide insight into any differences between the waves and how best to adjust the reports to improve readership and recall in both mediums.
- **Conduct additional analysis to directly test the difference of paper and email versus email only waves over time** if Georgia Power is interested in understanding the drivers of differences between these types of delivery modes. Long-term trends on the efficacy of paper and email reports waves versus email only waves are still uncertain. For example, creating an RCT splitting a new wave into two sub-groups of paper and email reports versus email only would highlight the differences in these modes for Georgia Power customers (although it would require several years for the savings to bear out). As another possibility, the evaluation team could delve deeper into prior years that had multiple modes in a single year (e.g., 2020 and 2021) to try to further isolate trends.

[11] Customers in this wave received both paper and email reports until 2021, where the wave transitioned to email only.

Conclusion 3: Customers like high bill alerts and the alerts are effective at changing customer behavior, but some would like them to compare to their previous year's usage rather than previous month.

Of the survey respondents who recalled receiving a high bill alert, most were satisfied with them and over half (57%) took action to reduce their energy use after receiving the alert. However, some customers mentioned that they received a high bill alert at a time when they expected their bill to increase, such as at the hottest month of the year.

RECOMMENDATIONS:

- **Have high bill alerts compare the projected energy usage to that month in the prior year rather than the energy usage in the preceding month of the current year.** For example, "your energy usage is projected to be 30% higher this month than it was last year." Comparing the projected energy usage amount to what it was last year would give a better indicator of unexpected increases.

Conclusion 4: Either choose an energy to peak demand factor (ETDF) that is multiplied over a whole year to estimate demand savings or use AMI in evaluation analyses to determine demand savings more precisely.

The evaluation team estimated peak demand savings using an ETDF slightly different than what the implementer used, which contributed to a difference in the savings estimates. In addition, the implementer multiplied demand savings over half of a year instead of a whole year, which led to differences in savings estimates. According to Georgia Power staff, AMI integration should be in place by summer 2024.

RECOMMENDATIONS:

- **In future evaluations, consider either using the evaluated ETDF multiplied over a whole year or conducting demand savings analyses using AMI data to estimate more precise peak demand savings by seasonality.** The current evaluated demand savings results give a high-level demand estimate during the peak period for the total residential load. Customers in the Residential Behavioral program may be reducing their demand in ways different than the total residential population. If more granular estimates are desired, future evaluations could use AMI data. Georgia Power should also ensure their AMI data is read at the decimal level to ensure precise estimates of savings can be assessed.

Conclusion 4: HERs encourage participation in other Georgia Power Energy Efficiency programs for some customers.

Treatment customers had a higher participation rate in other energy efficiency programs than control customers. This resulted in 293,166 kWh saved by the treatment customers from cross-program participation. Specifically, this was most prevalent for the Online Marketplace and the RR+ program.

2. TEMP✓- DEMAND RESPONSE PROGRAM

Georgia Power's Residential Thermostat Demand Response (DR) program, Temp✓, implemented by Uplight in 2023, manages the load from participant's electric heating and cooling systems through thermostats when there is a need to lower peak demand ("events"). Georgia Power provides incentives for participation in events, customer education, and awareness campaigns. The Temp✓ Program had over 20,000 customers enrolled in the program in 2023 to meet the program's annual participation goal of 25,000 enrolled thermostats. The program called seven total events in 2023 across its winter and summer seasons. Table 16 summarizes savings for the program, including program savings goals. The program achieved 100% of its kW goal. As a DR program, this program's purpose is to provide demand reduction rather than energy savings, and as such, it only has demand reduction goal and no energy (kWh) savings goal.

Table 16. 2023 Temp✓ Savings

	NET SAVINGS GOALS	REPORTED NET SAVINGS	VERIFIED NET SAVINGS	VERIFIED NET SAVINGS AS A % OF GOAL
Electric Energy Savings (kWh)	n/a	n/a	n/a	n/a
Demand Reduction (kW)	18,500	139,502	18,519	100%

Overall impact of 18,519 kW is consistent with the implementer's reported demand savings and meets the annual goal of 18,500 kW. Compared to prior years, increased program enrollment and changing the program design from a control and treatment group to all eligible enrollees participating in events increased the delivered demand reduction from the program in 2023. Participating customers with more than one enrolled device had almost double the demand savings compared to participating customers with only one enrolled device. The program implemented new "critical" events this year, which Georgia Power can call on shorter notice when there is a load emergency on the grid. The one critical event of the summer had the second highest impact of the four summer events of 2023.

Overall satisfaction with Georgia Power and the Temp✓ program decreased from last cycle. But survey respondents who had signed up for the program because they wanted to help Georgia Power or felt it was environmentally the right thing to do said they were satisfied with the program, and more so than others who signed up for several different reasons. Findings also indicated that the new annual $15 incentive may not be influential to continue participation. Less than 7% of survey respondents reported that their manufacturer automatically enrolled them in the Temp✓ program, indicative of high customer awareness of and intent to participate in the program's events.

Temp✓ Program

Program Savings Overview

In 2023, the Temp✓ Program achieved 100% of its kW goal. The Program achieved average shed period savings of 18,519 kW per event, which reflects average savings of 0.651 kW per device and the program's maximum event-day enrollment of 28,450 devices. The Program had over 20,000 customers enrolled in 2023.

The program called seven total events in 2023 across its winter and summer seasons. Compared to prior years, increased program enrollment and changing the program design from having both a control and treatment group to having all eligible enrollees participate in events increased the delivered demand reduction from the program in 2023. Georgia Power's 2024 filing to double the enrollment capacity of the program was approved. The evaluation team expects the overall program savings to increase proportionally due to the stable device-level savings.

Conclusions & Recommendations

CONCLUSION 1

The Temp✓ Program achieved average savings of 0.651 kW per device across its winter and summer seasons.

RECOMMENDATION

Target high potential saving customers to fill the newly doubled enrollment capacity. Georgia Power can consider conducting a propensity analysis to target enrolling customers with high potential savings. The study could use already available AMI data to identify high savers in summer and winter, understand high electric use that could benefit from demand response, and what types of participants did not have summer or winter savings.

CONCLUSION 2

Increased enrollment and changing the program design from having a control group increased the delivered demand reduction in 2023. The program doubled its impact since the last evaluation with about 20,000 customers throughout 2023. Savings are expected to increase more with double the enrollment capacity.

RECOMMENDATION

Research new channels for enrolling customers, such as potential collaboration opportunities to enroll participants when they get new HVAC systems or targeting and incentivizing landlords who install smart thermostats for tenants.

CONCLUSION 3

Participating customers with more than one enrolled device had almost double the demand savings compared to customers with only one device. Despite higher increased usage in event pre-conditioning periods, multiple devices are able to reach the same minimum usage during the event shed period as customers with only one device.

RECOMMENDATION

If revisiting eligibility requirements for the program, consider how many devices a single customer can enroll. Georgia Power can consider setting an eligibility requirement of up to 2 thermostats to maximize savings, if practicable in program design.

Program Overview

Georgia Power's Residential Thermostat Demand Response (DR) program, Temp✓, was a new offering last cycle, building on the DR pilot that was evaluated in 2018 and 2019. Georgia Power continued working with Uplight as the program implementer for the Temp✓ program for the 2023 – 2025 cycle. Through the program, Georgia Power manages the load from participant's electric heating and cooling systems through thermostats ("devices") when there is a need to lower peak demand ("events"). Georgia Power provides incentives for participation in events, customer education, and awareness campaigns. The maximum number of events for the Temp✓ program is set at ten per season. To qualify:

- The participant must be a residential Georgia Power customer, as verified with customer data and an account number.
- The participant must reside in a single-family or multifamily home with an individual electric meter, electric heat, and central air conditioning.
- The participant must not be on time-of-use or net-metering rates or use solar power for their home's electricity.

Georgia Power targets marketing to customers with high propensity to have electric heating. Customers receive a one-time $50 Mastercard gift card when they enroll, and, as of 2023, an additional $15 gift card annual incentive[12] to stay in the program through both the summer and winter seasons.

The program called seven total events in 2023 across its winter and summer seasons. Table 17 shows the seven events, their associated start times, and duration in hours.

[12] The evaluation team researched incentives other utilities offer and found that Georgia Power's annual incentive is within range of other utilities but lower than most in our search. Some programs also have additional participation verification for the annual incentive. Other researched utilities offer enrollment incentives ranging from $50-$85 and annual incentives ranging from $20-$40 with one utility offering a $10 annual incentive after offering $25 the first year.

Table 17. 2023 Event Characteristics

DATE	SEASON	START TIME	DURATION (HOURS)
1/27/2023	Winter	7am	1
3/15/2023	Winter	7am	1
6/29/2023	Summer	4pm	2
7/20/2023	Summer	4pm	2
7/31/2023	Summer	4pm	2
8/24/2023	Summer	4pm	2
12/20/2023	Winter	7am	2
AVERAGE	**-**	**-**	**1.7**

Changes from Previous Cycle Design

The prior evaluation cycle was the first for the Temp✓ Program. After launching as a pilot program in 2018, the full program launched in 2020 and expanded to participation of additional thermostat brands including ecobee, Google Nest, and Emerson Sensi. Changes to the program from the previous evaluation cycle include:

- In 2020, discontinuing the enrollment mechanism and instant rebate previously offered through the Online Marketplace. Georgia Power discontinued these aspects of the program due to the high rate of pre-approved customers later deemed ineligible due to non-electric heating and cooling systems, ineligible rate participation, or other reasons.
- Offering an additional $15 annual incentive (Virtual Prepaid Mastercard) as of 2023 to every residence that remains in the program. The first batch of $15 retention bonuses were sent to each participating location (14,383 customers) in late October 2023.
- Discontinuing the control customer program design, instead sending signals to participate in an event to every enrolled and eligible device.
- Periodically removing customers and devices from enrollment lists, such as customers who were no longer eligible or unable to participate in the program, and opening enrollment for short windows to enroll new devices up to the enrollment capacity. In December of the 2023 program year, the number of enrolled devices was 9% lower than on the last summer event day in August 2023.
- Recognizing some events as critical/emergency events on exceptionally high demand days.

In 2024, Georgia Power filed to double the enrollment capacity of the program. This filing was approved.

Program Participation and Achievements

The Temp✓ Program had over 20,000 customers with more than 28,000 devices enrolled in the program in 2023. This met the program's participation goal of 25,000 enrolled devices. Table 18 summarizes savings for the program, including program savings goals. In 2023, the program achieved 100% of its kW goal. As a DR

program, the purpose of this program is to provide demand reduction rather than energy savings, and as such, the program only has a demand reduction goal, and no energy savings (kWh) goal.

Table 18. 2023 Temp✓ Participation and Savings

	NUMBER OF PARTICIPANTS [a]	NET SAVINGS GOALS	REPORTED NET SAVINGS [b]	% OF GOAL
Electric Energy Savings (kWh)	n/a	n/a	n/a	n/a
Demand Reduction (kW)	20,165	18,500	139,502	100%

a The number of participants represents the maximum number of participating customers enrolled, which is from the Georgia Power enrollment file of the event on June 29, 2023.

b The reported savings presented are from Georgia Power's Certified Demand-Side Management Programs, Fourth Quarter 2023 Program Status Report; Docket No. 44161 (Q42023 PSC Report)[13]. The Evaluation Team notes that the reported savings were additive of the implementer's reported savings of the seven demand response events of 2023. This is further discussed in Appendix 3A. Reported Demand Savings.

Relative to the implementer's reported savings, the Temp✓ Program achieved 93% of the reported peak demand reduction (kW). Table 19 outlines the verified gross and verified net impact. The evaluation models produce net savings and therefore the NTGR is effectively 100%. There is zero free-ridership in the program because there is no mechanism for customers to participate in the program without being enrolled in the program.

Table 19. 2023 Temp✓ Program Savings Summary

METRIC	NET SAVINGS/ IMPACT GOAL	TRACKED SAVINGS/ IMPACT	VERIFIED NET SAVINGS/ IMPACT	RETROSPECTIVE REALIZATION RATE
Electric Energy Savings (kWh)	n/a	n/a	n/a	n/a
Demand Reduction (kW)	18,500	19,929 [a]	18,519	93%

[a] The Evaluation Team presents the event-level average of the implementer's reported savings, as opposed to Georgia Power's reported savings, which were additive of the seven demand response events of 2023 for consistency with reported savings for other Georgia Power programs. This is further discussed in Appendix 3A. Reported Demand Savings. Throughout the balance of the report, the implementer's reported savings are referred to as "tracked savings" to distinguish between those included in the Q42023 PSC Report.

Methodology

This section includes documentation of research questions and activity overview, the participant survey approach, and the impact evaluation approach.

[13] https://psc.ga.gov/search/facts-docket/?docketId=44161

Research Questions and Activity Overview

The evaluation sought to address both process and impact research questions.

Process evaluation questions focused on customer motivations to participate in the program, customer awareness and behavior during event periods and emergency events, customer satisfaction and reasons for opting out, and successes and challenges with implementing the program.

Impact evaluation questions focused on validating average demand and energy savings assumptions, verifying savings against planned, and what factors drive savings and whether adjustments should be made.

Table 20 summarizes the activities completed to address these research questions followed by a detailed description of the approaches to completing the process and impact evaluations. In addition to the following Temp✓ Program evaluation activities, the evaluation team also fielded a general population survey with 350 respondents.

Table 20: 2023 Evaluation Activities

EVALUATION ACTIVITY	COMPLETED
Program staff and implementer interviews	2
Temp✓ Participant surveys	514
Calculate gross savings (kW)	✓

Impact Evaluation Findings

Key findings include:

- Overall impact is consistent with the implementer's tracked impact and prior evaluation reports and meets the annual goal of 18,500 kW. Georgia Power's reported annual savings in Q42023 PSC Report, which added up the demand savings from all events as opposed to averaged, is inconsistent with these methods.
- The Temp✓ program achieved 87% of the implementer's tracked savings per device. The implementer reported 0.747 kW/device overall and the evaluation team's verified savings were 0.651 kW/device.
- Increased program enrollment and changing the program design from having a control group increased delivered demand savings this program cycle. With about 20,000 customers in the program throughout 2023, the program doubled its annual impact since the last evaluation cycle. When the control group was still part of the program design, the savings estimates were calculated using the enrolled number of devices despite about 20% of the devices not receiving a signal to participate in an event. Without the control group, the program could deliver higher actual demand savings in 2023.
- The results for the pre-conditioning period in 2023 showed higher impacts (negative demand savings) in winter than in summer. The results for the snapback period in 2023 showed higher impacts (negative demand savings) in summer than winter.

- Participating customers with more than one enrolled device had almost double the demand savings compared to participating customers with only one enrolled device.
- The summer critical event had the second highest demand impact of the four summer events of 2023.

Verified Impact and Planning Estimates

Georgia Power's Temp✓ program achieved average shed period savings of 18,519 kW per event, which reflects average savings of 0.651 kW per device and the program's maximum event-day enrollment of 28,450 devices. Table 21 shows program-level demand savings from ILLUME's evaluation results. The evaluation team recommends using these values for reported savings and in cost-effectiveness testing because they reflect the demand capacity created in 2023.

Table 21. 2023 Verified Impact

VERIFIED SAVINGS PER DEVICE (kW)	MAXIMUM EVENT-DAY DEVICE ENROLLMENT OF 2023	VERIFIED IMPACT (kW)
0.651	28,450	18,519

The evaluation team presents two other estimates of savings for different purposes of the Georgia Power team. Delivered savings results reflect the 2023 event-day savings per device (which is, on average, the same as the savings per device of the capacity estimate), and the event-day enrollment. This granular estimate represents realized savings in 2023 and can be used to analyze differences in savings between event days.

For future planning estimates Georgia Power should also use 0.651 kW per device. Planning estimates, however, will fluctuate based on forecasted enrollment. For a 2024 outlook Georgia Power can use the most recent, year-end enrollment figures of 2023. Table 22 below presents the differences between all three estimates.

Table 22. 2023 Evaluated Estimates

SAVINGS TYPE	RECOMMENDED USE	SAVINGS PER DEVICE (kW)	DEVICE ENROLLMENT
Capacity	Reporting verified savings and cost-effectiveness	0.651	Maximum event-day of 2023
Delivered	Delivered savings	0.651	Event-day
Planning	2024 outlook	0.651	Year-end 2023

Participant Counts

In this section, the evaluation team provides participation counts by event, as well as an investigation into event completion and customer opt-outs.

Participant Counts by Event

Georgia Power's Temp✓ program enrolls customers throughout the year to meet the goal of 25,000 devices. Enrollment was open in May and October to enroll new devices. The Georgia Power team also periodically unenrolls customers who moved out or had ineligible heating or cooling equipment. Before the March and December events several thousand devices were removed from the program. Georgia Power enacted additional un-enrollments through September. Table 23 shows enrolled customer counts for each event and on average across the seven events included in this evaluation. It shows the number of devices enrolled by the time of each event, and the number of devices included in the evaluation team's interval usage data modeling. The evaluation team used the number of enrolled devices when estimating total delivered 2023 program impacts.

Table 23. 2023 Event-Level Disposition Table

EVENT DATE	ENROLLED DEVICES	DEVICES INCLUDED IN MODELING [a]
1/27/2023	26,735	21,459
3/15/2023	23,864	21,420
6/29/2023	28,450	25,803
7/20/2023	27,633	25,298
7/31/2023	27,487	25,240
8/24/2023	27,452	25,145
12/20/2023	24,973	22,103
AVERAGE	**26,656**	**23,781**

[a] *The number of devices included in the modeling is imputed based on the number of modeled accounts multiplied by the average number of devices per modeled account (1.38). This is slightly different from the number of devices per enrolled account implied in the Program Participation and Savings Table (1.41).*

Participant Event Completion

The nature of participation is complex for DR programs. While over 20,000 Georgia Power customers were enrolled in the Temp✓ program with over 28,000 devices by the first summer event on June 29, 2023, only 22,210 devices were enrolled and identified as eligible for receiving the event algorithms and only 18,710 participating devices completed the event algorithms. In other words, about 78% of enrolled devices were eligible to participate in the event and about 68% of all enrolled devices completed the event algorithms on this event day. Table 24 shows the seven event days of 2023 with data from the implementer's event-level reporting file to show the differences between enrolled, participation eligible, and completed devices. On average, 74% of devices are eligible to start participating in an event. Of those devices, 84% complete participating in the event on average.

Table 24. 2023 Counts of Participating Devices

EVENT	ENROLLED DEVICES	ELIGIBLE DEVICES	% DEVICES ELIGIBLE OF ENROLLED	DEVICES THAT COMPLETED THE EVENT	% DEVICES COMPLETED OF ELIGIBLE
1/27/2023	26,735	16,248	61%	14,651	90%
3/15/2023	23,864	13,847	58%	12,417	90%
6/29/2023	28,450	22,210	78%	18,710	84%
7/20/2023	27,633	22,051	80%	18,298	83%
7/31/2023	27,487	21,948	80%	18,380	84%
8/24/2023	27,452	21,744	79%	18,099	83%
12/20/2023	24,973	19,792	79%	15,203	77%
AVERAGE	**26,656**	**19,691**	**74%**	**16,537**	**84%**

Customers may not complete the event algorithms because they are excluded from the event prior to the event, the event algorithms may not reach the customer's device due to connectivity issues, or the customer adjusts their device such that it opts them out of the event during the event. Implementers choose eligible enrolled customers based on HVAC types or thermostat modes. Adding complexity, some customers who did not complete the event algorithms still contributed demand savings, because they may have opted out in the middle of the event or opted out unintentionally by using even more efficient setpoints. Opting out can also occur prior to an event.

The number of devices completing the event algorithms was stable throughout the seven events, but customers were more likely to be eligible to participate in the summer. The increase in ineligible enrolled customers during the winter events may reflect devices that are not controlling active heating systems or controlling heating systems that use non-electric energy sources. Further discussion of completing events and opting out behavior can be found in the Process Evaluation section.

Savings Results by Season

In this section, the evaluation team summarizes impact findings by season during preconditioning, shed, and snapback across three winter events and four summer events. In addition, the evaluation team combines demand savings and duration for each of the event periods to estimate energy savings (kWh) generated by the events, which are not captured in the program's reported savings.

Winter Demand Response Events

During winter DR events, Georgia Power achieved an average per customer preconditioning period demand increase of 0.436 kW, average shed savings of 0.966 kW, and a snapback demand increase of 0.099 kW. These impacts equate to 0.417 kWh of average increased per customer daily energy use during winter events. Table 25 shows average results during preconditioning, shed, and snapback across three winter events. This table

also provides the average number of hours, modeled customers, per customer demand savings, modeling precision, and per customer energy savings.

Table 25. 2023 Estimated Customer-Level Average Demand Reduction for Winter DR Events

SEASON	PERIOD	NUMBER OF HOURS	MODELED CUSTOMERS PER EVENT	PER CUSTOMER kW SAVINGS	MODEL PRECISION [a]	PER CUSTOMER DAILY ENERGY SAVINGS (kWh)
Winter	Preconditioning	3	15,696	-0.436	2%	-1.309
Winter	Shed	1.3[b]	15,696	0.966	2%	1.288
Winter	Snapback	4	15,696	-0.099	8%	-0.396
TOTAL CUSTOMER DAILY ENERGY SAVINGS [c]					6%	-0.417

[a] The evaluation team estimates demand response impacts on an hourly basis and combines the error from the hourly impacts by preconditioning, shed, and snapback with a simplified approach. We assume no collinearity or relationship between covariates, which may lead to slight underestimates of precision.

[b] 1.3 hours is the average winter event duration. Two winter events were one hour, and the last winter event was two hours long.

[c] While Georgia Power claims energy savings from the purchase of smart thermostats in the Home Energy Improvement Program, the evaluation of that program excludes Temp✓ event days. As such, while small, Georgia Power does not currently claim energy savings from Temp✓ event days.

The pre-conditioning period has higher impact (negative savings) in winter compared to summer, as seen below in Table 26. The evaluation team looked at winter peak demand in pilot evaluation research for Georgia Power. The research showed that winter peak demand often occurs during prolonged periods (several days) of higher demand. The typical prolonged cold in winter could be contributing to the higher pre-conditioning impact for the season.

Summer Demand Response Events

During summer DR events Georgia Power achieved an average per customer preconditioning period demand increase of 0.295 kW, average shed savings of 0.872 kW, and a snapback demand increase of 0.165 kW. These impacts equate to an average per customer daily energy savings of 0.201 kWh during summer events. Table 26 shows average results during preconditioning, shed, and snapback across four summer events. This table also provides the average number of hours, modeled customers, per customer demand savings, modeling precision, and per customer energy savings.

Table 26. 2023 Estimated Customer-Level Average Demand Reduction for Summer DR Events

SEASON	PERIOD	NUMBER OF HOURS	MODELED CUSTOMERS PER EVENT	PER CUSTOMER kW SAVINGS	MODEL PRECISION [a]	PER CUSTOMER DAILY ENERGY SAVINGS (kWh)
Summer	Preconditioning	3	18,385	-0.295	3%	-0.884
Summer	Shed	2	18,385	0.872	1%	1.743
Summer	Snapback	4	18,385	-0.165	4%	-0.659
TOTAL CUSTOMER DAILY ENERGY SAVINGS [b]					11%	0.201

[a] The evaluation team estimates demand response impacts on an hourly basis and combines the error from the hourly impacts by preconditioning, shed, and snapback with a simplified approach. We assume no collinearity or relationship between covariates, which may lead to slight underestimates of precision.

[b] While Georgia Power claims energy savings from the purchase of smart thermostats in the Home Energy Improvement Program, the evaluation of that program excludes Temp✓ event days. As such, while small, Georgia Power does not currently claim energy savings from Temp✓ event days. .

Thermostats per Participating Customer

As shown in Table 27, the program's enrolled customers had about 1.4 enrolled devices per customer on average for each of the seven events included in this evaluation. The evaluation team estimated that savings per thermostat were 0.651 kW, resulting in an average demand reduction of 0.918 kW per customer.

Table 27. 2023 Thermostats per Customer

EVENT DATE	ENROLLED CUSTOMERS	ENROLLED DEVICES	DEVICES PER CUSTOMER
1/27/2023	19,622	27,081	1.38
3/15/2023	17,437	24,508	1.41
6/29/2023	20,165	28,413	1.41
7/20/2023	19,493	27,591	1.42
7/31/2023	19,358	27,447	1.42
8/24/2023	19,293	27,410	1.42
12/20/2023	17,385	24,937	1.43
AVERAGE	**18,965**	**26,770**	**1.41[a]**

[a] For this table referencing enrolled customers and devices, the evaluation team presents the average number of enrolled devices per customer, 1.41, as opposed to the average number of modeled devices per customer, 1.38, previously presented in the Participant Counts by Event Section.

Drivers

In this section, the evaluation team presents findings into the factors that may drive per-customer savings higher or lower. We present results by event, thermostat brand, and the number of devices per participating customer, plus other considerations for savings drivers.

Delivered Savings by Event

Across all events of 2023, the retrospective RR between the post event summaries and event-level evaluation results varied between 73% and 105%. These delivered savings estimates reflect the actual enrollment on each event day and savings per event. Table 28 shows event-level demand savings from Georgia Power's program planning, the implementer's post event summaries, and ILLUME's evaluation results.

Table 28. 2023 Retrospective Event Level Realization Rate for Shed Period Savings

EVENT DATE	CRITICAL EVENT	TOTAL PLANNED SAVINGS (kW)	IMPLEMENTER POST-EVENT SUMMARY TOTAL SAVINGS (kW)	EVALUATION TOTAL SAVINGS (kW)	RETROSPECTIVE REALIZATION RATE (EVALUATION OVER POST-EVENT SUMMARIES)
1/27/2023	NO	18,500	19,749	17,465	88%
3/15/2023	NO	18,500	16,855	15,048	89%
6/29/2023	NO	18,500	20,412	16,894	83%
7/20/2023	NO	18,500	21,387	15,698	73%
7/31/2023	YES	18,500	20,839	17,817	85%
8/24/2023	NO	18,500	22,104	19,131	87%
12/20/2023	NO	18,500	18,156	19,120	105%
AVERAGE	**-**				**87%**

The implementer and evaluation team used different impact evaluation methods, which explains the difference between the results. The evaluation team did not have access to customer-or device- level data identifying which participants were eligible on any given event day, i.e., which enrolled customers received the notification about participating in an event. The evaluation team attempted to recreate the logic of who would be eligible on an event day using Georgia Power's VisionDSM database for the program, which contains the status (HVAC mode) of participating devices. However, the evaluation team was unable to recreate exactly the numbers of eligible participating devices on an event day provided by the implementer due to undetermined data issues likely to do with specific point-in-time data on device statuses.

Therefore, the evaluation team estimated the savings for all customers who were enrolled on an event day (for whom there was AMI data available). Comparatively the implementer estimated savings only for participants who were eligible to participate on an event day.

The implementer reported 0.747 kW/device overall and the evaluation team's verified savings were 0.651 kW/device. Increasing the program enrollment compared to last evaluation cycle drove savings higher. With the approval of the filing for increased program enrollment (e.g., by two-fold), the evaluation team expects the overall program savings to increase proportionally due to the stable device-level savings. Table 29 shows the number of enrolled participating devices and demand savings for seven events at the device level.

Table 29. 2023 Comparison of Evaluation Results and Implementer's Post Event Summary for Participating Devices

EVENT CHARACTERISTICS			NUMBER OF ENROLLED DEVICES			SHED PERIOD SAVINGS (kW PER ENROLLED DEVICE) [a]		
DATE	SHED START TIME	SHED DURATION (HOURS)	TRACKED: IMPLEMENTER EVENT SUMMARY	EVALUATION ESTIMATE [b]	RATIO (EVALUATION OVER TRACKED)	TRACKED: IMPLEMENTER EVENT SUMMARY [c]	EVALUATION ESTIMATE	PLANNING REALIZATION RATE (EVALUATION OVER TRACKED) [b]
1/27/23	7am	1	26,735	27,081	101%	0.739	0.653	88%
3/15/23	7am	1	23,864	24,508	103%	0.706	0.631	89%
6/29/23	4pm	2	28,450	28,413	100%	0.717	0.594	83%
7/20/23	4pm	2	27,633	27,591	100%	0.774	0.568	73%
7/31/23	4pm	2	27,487	27,447	100%	0.758	0.648	85%
8/24/23	4pm	2	27,452	27,410	100%	0.805	0.697	87%
12/20/23	7am	2	24,973	24,937	100%	0.727	0.766	105%
AVERAGE	**-**	**1.7**	**26,656**	**26,770**	**100%**	**0.747**	**0.651**	**87%**

[a] The evaluation team provides device level results to support Georgia Power's program planning and has not estimated precision for the device level estimates. However, the level of modeling error should be similar between customer level estimates (below in Savings Results by Season) and device level estimates unless the number of devices per customer in the tracking data is inaccurate.

[b] The evaluation estimate of enrolled participant devices is from the event day enrollment data provided by Georgia Power.

[c] The implementer estimated savings only for participant devices who were eligible to participate on an event day. To compare their estimate to the estimate of the evaluation team on all enrolled devices on an event day, the evaluation team adjusted the implementer's estimates by the percentage of devices that were eligible for the event.

Thermostat Brand

The evaluation team found similar shed savings between three thermostat brands, with minor differences that could reflect other customer characteristics that correlate with thermostat brand, such as the number of thermostats per customer and customer behavior during the events. However, as the Georgia Power team has known in recent years, ecobee uses a different pre-conditioning strategy.

The pre-conditioning period for ecobee is only one hour, with ecobee having the lowest impact in winter and summer, compared to the other thermostat brands with multiple hours of pre-conditioning. Figure 8 and Figure 9 below show the average customer usage by brand on event days. Table 30 shows the per customer savings by season, brand, and event period.

Figure 8. 2023 Winter Event Day Usage (kW) by Brand

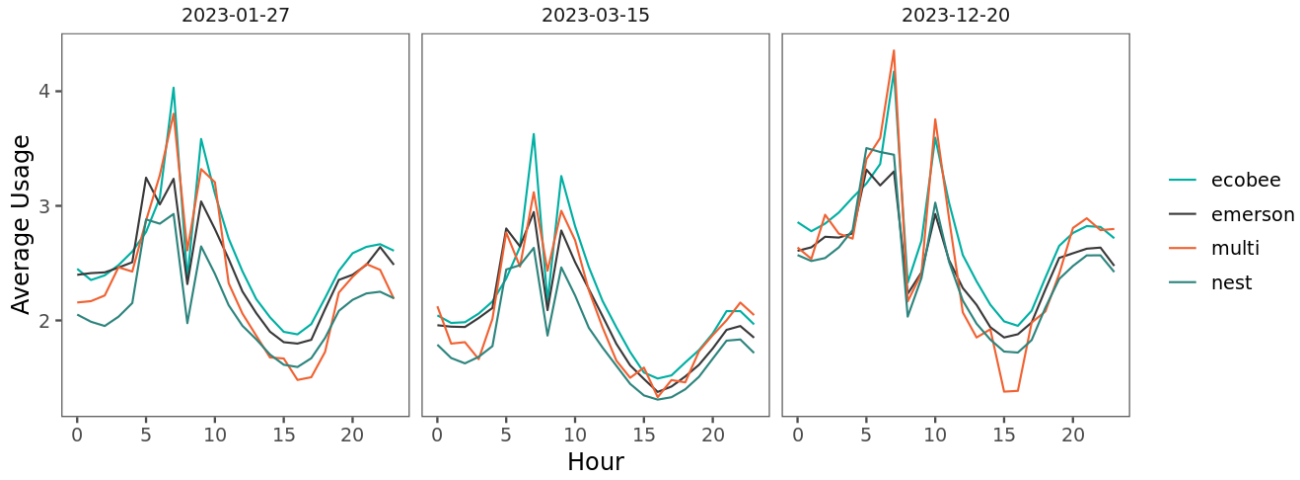


Figure 9. 2023 Summer Event Day Usage (kW) by Brand

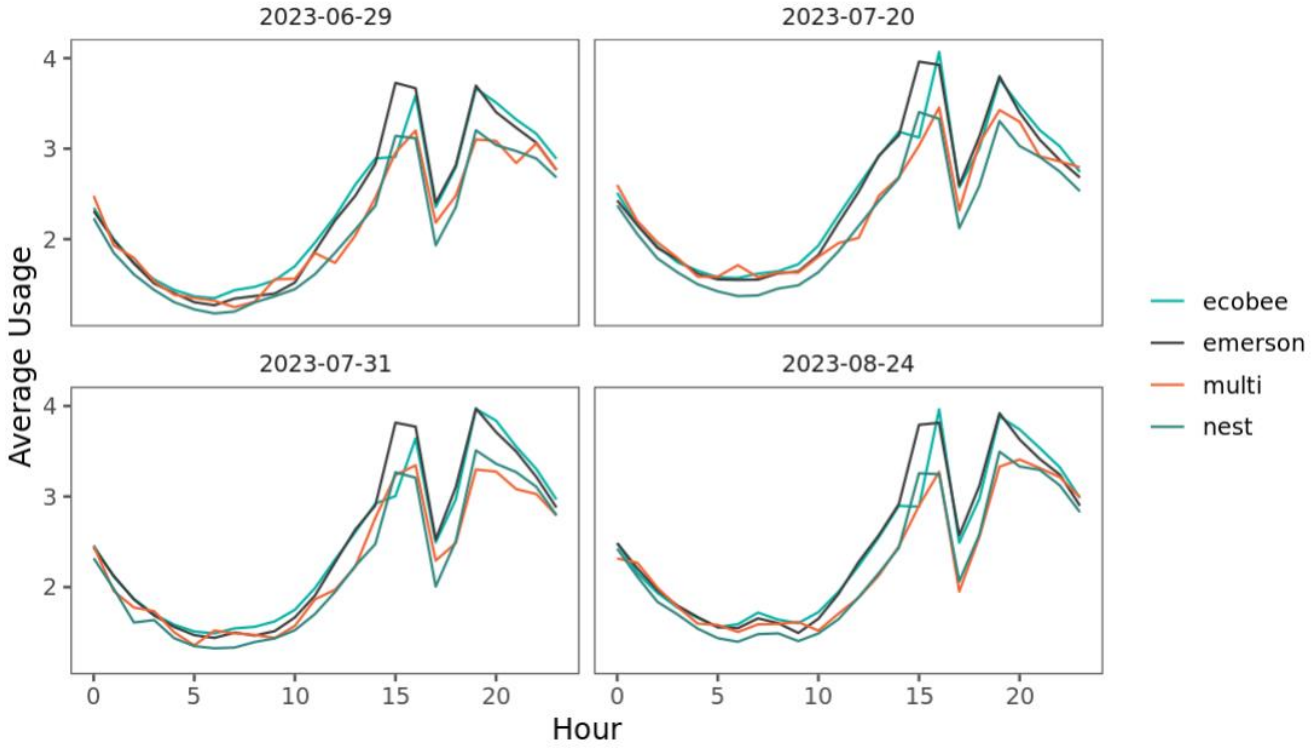


Table 30. 2023 Savings by Season, Brand, and Event Period

SEASON	BRAND	CUSTOMERS IN MODEL	PER CUSTOMER EVENT SAVINGS (kW)		
			PRE-CONDITIONING	SHED	SNAPBACK
Winter	Nest	12,692	-0.490	0.925	-0.059
	ecobee	5,224	-0.312	1.086	-0.194
	Emerson	1,377	-0.478	0.829	-0.068
Summer	Nest	12,319	-0.341	0.901	-0.154
	ecobee	5,116	-0.176	0.819	-0.190
	Emerson	1,197	-0.332	0.825	-0.166

Number of Devices

The number of devices per customer impacted savings differences during the shed event periods in winter and summer. In winter, shed savings were almost 0.5 kW higher for customers with two or three devices. In summer, shed savings for customers with two or three devices were almost double the savings of customers with only one device. The number of devices per customer is usually correlated with home HVAC systems. In other words, larger homes usually have more devices. This correlates with higher increased usage in the pre-conditioning periods for customers with more than one device, but the devices can reach the same minimum usage during the event shed period as customers with only one device. It is possible that manufacturers' software has gotten better at handling DR with multiple devices for the same customer. Similarly, the figures below indicate that participating customers do not see the same increase in savings when going from two to three enrolled devices as when going from one to two enrolled devices.

Figure 10 and Figure 11 show the customer average hourly usage on event days by the number of devices per customer. Table 31 shows the per customer savings by season, number of devices per customer, and event period.

Figure 10. 2023 Winter Event Day Usage (kW) by Number of Devices per Customer

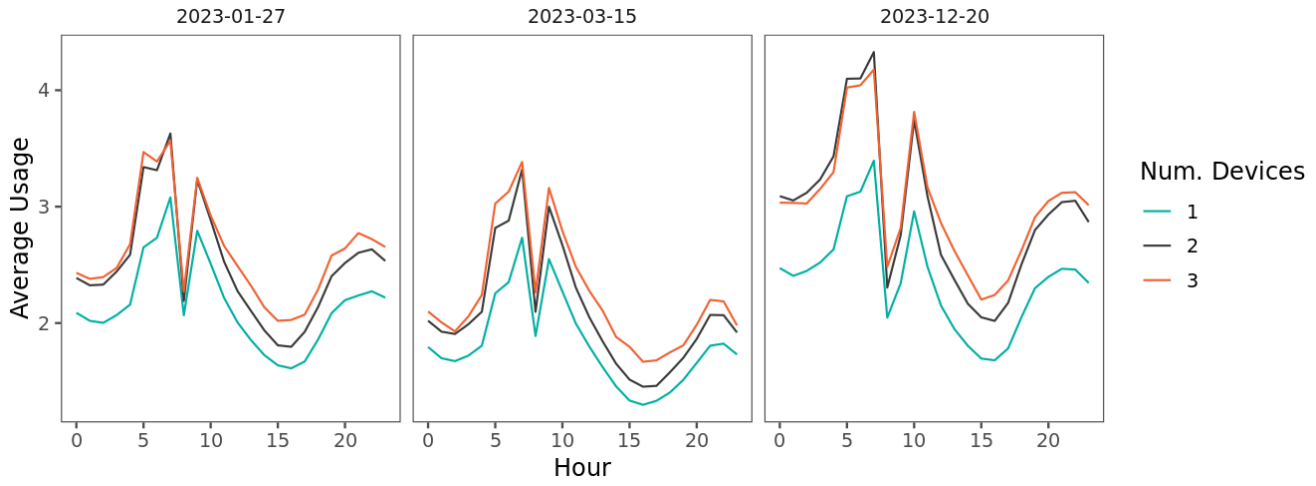


Figure 11. 2023 Summer Event Day Usage (kW) by Number of Devices per Customer

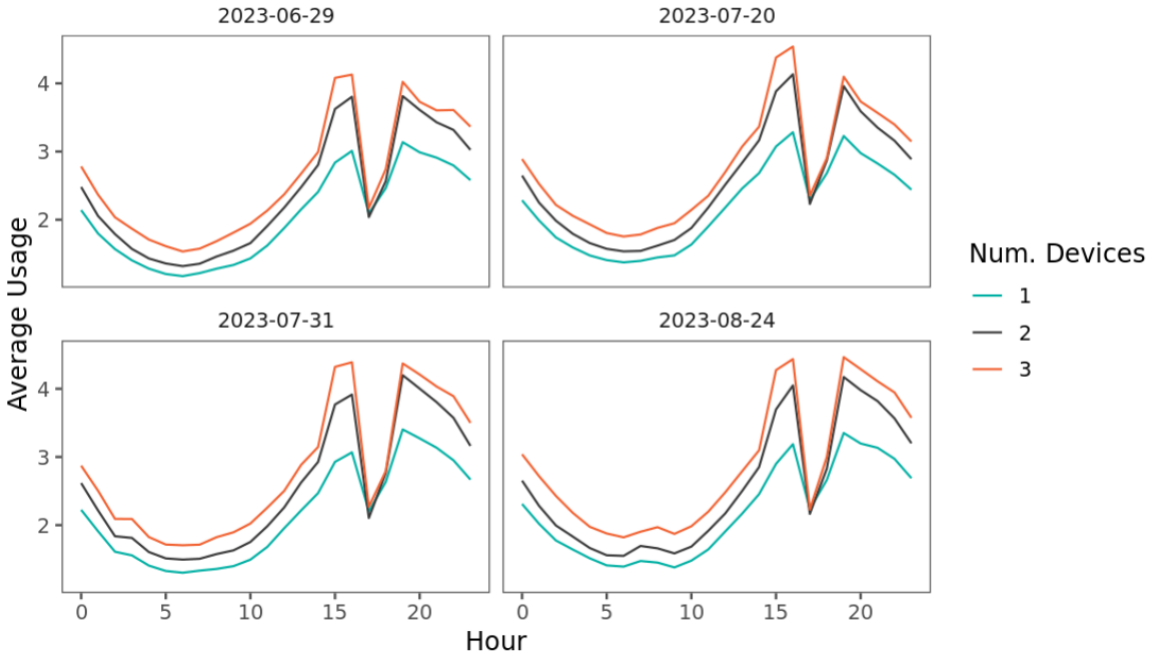


Table 31. 2023 Savings by Season, Number of Devices per Customer, and Event Period

SEASON	NUMBER OF DEVICES PER CUSTOMER	CUSTOMERS IN MODEL	PER CUSTOMER EVENT SAVINGS (kW)		
			PRE-CONDITIONING	SHED	SNAPBACK
Winter	1	13,191	-0.396	0.808	-0.102
	2-3	6,181	-0.532	1.300	-0.091
Summer	1	12,800	-0.211	0.663	-0.144
	2-3	5,909	-0.474	1.313	-0.211

Critical Events

The summer critical event was notably not the summer event with the highest savings impact per customer. The opt-out rate was also similar for critical events compared to other events.

Number of Customers

While not impactful of customer-level savings, not having a control group increased overall delivered savings. When the control group was still part of the program design, the savings estimates were calculated using the enrolled number of devices despite about 20% of the devices not receiving a signal to participate in an event. Without the control group, the program could deliver 20% higher actual demand savings in 2023.

Environmental Factors

The evaluation team performed a high-level analysis of humidity on summer event days. The evaluation team did not look at data for humidity on baseline days, or air quality for the event days or baseline days. The event on July 20, 2023, had the highest afternoon humidity of the summer events and the lowest demand savings (15,698 kW) of the summer events. Additionally in the surveys, respondents noted humidity being influential in their comfort level during events. Humidity, air quality, and/or other environmental factors may drive customer-level savings via opting out partway through an event, ability to participate in the program, and satisfaction with the program.

Process Evaluation Findings

Key findings include:

- Overall satisfaction with the Temp✓ program and Georgia Power overall decreased from last cycle. The incentive amount could be a driving factor here, as it was one of the lowest rated pieces of the program.
- Respondents were more satisfied with the program if they were motivated to sign up for the program because they want to help Georgia Power during periods of high demand or because they thought participating was the environmentally responsible thing to do.
- A remarkably high percentage of respondents reported that they had no issues with their thermostats, however two respondents did report that they had no power during the event.
- The new annual $15 incentive is not influential for sustained enrollment for most respondents. Very few respondents were aware of the incentive, and, of those that knew, just one-third reported that it was a very important influence to stay enrolled in the program.
- Customers were highly aware they were enrolled in the Temp✓ program. Few respondents across any thermostat brand reported that their manufacturer automatically enrolled them in the Temp✓ program.
- Opt-out rates were similar throughout the summer, even during the critical event. Winter opt-out rates were less consistent.

Participant Feedback

To understand the customer experience, the evaluation team conducted online surveys following a summer event in August 2023 and a winter event in December 2023. The survey assessed motivations for enrolling in the program, event experience, and overall customer satisfaction. The evaluation team fielded the surveys within one day of each event to aid recall. To avoid overburdening enrolled customers, customers who completed the summer event survey did not receive an invitation to complete the winter event survey.

The following sections detail the results related to source of awareness, reasons for participation, experience during the DR events, satisfaction with the program, and program impacts on customers. We report on differences between the groups when they are statistically significant. Statistically significant differences reported in this section are significant at the 90% confidence level; we specify in all cases where there is a statistically significant difference.

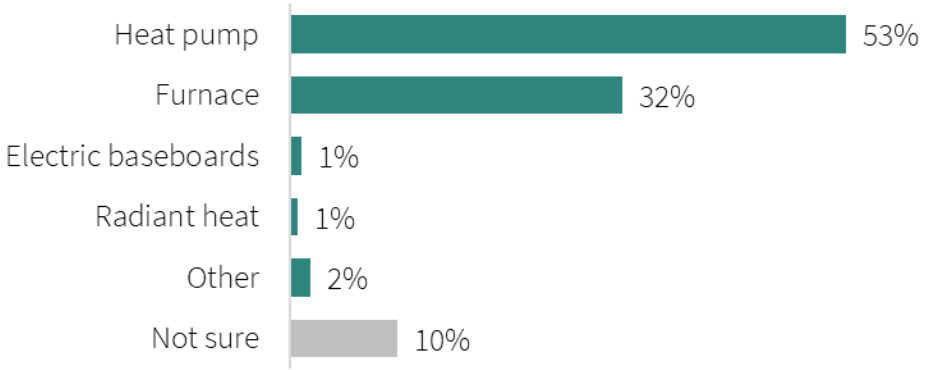
In addition, all survey results from the Temp✓ program survey reported in this chapter (aside from demographics) are weighted by thermostat brand to align with the distribution of thermostat brands in the population of Temp✓ enrolled customers.

Reported Heating and Cooling

In the Temp✓ program survey the evaluation team asked respondents to report their heating and cooling systems and fuel source to corroborate the administration of the program requirements. The program requires customers to have an all-electric heat pump (as noted on the program website) and central air conditioning (not noted on the program website). Enrolled customers are removed from enrollment lists throughout the year for having ineligible equipment. Enrolled customers also do not get called to participate in events if their equipment is in the wrong HVAC mode.

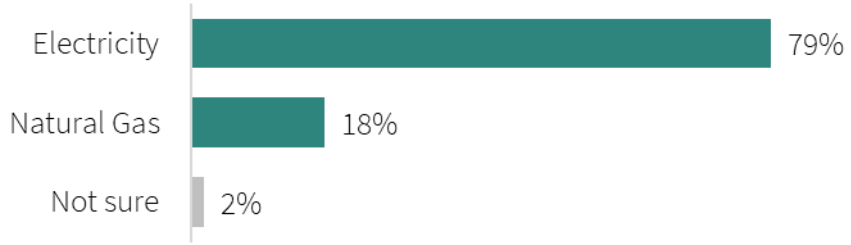
Across the summer and winter surveys, respondents reported mostly having heat pumps as their main heating system (53%), but almost one-third (32%) of respondents had furnaces. Natural gas was the reported heating fuel for 18% of respondents. Of the 94 respondents that reported having natural gas as their main heating fuel, 36% (n=34) were winter survey respondents. Most respondents (95%) reported having central air conditioning. These data points are presented in Figure 12, Figure 13, and Figure 14 below.

Figure 12: 2023 Respondent Main Heating System (n=513)



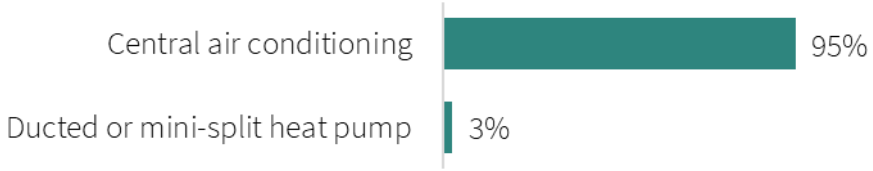
Source : Temp✓Participant Survey Question D10. Which of the following best describes the main heating system in your home?

Figure 13: 2023 Respondent Main Heating Fuel (n=512)



Source : Temp ✓ Participant Survey Question D11. What is the main fuel used to heat rooms or spaces in your home?

Figure 14: 2023 Respondent Main Cooling System (n=513)



Source: Temp ✓ Participant Survey Question D12 Which of the following best describes the main cooling system in your home?

Program Awareness and Marketing

In the Temp✓ program survey, we asked respondents if they were aware that they were participating in the Temp✓ program. We only allowed those that responded "Yes" to take the survey. In the summer survey, 53 respondents (16% of all respondents that attempted to take the survey) said either "no" or "not sure." However, respondents may have interpreted the question wording as if they remembered how they enrolled in the program, not that they were enrolled. After adjusting wording of this question for the winter survey, we had just 13 respondents (5% of all respondents that attempted to take the survey) respond "no" or "not sure." The original and edited wording is below in Table 32.

Table 32: 2023 Program Awareness Question A1 Wording Adjustment

SURVEY	QUESTION WORDING
Summer survey	Do you recall signing up to participate in this program?
Winter survey	Are you aware that you are participating in this program?

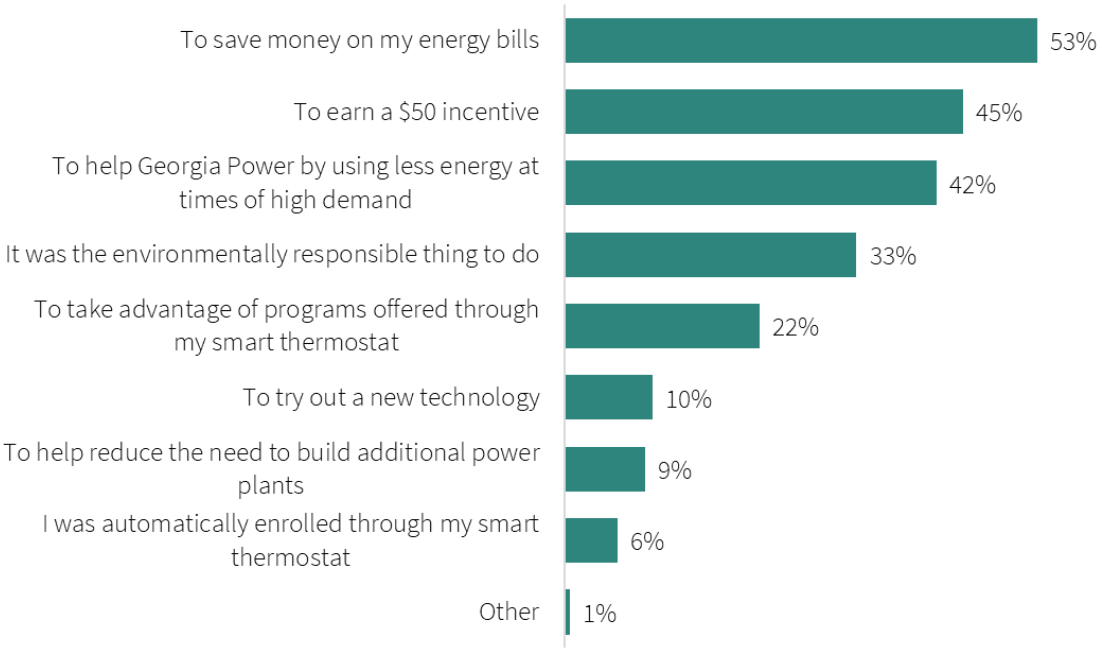
Seventy-one percent of respondents had heard about the program from an email from Georgia Power, 8% from the Georgia Power website, 5% from materials they received from their thermostat manufacturer, and 10% were not sure where they had first heard about the program. While many other programs reported the Georgia Power website as the most common source of awareness, these findings indicate that direct outreach from Georgia Power plays a crucial role in awareness for the Temp✓ program.

Respondents were almost entirely Bring-Your-Own-Device (BYOD) (93%). About one third (29%) of respondents reported purchasing their thermostat from the Online Marketplace, and 20% purchased their thermostat on Amazon. Seven percent of respondents (n=32) reported that they had purchased their thermostat as part of an HVAC installation. A small group (n=5) said they heard about the program "when they installed" the thermostat, which may or may not have been part of an HVAC installation. Although these are small numbers of respondents, they indicate that the HVAC installation touchpoint is another channel for program awareness that the program is not actively pursuing.

Participation Drivers

The most reported reasons for enrolling were to save money on energy bills (53%) and earn a $50 incentive (45%), while last cycle the most reported reason was the $50 incentive (57%) followed by saving money on energy bills (53%). As noted in prior evaluations, marketing materials do not suggest that customers will save money on their energy bills, yet this is a persisting belief among participants. The drop in the number of respondents that reported the $50 incentive was their motivation for enrolling in the program may suggest this incentive is less motivating for customers that have been enrolled longer. The third highest motivation was helping Georgia Power by using less energy in times of high demand (42%). All responses are summarized in Figure 15.

Figure 15: 2023 Respondent Motivations for Enrolling (n=514)*



**Results weighted by thermostat brand.*
Source: Temp✓Customer Survey. A8. Why did you enroll in the program?

Respondents primarily enrolled through Georgia Power reaching out to them (49%) or their thermostat manufacturer (32%). Less than 7% of respondents across all thermostat brands reported that their thermostat

manufacturer enrolled them automatically. Georgia Power eliminated Online Marketplace enrollment in 2022 due to program requirement and pre-enrollment misunderstandings that resulted in customer satisfaction issues. We asked respondents who enrolled in 2022 or 2023 (n=215) if they experienced any challenges when they signed up for the program. Most respondents (88%) reported no challenges with the enrollment process, and those that enrolled more recently (2022 and sooner) were significantly more likely to rate their satisfaction with the enrollment process a 5 out of 5 (p=0.01).

The evaluation team also asked about the new additional $15 annual incentive to remain an active participant in the program past the summer season, which Georgia Power implemented in 2023. Just 13% of respondents were aware of this additional incentive. Awareness did not vary significantly by thermostat brand. Of those respondents that were aware of the $15 incentive, 32% (n=21) said that it was very important to their decision to actively participate in the program. The evaluation team evaluated if there was a difference in awareness between summer and winter respondents because the $15 incentive was sent out in October 2023, after the end of the summer season. While there were significantly more winter respondents that were aware of this incentive (18% vs 9% summer respondents; p=0.001), overall awareness was still low even after most respondents had received the incentive (new enrollees excluded).

Demand Response Event Experience

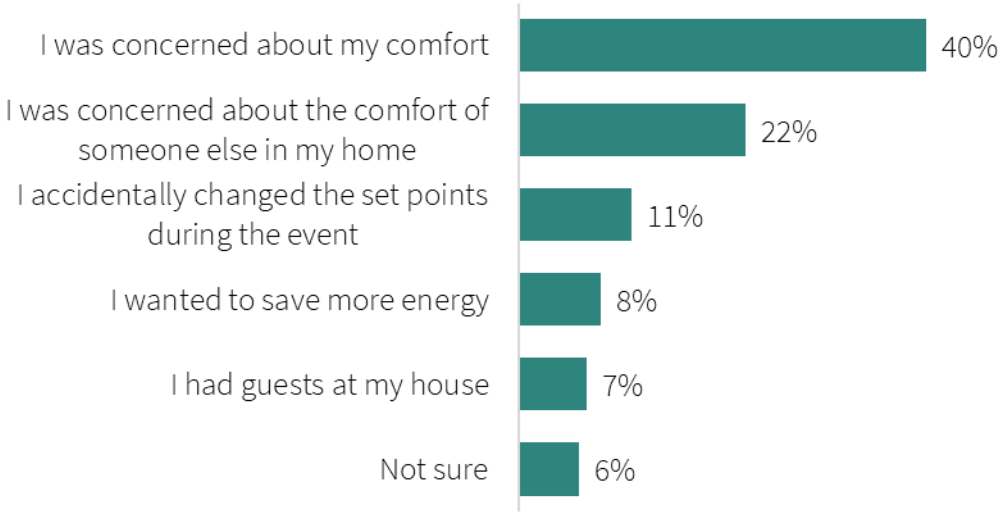
About half of respondents (46%) were home for the whole event, and about one third (32%) were home for part of the event. Almost all (97%) of these respondents said their thermostat was on and working properly. While we asked about issues respondents had with their thermostat, since most respondents reported having working thermostats, we cannot speak to the experiences of those that did not have working thermostats. Two people that said their thermostat was not on for the event reported because they had no power.

Opt-Outs

While few respondents reported choosing to opt out of the event (4%), more respondents reported taking actions that would have led to them opting out, such as raising or lowering the temperature on their thermostat (26%). This is like the previous evaluation and may indicate a need for further education on what opting out of an event means.

Like the previous evaluation, the most common reason for opting out of the event was respondent concern for their own comfort (40%). Other reasons for opting out included concern about the comfort of someone else in their home (22%) and accidentally changing the setpoints on their thermostat (11%). Figure 16 below summarizes the top five reasons for opting out.

Figure 16: 2023 Respondent Reasons for Opting Out (n=130)*



**Results weighted by thermostat brand.*
Source: Temp ✔ customer survey. B14. Why did you change the temperature or opt out of the event?

When we compared implementer-provided summer and winter opt-out rates, we found that opt-outs rates were similar for all summer events, including the critical event (16%), which provided less notice and time to pre-cool before the event. Summer event opt-outs were higher overall than winter event opt-outs in early 2023, which stayed around 10%, however the event in December 2023 after which we fielded this survey had the highest overall opt out rate (23%). Table 33 below shows the opt-out rate for each of the seven events. The weather during this event was 30 degrees Fahrenheit, about seven degrees below the historical average, which was a similar difference to the last summer event, 95 degrees Fahrenheit, or about seven degrees higher than the historical average.

Table 33. 2023 Opt-Out Rates by Event

EVENT DATE	SEASON	CRITICAL EVENT	OPT-OUT RATE
1/27/2023	WINTER	NO	10%
3/15/2023	WINTER	NO	10%
6/29/2023	SUMMER	NO	16%
7/20/2023	SUMMER	NO	17%
7/31/2023	SUMMER	YES	16%
8/24/2023	SUMMER	NO	17%
12/20/2023	WINTER	NO	23%
AVERAGE	**-**	**-**	**16%**

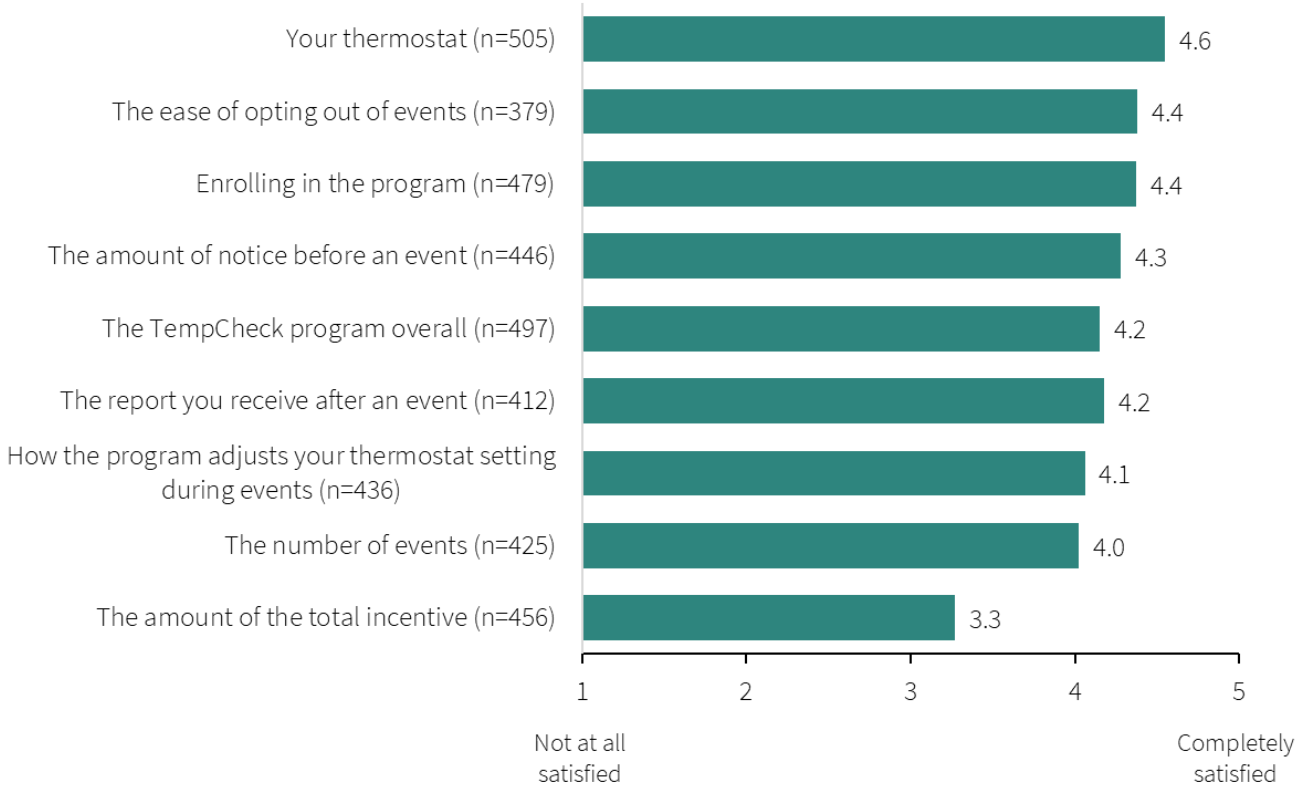
Survey respondents with Nest thermostats were more likely to opt out of an event compared to those with Emerson thermostats (p=.01). In addition, those that did not opt out were more likely to report that they were

moderately or completely satisfied with the program (p=0.001). Satisfaction is discussed further in the following section.

Satisfaction with the Program and Georgia Power

While satisfaction was still relatively high with the Temp✓ program, with 78% of respondents reporting being completely or moderately satisfied, this was a significant drop from last evaluation where 85% of respondents reported the same (p<0.01). Respondents were most satisfied with their thermostat, the ease of opting out of events, and enrolling in the program. Respondents were least satisfied with the amount of the total incentive and the number of events. However, there was no differentiation for respondents to rate the most recent $15 annual incentive separately from the initial enrollment incentive of $50. In addition, the Georgia Power Temp✓ website highlights the maximum of ten events per season, and at the time of the summer survey there had been four summer events, and by the time the winter survey was fielded there had been just one event in the 2023 – 2024 winter season. Average satisfaction scores are summarized below in Figure 17.

Figure 17: 2023 Satisfaction with Various Program Elements*



**Results weighted by thermostat brand.*

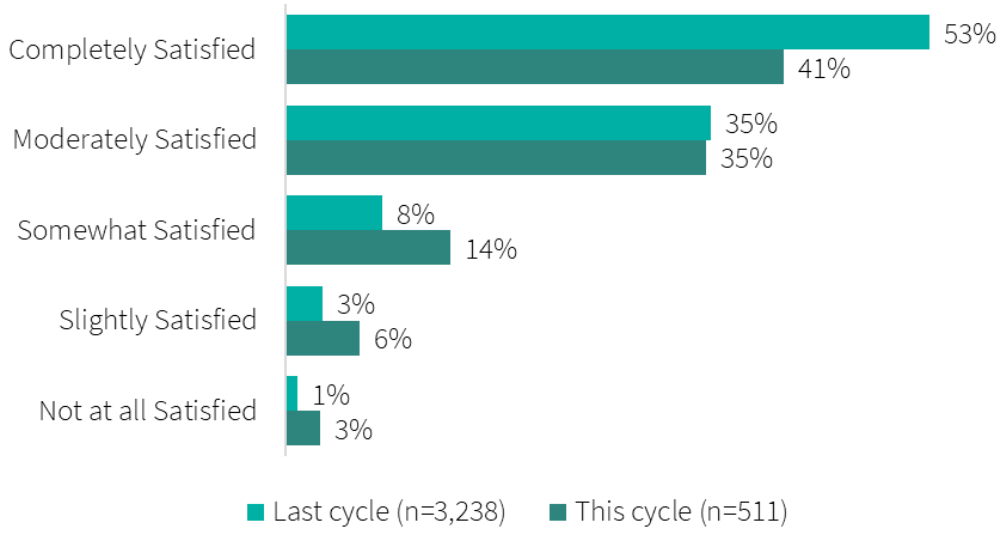
Source: Temp✓ customer survey. C1. Please rate your satisfaction with each of the following aspects of the Temp✓ Program.

The most common reasons for lower satisfaction with the Temp✓ Program overall included the fact that the incentive is not high enough (17%), the respondent's home gets too uncomfortable (12%), and the belief that participating in the program should save them money or lower their bill (11%).

Those that were more satisfied with the program overall were more likely to have enrolled because it was the environmentally responsible thing to do ($p<0.001$) or to help Georgia Power by using less energy at times of high demand ($p<0.001$). Highlighting these factors in marketing materials may lead to increased satisfaction in the future if customers enroll for these reasons.

In addition, satisfaction with Georgia Power overall fell significantly from 88% completely or moderately satisfied with Georgia Power to 76% completely or moderately satisfied (Figure 18, $p<0.001$). This did not vary by enrollment year or brand. Winter respondents were less likely to be moderately or completely satisfied than summer respondents ($p=0.03$), which could indicate that winter events are more disruptive or uncomfortable to customers than summer events. However, summer respondents did opt out at higher rates than winter respondents (29% and 23%, respectively).

Figure 18: 2023 Satisfaction with Georgia Power*



**Results from this cycle's survey weighted by thermostat brand.*
Source: Temp ✓customer survey. C3. Taking into consideration all aspects of your utility service experience, please rate your current satisfaction with Georgia Power overall.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion 1: Overall verified impact is consistent with the implementer's reported impact and prior evaluation reports and meets the annual goal of 18,500 kW.

The program's capacity was 100% of the annual goal in 2023. Georgia Power's reported annual savings included in the Q42023 PSC Report, which were additive of the seven demand response events of 2023 for consistency with reported savings for other Georgia Power programs, is inconsistent with the evaluation and implementer methods for Temp✓.

RECOMMENDATIONS:

- **Georgia Power should report demand savings as an average of event impacts.** Georgia Power should report an average to make the metric of demand impact consistent across the planning goal, reported savings, and verified savings.

Conclusion 2: The Temp✓ program achieved 87% of the implementer's reported savings per device.

The implementer reported 0.747 kW/device overall and the evaluation team's verified savings were 0.651 kW/device.

RECOMMENDATIONS:

- **Georgia Power should plan to achieve 87% of the savings per device provided in the implementer's post-event summaries.** Georgia Power could also consider evaluating results more frequently with a smaller sample size of participants. If feasible, Georgia Power could research the number of participants that would be statistically significant and representative of the participant population to run results more iteratively and understand program trends throughout the year.
- **Target high potential savings customers to fill the new enrollment capacity.** Georgia Power can consider conducting a propensity analysis to target enrolling customers with high potential savings. The study could use already available AMI data to identify high savers in summer and winter, understand high electric use that could benefit from demand response, and what types of participants did *not* have summer or winter savings.
- **Target landlords to fill the new enrollment capacity.** Georgia Power can consider conducting research to find out how many renters and homeowners are enrolled in the program, and if aligned with program goals, further research to understand willingness to participate among landlords to target more renters who could participate in the program.

Conclusion 3: Increased program enrollment and changing the program design from having a control group increased the delivered demand reduction in 2023.

With about 20,000 customers in the program throughout 2023, the program doubled its annual impact since the last evaluation cycle. When the control group was still part of the program design, the savings estimates were calculated using the enrolled number of devices despite about 20% of the devices not receiving a signal to participate in an event. Without the control group, the program could realize the higher demand savings

in 2023. Given the approval of the filing to double the enrollment capacity of the program, savings are expected to increase more.

RECOMMENDATIONS:

- **Georgia Power should plan to achieve an additional 0.651 kW/device for all devices added to the program with the increased enrollment capacity.**
- **Research potential collaboration opportunities to enroll participants when they get new HVAC systems.** In coordination with increasing enrollment, Georgia Power can research and consider partnerships with installers of HVAC systems to promote the program. Georgia Power can interview HVAC installers to understand effective incentive levels for them to channel to the program.
- **Consider removing the all-electric heat pump requirement from the website in tandem with other strategies for maintaining customer enrollment long term.** Removing customers from the program decreases event savings. Customers with electric furnaces are still contributing savings to the program. Alternatively, Georgia Power could consider a tiered or higher incentive for heat pumps if they participate in summer and winter or provide half the amount if customers are participating in summer only.

Conclusion 4: The results for the pre-conditioning period in 2023 showed higher impacts (negative savings) in winter than in summer. The results for the snapback period in 2023 showed higher impacts in summer than winter.

Winter peak demand often occurs during prolonged periods of higher demand. Because usage can peak over several days, pre-conditioning impacts on usage during a demand response event could also occur during an early morning peak window. Snapbacks, on the other hand, which are hours in the middle of the day, have a more diminished effect on impact.

RECOMMENDATIONS:

- **Georgia Power could consider testing different pre-conditioning strategies and event lengths during winter.** Georgia Power could try to hold events with longer shed periods for winter events to flatten winter peaks and evaluate the pre-conditioning, shed, and snapback impacts of these events compared to historical event impacts.

Conclusion 5: Participating customers with more than one enrolled device had almost double the demand savings compared to participating customers with only one enrolled device.

In winter, shed savings were almost 0.5 kW higher for customers with two or three devices. In summer, shed savings for customers with two or three devices were almost double the savings of customers with only one device. The number of devices per customer is usually correlated with home HVAC systems. In other words, larger homes usually have more devices. This correlates with higher increased usage in the pre-conditioning periods for customers with more than one device, but the devices can reach the same minimum usage during the event shed period as customers with only one device.

The number of devices has diminishing returns, though, as the change in savings from one to two devices is more apparent than the change in savings from two to three devices.

RECOMMENDATIONS:

- **If revisiting eligibility requirements for the program, consider how many devices a single customer can enroll.** Georgia Power can consider setting an eligibility requirement of up to two thermostats to maximize savings, if practicable in program design.

Conclusion 6: The summer critical event had the second highest impact of the four summer events of 2023.

The first ever critical event for the program was not the highest savings event of the summer.

RECOMMENDATIONS:

- **Conduct a marginal emissions study to understand other benefits of critical events.** If aligned with Georgia Power's program, regulatory, or marketing goals, Georgia Power can consider conducting a study to understand the emissions benefits of calling events on critical event days. Using available data, the research could evaluate a carbon benefit from reducing peak emissions in summer and winter, which may be higher on critical event days. A study on emissions benefits may have value beyond the critical events, such as for marketing materials for the program, or anticipating any future reporting requirements on emissions.
- **Conduct an air quality and humidity study to understand other environmental factors to savings on high demand days.** Georgia Power can consider conducting a study to understand what impacts savings besides temperature when calling demand response events. The research could encompass including humidity in addition to temperature in the selection of baseline days or in regression models for evaluating savings.

Conclusion 7: Overall satisfaction with Georgia Power and the Temp✓ program overall decreased from last cycle.

While 78% of respondents reported being completely or moderately satisfied, this was a significant drop from last evaluation where 85% of respondents reported the same. The incentive amount could be a driving factor, as it was one of the lowest rated pieces of the program. Customers were also largely unaware of the annual incentive, even after delivery.

RECOMMENDATIONS:

- **Consider the timing, notice, delivery, and reminders of the annual incentive amount.** Georgia Power can consider different mechanisms for the annual incentive amount that would drive awareness and satisfaction. Other DR models give bill credits at the beginning or end of season as well as notice of when a credit will be included on the bill. This could additionally help address the ongoing issue of customers expecting bill savings.

Conclusion 8: Respondents were more satisfied with the program if they were motivated to sign up for the program because they want to help Georgia Power during periods of high demand.

Respondents were also more satisfied with the program if they thought participating was the environmentally responsible thing to do.

RECOMMENDATIONS:

- **Georgia Power should continue to highlight the sentiment of helping and environmental impacts of participating in marketing materials.** Focusing on these aspects as opposed to the monetary incentives could influence customers to participate who will be more satisfied with the program's outcomes.

Conclusion 9: The new annual $15 incentive is not influential for sustained enrollment for most respondents.

Very few respondents were aware of the incentive, and of those that knew, just one third reported that it was a very important influence to staying enrolled in the program.

RECOMMENDATIONS:

- **Continue to monitor program retention through the upcoming event seasons.** With the approved filing for increased enrollment and more data on customer enrollment, Georgia Power can consider taking a data-driven approach to monitoring changes in rates of enrollment over time and changes in the duration of customers staying enrolled over time.

Conclusion 10: A very high percentage of respondents reported that they had no issues with their thermostats.

However, two respondents did report that they had no power during the event.

Conclusion 11: Customers were highly aware they were enrolled in the Temp✓ program.

Few respondents across any thermostat brand reported that their manufacturer automatically enrolled them.

Conclusion 12: Opt-outs were similar rates throughout the summer, even during the critical event.

Of devices that were eligible to start an event, 84% completed participating in the event on average throughout the winter and summer seasons. During the summer critical event, 84% of devices that started the event completed participating. However, winter opt-out rates were less consistent than summer opt-out rates.

3. RESIDENTIAL SPECIALTY LIGHTING PROGRAM

The Residential Specialty Lighting Program, implemented by CLEAResult in 2023, promotes the adoption of efficient light-emitting diode (LED) technologies in Georgia Power residential customer homes. The program operates through three channels of distribution: retailers, food bank distributions, and the Online Marketplace. For the 2023 – 2025 cycle, the program focused on reaching income-qualified (IQ) customers through food banks and retailers that traditionally serve rural, IQ, or other under-represented customers. The evaluation confirmed the distribution of bulbs shifted from the last cycle to increase distribution to smaller, local, community-based stores such as Dollar Tree.

The Residential Specialty Lighting Program achieved 3,608 MWh verified net savings and 389 kW summer peak demand savings in 2023 (Table 34). Verified energy savings account for the impacts of the Energy Independence and Security Act (EISA) which impacted most bulbs incentivized or distributed through the program after July 1, 2023 (specifically, those bulbs from 310 up to 3,300 lumens). These federal lighting standards effectively ended the sale of inefficient general standard lamps in the United States, thus impacting savings for most bulbs distributed or incentivized after July 2023. The only bulbs that were exempt from these new standards were candelabra bulbs. Verified net savings achieved 12% of the program's energy savings goal and 17% of its summer peak demand savings goal.

Table 34. 2023 Residential Specialty Lighting Program Savings

	NET SAVINGS GOALS	REPORTED NET SAVINGS	VERIFIED GROSS SAVINGS	NTGR	VERIFIED NET SAVINGS	VERIFIED NET SAVINGS AS A % OF GOAL
Electric Energy Savings (MWh)	30,705	45,949	14,204	25%	3,608	12%
Peak Demand Reduction (kW)	2,262	12,413	1,929	20%	389	17%

The impact of EISA and the shift to IQ channels indicates a need for overall adjustment of the program, including removing screw-based LED lighting from the portfolio. As noted, Georgia Power adapted the program by focusing on IQ customers by including food bank distributions. However, the evaluation approach, and data collected by Georgia Power, did not allow the team to verify the installation of those distributed bulbs and what they replaced. In the future, if Georgia Power wants to continue distributing lighting to IQ customers, including through food banks, it will be important to collect data to allow Georgia Power or the evaluation team to understand installations, bulbs replaced, and experiences with the program. This will also help improve confidence in RRs.

Chapter Three

Residential Specialty Lighting Program

Program Savings Overview

The Residential Specialty Lighting Program achieved 12% of its energy savings goal and 17% of its demand goal.

Though the program discounted or distributed over 800,000 measures in 2023, the evaluation only credited savings for most lighting products distributed or sold from January through July 2023 due to the impact of the Energy Independence and Security Act (EISA). Select candelabra bulbs were an exception due to EISA rules.

Conclusions & Recommendations

CONCLUSION 1

The residential lighting market has been largely transformed, with LEDs serving as the only remaining option for most customers for most applicable uses.

CONCLUSION 2

Georgia Power targeted IQ customers through food banks and by partnering with retailers that, geographically, are more likely to serve IQ customers. This targeting strategy appeared to be effective, as there was a marked change in the distribution of bulbs through different retailers compared with the prior cycle.

CONCLUSION 3

The program achieved 12% of its energy savings goal and 17% of its demand goal. This is driven primarily by reduced savings after the EISA backstop went into effect as well as differences in NTG assumptions between reported and verified savings.

RECOMMENDATION

Remove screw-based LED lighting from the residential portfolio. With both gross and net savings falling to effectively zero, there no longer remains a cost-effective program design with screw-based LED lighting as a primary measure.

CONCLUSION 4

Verified savings for lamps with daylight sensors are significantly lower than reported as the savings assumptions referenced whole-room C&I versus single-lamp applications, most notably affecting food bank component savings.

RECOMMENDATION

Revise deemed savings for daylight sensors to reflect the evaluation findings if they continue to be offered.

CONCLUSION 5

While Online Marketplace customers tend to install standard lightbulbs at a high rate, we are unaware of how frequently customers install lightbulbs received through food bank distributions.

CONCLUSION 6

The Online Marketplace did not effectively reach IQ customers.

RECOMMENDATION

Develop additional strategies for better reaching IQ customers through the Online Marketplace.

Program Overview

Georgia Power's Residential Specialty Lighting Program (implemented by CLEAResult) promotes the accelerated adoption of efficient LED technologies in Georgia Power residential customer homes. The program relies on a network of participating retailers, food bank distributions, and the Online Marketplace. The goals of the program are to increase customer awareness of the benefits of energy-efficient lighting products and increase the local market penetration and saturation of those lighting products to help customers save energy and money.

The Residential Specialty Lighting Program incentivizes several types of bulbs, used in different fixtures and applications. For the purposes of this report, we report differences across bulb types where notable, and define them as such:

- **Standard Lamps:** This refers to standard, pear-shaped lightbulbs used in general lighting applications (such as a table lamp) and account for around 70% of the installed lighting in the residential sector. This report will refer to them as "standard" lamps, but they are often also referred to as A-lamps, A-shape or A-line bulbs, and general service lamps (GSLs).
- **Specialty Lamps:** This refers to more specialized bulb shapes (such as globes and candelabras) which are used in specific fixtures or applications (such as bathroom vanity lighting, or dining room candelabras). These lamps account for approximately 15% of lighting in the residential sector.
- **Reflector Lamps:** This refers to common cone-shaped lightbulbs most typically used in track lighting and "recessed can" light fixtures. The bulb is lined with reflective coating to direct the light. These lamps account for approximately 15% of lighting in the residential sector.
- **Nightlights:** This refers to a small light fixture attached directly to an electrical outlet and equipped with a photocell to turn on and off automatically providing dim light during the night.

For the 2023 – 2025 cycle Georgia Power shifted the emphasis of the program to IQ customers. Georgia Power set a goal of having 86% of savings achieved through IQ channels in 2023, which increases to 90% by 2025. To achieve this, Georgia Power set additional goals including increasing the availability of energy-efficient lighting products in retail stores that traditionally serve rural, IQ or other under-represented customers as well as distributing light bulbs through food banks, distribution events, and other strategic community and retail partners like thrift and dollar stores.

Lighting savings and opportunities in the 2023 – 2025 cycle were significantly affected by the reinstatement and expansion of federal lighting standards. In late 2021, the federal government proposed reinstating the previously suspended EISA lighting backstop for general service lightbulbs. In addition to reinstating the backstop the federal government expanded the definition of general service lamps ("GSL") to include most bulbs with a standard screw base, including many candelabra, globe, and reflector bulbs. This backstop required that all EISA-eligible lighting meet a 45 lumens/watt standard, effectively removing inefficient incandescent and halogen bulbs from the market.

EISA rulings were put into effect in July 2022 and included staggered manufacturing/import and retail sale enforcement dates, after which the federal government can impose both warnings and penalties. For manufacturing and import, warnings and limited penalties were given from July through December of 2022, with full enforcement on January 1, 2023. Similarly, warnings for retail sales of non-compliant bulbs began in September of 2022, and continued through July of 2023.

As of August 1, 2023, sales of inefficient GSLs effectively ended in the United States. These changes due to EISA have been incorporated into the impact evaluation, affecting gross savings, and are considered in evaluation findings and recommendations.

Program Participation and Achievements

The Residential Specialty Lighting Program discounted or distributed over 800,000 lightbulbs in 2023. Most of these measures were general screw-based lamps sold through upstream channels or distributed through food bank partners. A smaller portion was purchased on the Online Marketplace. Georgia Power also offered lamps with integrated dusk to dawn daylight sensors and LED nightlights, which were new for the 2023 – 2025 program cycle.

The Residential Specialty Lighting Program reported 150% of the electric energy savings (MWh) goal, and 548% of the peak demand reduction (kW) goal (Table 35) in 2023.

Table 35. 2023 Residential Specialty Lighting Participation and Savings

	NUMBER OF MEASURES	NET SAVINGS GOALS	REPORTED NET SAVINGS	REPORTED SAVINGS AS A % OF GOAL
MWh	843,809	30,705	45,949	150%
kW	843,809	2,262	12,413	548%

As noted above, the program shifted its focus to make a concerted effort to serve IQ customers, including through food bank distributions. Review of the proportion of reported savings by components shows the program effectively did so, increasing the proportion of bulbs distributed through food bank partners considerably from 2020 to 2023 (16% of reported savings to 47%, respectively). In Table 36 and in the balance of this chapter, savings are pulled from program tracking data and referred to as tracked savings.

Table 36. 2020 and 2023 Comparison of Residential Specialty Lighting Program Savings by Component

PROGRAM COMPONENT	2023		2020	
	TRACKED SAVINGS (MWh)	% OF TRACKED SAVINGS	TRACKED SAVINGS (MWh)	% OF TRACKED SAVINGS
Retail Lighting	24,260	53%	26,579	77%
Online Marketplace	277	<1%	2,415	7%
Food Banks	21,412	47%	5,572	16%
Total	**45,949**	**100%**	**34,566**	**100%**

The program also intended to reach more IQ customers through increased distribution to smaller, local, community-based stores such as Dollar Tree. Table 37 shows the percent of bulbs sold within each store (regardless of type) in 2023 compared with 2020. As expected, the share of lamps sold through traditional big-box retailers dropped substantially, with only around six percent of lamps being sold through Walmart. Most lamps (92%) were either sold through retailers serving IQ customers, like Habitat Restore or Goodwill, or distributed through food bank partners. Further, program staff reported targeting Walmart stores within Georgia Power service territory that had a higher propensity to serve IQ customers.

Table 37. 2020 and 2023 Distribution of Program LEDs by Retailer and Lamp Type

RETAILER	2023 TOTAL	2023 SHARE	2020 SHARE
The Home Depot	0	0%	22%
Food Banks	185,943	22%	18%
Costco	0	0%	13%
Walmart	48,625	6%	11%
Habitat Restore	345,694	41%	10%
Online Marketplace	17,302	2%	7%
Target	0	0%	6%
Sam's Club	0	0%	4%
Ace Hardware	0	0%	4%
Dollar Tree	63,970	8%	3%
Lowe's	0	0%	2%
Independents	47,075	6%	1%
True Value	0	0%	1%
Dollar General	0	0%	0%
Goodwill	100,832	12%	0%
St. Vincent DePaul	34,368	4%	0%
Total	**843,809**	**100%**	**100%**

Methodology

Research Questions and Activity Overview

The evaluation sought to address both process and impact evaluation questions.

Process evaluation questions focused on customer experience with the Online Marketplace, lessons learned from the IQ channel that could be applied to other programs, how program changes affected program delivery, and how the program adjusts to the EISA backstop effective mid-2023.

Impact evaluation questions focused on verifying savings against planned, the effects of the EISA backstop on savings and future offerings, and program cost-effectiveness.

Table 38 summarizes the activities completed to address these research questions followed by a detailed description of the approach to complete the impact and process evaluations.

Table 38: 2023 Evaluation Activities Completed

EVALUATION ACTIVITY	COMPLETED
Program staff and implementer interviews	2
Tracking system analysis	✓
Participant surveys	90[1]
Residential general population survey	250 across multiple res. programs
Calculate gross savings (unit energy savings)	✓

[1]The evaluation team received a total of 350 Online Marketplace survey respondents, 90 of whom purchased lighting products.

Impact Evaluation Findings

This section presents findings of the impact evaluation. Key findings include:

- The residential lighting market has been largely transformed, with LEDs serving as the only remaining option for most customers for most applicable uses.
- Georgia Power targeted IQ customers through food banks and by partnering with retailers that, geographically, are more likely to serve IQ customers.
- The verified net savings are 8% and 3% of tracked savings for kWh and kW and 12% and 17% of kWh and kW goals, respectively, driven in large part by NTG assumptions between *tracked* and *verified net* savings calculations.
- The verified savings for lamps with daylight sensors are significantly lower than tracked as the savings assumptions referenced whole-room C&I versus single-lamp applications, most notably affecting food bank component savings.

Verified Gross and Net Savings

Table 39 summarizes energy and summer peak demand savings delivered by the Residential Specialty Lighting Program. Tracked savings, which we calculated from the tracking data and verified in Q42023 PSC Report, includes NTG assumptions of 100% for IQ and 43% for non-IQ measures. All measures discounted or distributed through the retail and food bank channels were delivered to IQ participants.

Verified net savings integrates the results from the engineering analysis as well as the recommended NTG values described above. Integrating the revised NTG values and findings from the impact analysis, the verified net savings and demand reduction is 8% and 3% of tracked values, respectively.

Table 39. 2023 Residential Specialty Lighting Program Savings

METRIC	TIME PERIOD	TRACKED SAVINGS	VERIFIED GROSS SAVINGS	VERIFIED NET SAVINGS	% OF TRACKED NET SAVINGS VERIFIED [a]
Electric Energy Savings (MWh)	2023	45,949	14,204	3,608	8%
Summer Peak Demand Reduction (kW)	2023	12,413	1,929	389	3%

[a] *Verified net savings accounts for adjustments from the engineering analysis as well as NTG assumptions*

Table 40 shows the distribution of savings by program component (retail, Online Marketplace, and food bank distributions). Food banks resulted in higher verified net energy savings due to the higher NTG applied for food bank distributions.

Table 40. 2023 Residential Specialty Lighting Program Savings by Component

PROGRAM COMPONENT	TRACKED		VERIFIED GROSS		VERIFIED NET	
	ENERGY SAVINGS (MWh)	SUMMER PEAK DEMAND SAVINGS (kW)	ENERGY SAVINGS (MWh)	SUMMER PEAK DEMAND SAVINGS (kW)	ENERGY SAVINGS (MWh)	SUMMER PEAK DEMAND SAVINGS (kW)
Retail Lighting	24,260	4,397	10,684	1,641	1,496	230
Online Marketplace	277	39	345	55	48	8
Food Banks	21,412	7,977	3,175	233	2,064	152
Total	**45,949**	**12,413**	**14,204**	**1,929**	**3,608**	**389[a]**

[a] Note totals may not add up due to rounding

Savings Adjustments

The program provided incentives for lamps for most of 2023, although verified savings credit was only attributed through the EISA backstop period from January through July 2023. Table 41 and Table 42 compare the tracked and verified net savings for energy and summer peak demand respectively.[14]

Table 41. 2023 Residential Specialty Lighting Program Tracked & Verified Net Electric Energy Savings

COMPONENT	TRACKED ELECTRIC ENERGY SAVINGS (MWh)	VERIFIED NET ELECTRIC ENERGY SAVINGS (MWh)
Retail Lighting	24,260	1,496
Online Marketplace	277	48
Food Banks	21,412	2,064
Total Savings	45,949	3,608
% of Tracked Electric Energy Savings Verified		8%

Table 42. 2023 Residential Specialty Lighting Program Tracked & Verified Net Peak Demand Reduction

COMPONENT	TRACKED PEAK DEMAND REDUCTION (kW)	VERIFIED NET PEAK DEMAND REDUCTION (kW)
Retail Lighting	4,397	230
Online Marketplace	39	8
Food Banks	7,977	152
Total Savings	12,413	389
% of Tracked Peak Demand Reduction Verified		3%

To determine verified net savings, the evaluation team used the UMP-recommended ENERGY STAR lumens binning approach to determine baseline wattage for each program LED and calculated savings specific to that bulb. From there, we applied a NTGR of 65% for measures distributed through food banks and 14% for all other measures.[15]

Variance in the percent of verified net savings result from differences between the tracked and verified net savings calculation methodologies and NTG assumptions. Tracked savings assume fixed per-kWh and kW values applied to every bulb in the tracking database and includes a 100% NTG assumption for IQ measures and measures new to the portfolio, and 43% for non-IQ measures.

Table 43 provides more detail on verified net savings by component and bulb category. Standard LEDs represent most bulbs in each channel and represent the greatest proportion of savings.

[14] The summer peak period is defined as 4-5pm during July weekdays.

[15] See Appendix 4A. Detailed Study Methodology for Specialty Lighting Program Evaluation for details on determining the NTGR.

Table 43. 2023 Tracked & Verified Net Electric Energy Savings by Program Channel and Bulb Category

COMPONENT	BULB QUANTITY	TRACKED ELECTRIC ENERGY SAVINGS (MWh)	VERIFIED NET ELECTRIC ENERGY SAVINGS (MWh)	% OF TRACKED NET SAVINGS VERIFIED
Retail Lighting Standard LED	506,455	19,379	1,128	6%
Retail Lighting Specialty LED	103,206	3,757	256	7%
Retail Lighting Reflector LED	30,903	1,125	112	10%
Marketplace Standard LED	12,310	197	35	18%
Marketplace Specialty LED	4,794	75	13	17%
Marketplace Reflector LED	26	0.9	0.2	20%
Marketplace Nightlight LED	172	3.3	0.5	14%
Food Banks Standard LED	185,943	21,412	2,064	10%
Food Banks Specialty LED	0	0	0	N/A
Food Banks Reflector LED	0	0	0	N/A

The most substantive adjustments to verify the gross savings are as follows:

- The tracking data referenced the wrong savings value for reflector LEDs. The tracked savings value matches specialty LEDs (36.4 kWh) from the prior evaluation instead of reflector LEDs (52.9 kWh) as reported in the prior evaluation report and included in Georgia Power's planning documents.
- Many standard LEDs are "Dusk to Dawn" capable lamps. These bulbs, new to the program this cycle, resulted in lower savings than claimed. The bulbs are single exterior lights. However, the savings assumption for controlled wattage was taken from the Commercial and Industrial Measures volume of the Illinois TRM (v10)[16] which essentially assumes a whole room of controlled lighting rather than a single lamp. The impact of this adjustment is most noticeable in the Food Banks channel where 30% of lamps are equipped with daylight sensors.

Additionally, Georgia Power claimed savings for bulbs discounted or distributed after the EISA backstop on July 1, 2023, per approved program guidelines. The evaluation results are intended to be used prospectively.

Table 44 shows the tracked to verified net electric energy savings for time periods pre-and post-EISA backstop. There remains a very small amount of verified savings after the backstop contributed by EISA exempt bulbs, reflected in line items dated July through December 2023.

[16] 2022 IL-TRM Version 10 dated September 24 2021 Final (Volumes 1-4 Compiled).pdf (illinois.gov)

Table 44. 2023 Tracked & Verified Net Electric Energy Savings Pre- and Post-EISA Backstop

COMPONENT	BULB QUANTITY	TRACKED ELECTRIC ENERGY SAVINGS (MWh)	VERIFIED NET ELECTRIC ENERGY SAVINGS (MWh)	% OF TRACKED NET SAVINGS VERIFIED [a]
Retail Lighting (Jan – Jun 2023)	246,352	9,806	1450	15%
Retail Lighting (Jul – Dec 2023)	394,212	14,455	45	<1%
Marketplace (Jan – Jun 2023)	10,260	165	48	29%
Marketplace (Jul – Dec 2023)	7,042	112	1	<1%
Food Banks (Jan – Jun 2023)	79,968	8,162	2064	25%
Food Banks (Jul – Dec 2023)	105,975	13,250	0	0%

[a] *Verified net savings accounts for adjustments from the engineering analysis as well as NTG assumptions*

The verified net savings also reflect differences in NTG assumptions. The tracked savings assume a NTG of 100% for all bulbs discounted through retailers, provided for food bank distributions, and a small proportion discounted through Online Marketplace. The verified net savings include a deemed NTGR of 14% for all bulbs except food bank distributions, which are deemed at 65%. While there are adjustments in savings as part of the engineering analysis, it is the integration of the updated NTG values that has the most substantive impact on Specialty Lighting savings.

Table 45 provides a more granular view of the total verified net savings by measure. The table also includes the per-unit verified net and planned savings for comparison.

Table 45: 2023 Per-Measure Verified and Planned Savings.

MEASURE	QUANTITY	TOTAL VERIFIED NET kWh	TOTAL VERIFIED NET SUMMER kW	VERIFIED NET kWh PER UNIT	VERIFIED NET SUMMER kW PER UNIT	*PLANNED NET kWh PER UNIT* [a,b]	*PLANNED NET kW PER UNIT* [a,b]
Standard I	513,222	1,432,552	224	2.8	0.0004	*33.1*	*0.0048*
Standard II	110,650	768,656	103	6.9	0.0009	*39.9*	*0.0040*
3-Way	3,402	1,782	0	0.5	0.0001	*46.7*	*0.0000*
Daylight Sensor	65,124	988,636	0	15.2	0	*295.3*	*0.1345*
Reflector	30,903	112,240	17	3.6	0.0005	*52.9*	*0.0077*

MEASURE	QUANTITY	TOTAL VERIFIED NET kWh	TOTAL VERIFIED NET SUMMER kW	VERIFIED NET kWh PER UNIT	VERIFIED NET SUMMER kW PER UNIT	*PLANNED NET kWh PER UNIT* [a,b]	*PLANNED NET kW PER UNIT* [a,b]
Specialty	103,206	255,637	37	2.5	0.0004	*36.4 / 15.7*	*0.0053/ 0.0023*
OM Standard	12,157	33,206	6	2.7	0.0005	*33.1*	*0.0048*
OM 3-Way	153	1,801	0	11.8	0.0017	*46.7*	*0.0000*
OM Reflector	26	185	0	7.1	0.001	*52.9*	*0.0077*
OM Specialty	4,794	12,620	2	2.6	0.0004	*36.4 / 15.7*	*0.0053/ 0.0023*
OM Nightlight	172	467	0	2.7	0	*19.4*	*0*

[a] Only specialty lighting had separate NTGRs for IE (100%) and non-IQ (43%) bulbs, reflected in the deemed savings. All other bulbs assume 100% NTG for one of two reasons: 1) assuming they are discounted or distributed to IE customers and/or 2) they are new to the portfolio this program cycle.
[b] Planned values were pulled from Georgia Power's 2023-2025 Cycle BenCost extract.

Net-to-Gross

As documented earlier, the impact evaluation drew from multiple recent studies to estimate NTG, estimated at 14% apart from food bank distributions, deemed at 65%. Please see

Net Savings Approach for more detailed information.

Process Evaluation Results

The process evaluation focused primarily on Online Marketplace and customers' behaviors related to lighting. Key findings include:

- There is low awareness of the Online Marketplace and Residential Specialty Lighting Program among the general population.
- While Online Marketplace customers tend to install standard lightbulbs at a high rate, we are unaware of how frequently customers install lightbulbs received through food bank distributions because there is not currently a mechanism (i.e., a survey) to follow up with these customers.
- The Online Marketplace did not effectively reach IQ customers.

The process evaluation for the Residential Specialty Lighting Program focused on the Online Marketplace. ILLUME fielded a survey in October 2023 to customers that had purchased lighting products, thermostats, electric vehicle (EV) chargers, and advanced power strips (APS). The survey results for thermostats, EV chargers and APSs can be found in Chapter 4. Home Energy Improvement Program (HEIP) – Online Marketplace. This section will primarily focus on respondents that purchased lighting but will include some overall findings relevant for all respondents.

The evaluation team surveyed 350 Online Marketplace customers, including 90 customers who purchased lighting from the Online Marketplace between January and October 2023. Respondents included 59 customers who purchased GSL lighting, 13 who purchased just specialty lighting and 18 who purchased both specialty and GSL lighting.[17] The population at the time of survey fielding consisted of 632 customers who purchased GSL, 153 who just purchased specialty, and 181 customers that purchased both GSL and specialty lighting. There was one respondent who had purchased smart lightbulbs, out of just 18 customers that purchased smart lightbulbs on the Online Marketplace at the time of survey fielding. Because there were low numbers of customers that purchased specialty lighting, results related to specialty lighting should be interpreted with caution.

In addition, the evaluation team also fielded a general population survey which yielded 350 respondents.

Online Marketplace Awareness

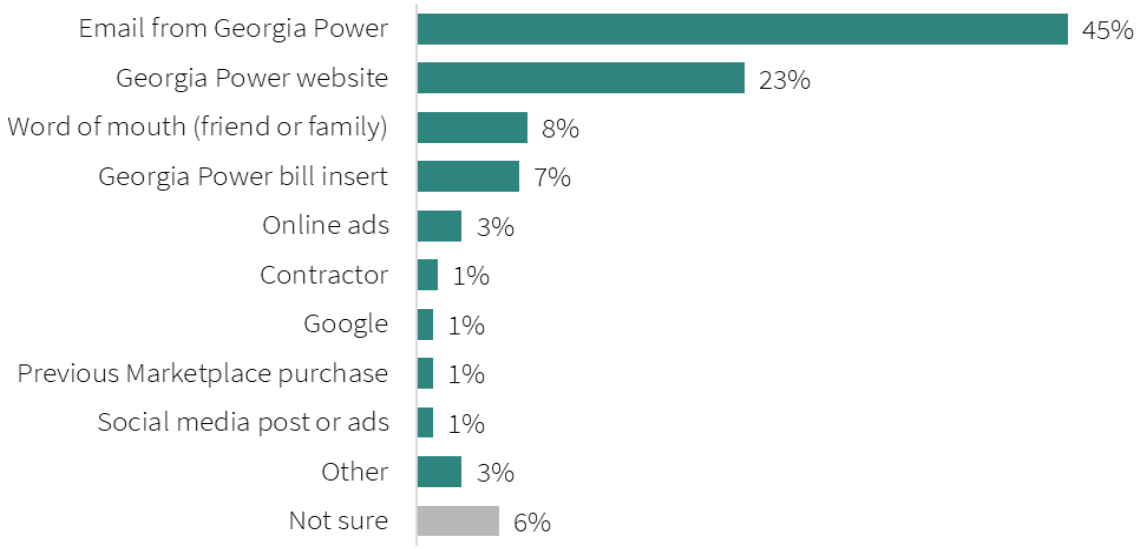
Just 16% (n=55) of general population survey respondents had heard about the Specialty Lighting Program, and another 16% (n=55) had heard about the Online Marketplace, indicating low overall awareness of both initiatives. Of those that had heard about the Specialty Lighting Program or the Online Marketplace, 49% had heard of it through the Georgia Power website, and 30% had heard about it through email. Of those that had

[17] Purchases of reflector, specialty, or nightlight bulbs on the Online Marketplace are combined and referred to as "specialty" lighting throughout this section.

heard of the Online Marketplace, 55% had not used it for anything, and 33% had wanted to see what products were available. Fifteen percent (n=8) had purchased products.

The most common way that all Online Marketplace survey respondents had heard about the Online Marketplace was through a Georgia Power email (45%) followed by the Georgia Power website (23%). These findings highlight the importance of Georgia Power marketing and website presence in generating sales. Figure 19 below summarizes other sources of Online Marketplace awareness.

Figure 19: 2023 Sources of Program Awareness (n= 350)

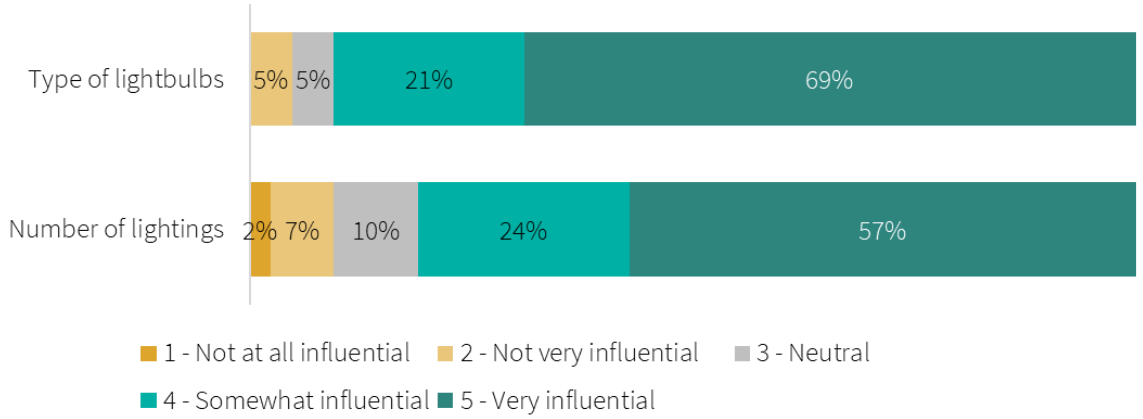


Source: Online Marketplace customer survey. B1. How did you first learn about the Georgia Power Marketplace? Percents may not add to 100% due to rounding.

Flash sales were also an effective strategy to drive sales. Sixty percent (n=54) of survey respondents who bought lighting had bought lighting during a flash sale. In addition, 80% of respondents who were identified as having purchased lighting during a flash sale were aware that there was a sale. Of those, 90% (n=38) said that the flash sale was either "very" or "somewhat" influential in their decision to purchase the *type* of lightbulb that they did purchase. Eighty-one percent (n=34) said the flash sale was "very" or "somewhat" influential in their decision to purchase the *number* of lightbulbs that they did purchase, as seen below in

Figure 20.

Figure 20: 2023 Influence of Flash Sale on Lightbulbs Purchased (n=42)



Source: Online Marketplace customer survey. D5, D6. How influential was the flash sale on your decision to purchase the type/number of lightbulbs that you did? Percents may not add to 100% due to rounding.

Lighting Installations

About 71% of standard lightbulbs and 50% of specialty lightbulbs purchased through the Online Marketplace were reported as either currently installed in a customer's home or intended to be installed in the next 12 months.[18] When a customer purchased more than ten lightbulbs through the Online Marketplace, we asked if they purchased more lighting than they needed to qualify for free shipping. There is evidence that this is the case, with about 40% of customers that purchased lighting saying they did this.

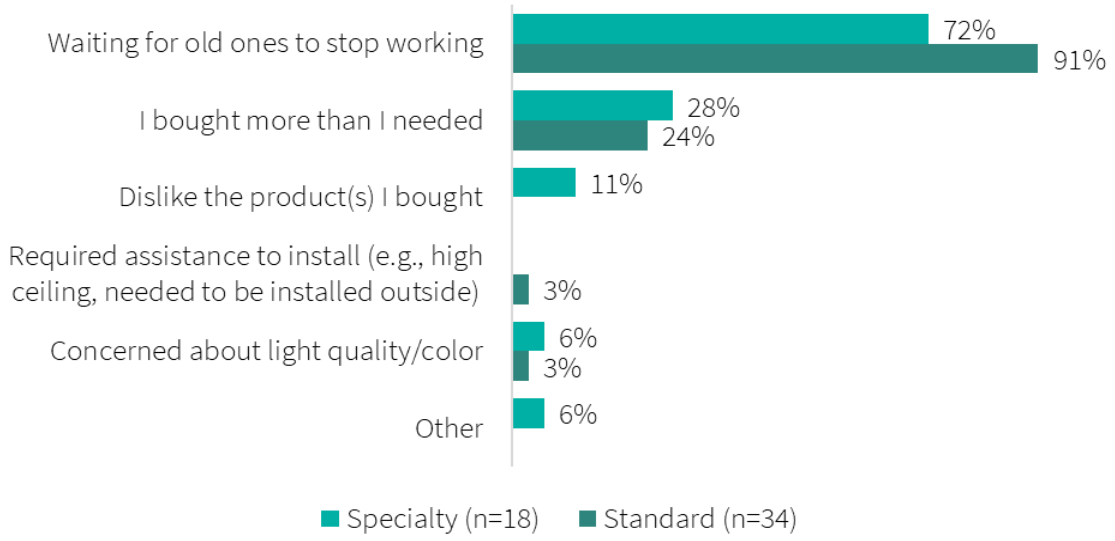
The most common reason that lighting was not installed in a customer's home was that the customer was waiting for the existing lightbulbs to stop working or they bought more than they needed. There were also some customers that bought specialty lighting that did not like the products they purchased, as seen below in

Figure 21.

The number of respondents that bought specialty bulbs and reported they bought more than they needed increased from last cycle (7%) to this cycle (28%). The number of respondents who were waiting for their old lightbulbs to stop working also increased for both specialty and standard respondents, from 67% to 91% for standard and from 57% to 72% for specialty. However, these results should be interpreted with caution because of the low numbers of overall responses.

Figure 21. 2023 Reasons Lighting Was Not Installed

[18] Specialty lighting responses should be viewed cautiously as there were only 25 responses.



Source: Online Marketplace customer survey. C6, C14. Why isn't the standard/specialty lighting currently installed in your business/home? Percents may not add to 100% due to rounding.

Most respondents that reported not installing lighting reported putting most of it into storage (97% for standard lighting and 95% for specialty). All the respondents that bought standard lighting said they were planning on installing the lighting in the future, except for one respondent that was not sure.

Participant Survey Demographics

Most lighting respondents that reported their age was 43 or older (84%), though many respondents chose not to respond (19%). About two thirds of lighting respondents were White (69%), followed by Black or African American (23%). The most reported language spoken daily by respondents besides English was Spanish (4%).

A little over one fourth of respondents declined to provide their income, but of the 73% that did, 49% made over $100,000 annually. About two thirds of respondents had a four-year college degree or higher (67%), and 43% said at least one adult in their home was retired. Most were homeowners (89%) living in single-family homes (81%).

These income demographics findings highlight that the Online Marketplace is not the primary channel that is reaching IQ customers. Georgia Power should continue to focus on reaching those customers through their established retail and food bank channels.

Additional demographics data for all respondents is available in Appendix - General Population Survey.

Impact of Program Changes

EISA, as discussed in the impact evaluation findings section, significantly impacted the program this cycle through directly impacting the program's ability to claim savings for lightbulbs purchased after July 1, 2023. We determined there were almost no evaluated savings for these lightbulbs. Georgia Power may wish to continue distributing lightbulbs to IQ customers; some utilities have continued to do this. If Georgia Power

wants to accurately claim savings from food bank distributed bulbs, there needs to be an added mechanism (i.e. customer survey in future evaluations) to understand what is happening to those lightbulbs and if customers are installing them or not.

Beginning last cycle, the program shifted focus to prioritizing IQ channels for program delivery. However, as discussed previously, the Online Marketplace survey demographics data indicate the Online Marketplace is not the primary channel to reach these customers. Intercept interviews at food bank distributions or including a survey QR code with the distributed lightbulbs could assist in better understanding these customers and their experience in future evaluations.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion 1: The residential lighting market has been largely transformed, with LEDs serving as the only remaining option for most customers for most applicable uses. Accordingly, the NTG value used for net savings for upstream and Online Marketplace residential lighting was found to be 14%, and we expect further declines in net savings in the future.

With the implementation of the expanded backstop to EISA in July of 2023, nearly all screw-based residential lighting must now, by regulation, be more efficient than 45 lumens per watt. Realistically, the only technology that currently achieves that level of efficiency is LEDs, and while there is some variability in LED quality, durability, and energy consumption, even the cheapest LEDs use far less energy than former baseline lamps.

Conclusion 2: Georgia Power targeted IQ customers through food banks and by partnering with retailers that, geographically, are more likely to serve IQ customers. This targeting strategy appeared to be effective, as there was a marked change in the distribution of bulbs through different retailers compared with the prior cycle.

Conclusion 3: The verified net savings is 8% and 3% for kWh and kW, respectively, driven primarily by reduced savings from after the EISA backstop went into effect as well as methodological differences in NTG assumptions between tracked and verified savings. While tracked savings were determined using fixed per-unit values, verified savings were determined using the UMP-recommended ENERGY STAR lumens binning approach to determine baseline wattage and calculate savings specific to each bulb.[19] Tracked savings also assumes 100% NTG for IQ measures and 43% for non-IQ measures while verified savings assumed 14% for IQ and 65% for non-IQ. The percentage of verified net savings include bulbs discounted or distributed both before and after the EISA backstop in July of 2023.

RECOMMENDATIONS:

- **Remove screw-based LED lighting from the residential portfolio.** With verified gross and net savings falling to effectively zero, screw-based LED lighting is no longer a cost-effective measure. Even in situations where LEDs are directly installed replacing halogen or incandescent lamps, the expected savings are still relatively low, given the short expected useful lives of halogen and incandescent lamps. Georgia Power should remove these measures to ensure continued gross and net claimable savings. However, if Georgia Power wishes to continue distributing LEDs through either the foodbank channel, or other IQ offerings, it would likely be an effective customer satisfaction measure, so long as there is no expectation of claimable gross or net savings.

Conclusion 4: Verified savings for lamps with daylight sensors are significantly lower than reported as the savings assumptions referenced whole-room C&I versus single-lamp applications, most notable

[19] https://www.energy.gov/eere/uniform-methods-project-determining-energy-efficiency-program-savings

affecting food bank component savings. These assumptions assumed default controlled wattage for a commercial daylight sensor taken from the Commercial and Industrial volume of the Illinois TRM (v10) which includes a whole room of controlled lighting rather than a single lamp. The impact of this is most noticeable in the Food Banks channel where 30% of lamps are equipped with daylight sensors.

RECOMMENDATIONS:

- **Revise deemed savings for daylight sensors to reflect the evaluation findings if they continue to be offered**.

Conclusion 6: While Online Marketplace customers tend to install standard lightbulbs at a high rate, we are unaware of how frequently customers install lightbulbs received through food bank distributions because there is not currently a mechanism (i.e., a survey) to follow up with these customers.
Food banks, as a primary channel to reach a targeted market (IQ customers), have an uncertain ISR.

Conclusion 7: The Online Marketplace survey did not effectively reach IQ customers. Most lighting survey respondents were White (69%) homeowners (89%) in single-family homes (81%). About half (49%) reported an income over $100,000 annually. Though Georgia Power is focused on reaching IQ customers through this program, these demographics highlight that the Online Marketplace is not the primary channel to reach those customers currently.

RECOMMENDATIONS:

- **Develop additional strategies for better reaching IQ customers through the Online Marketplace.** This could include:
    - Offering additional rebates for IQ customers.
    - Targeted marketing of the Online Marketplace to IQ customers (e.g., cross-program promotion).
    - Consider changes to the Online Marketplace that might increase uptake. Example strategies include outreach targeted to geographies with a higher incidence of IQ customers and cross-program promotion (such as through EASE).

4. HOME ENERGY IMPROVEMENT PROGRAM (HEIP)

Home Energy Improvement Program (HEIP), implemented by Utility Energy Services (UES) in 2023, offers a wide range of services to existing single-family, manufactured home, and multifamily customers with central HVAC systems.[20] Customers have the option of participating in a comprehensive, Whole House pathway, or receiving rebates through the Individual Improvements pathway (which includes equipment rebated through Online Marketplace channel). The overall program design was like the previous cycle, with the most notable exception being the inclusion of a Manufactured Homes pathway with direct installation of measures for the 2023 – 2025 cycle. Last cycle, the program was implemented by Georgia Power.

HEIP achieved 8,321 MWh verified net energy savings and 2,261 kW summer peak demand savings in 2023 (Table 46) across the Individual Improvements (includes Online Marketplace channel), Whole House, and Manufactured Homes pathways. The program reported 34.67% of its energy savings goal, while the evaluation team estimated that the program's verified net energy savings achieved 27% of program energy savings goal.

Table 46. 2023 HEIP Savings

	NET SAVINGS GOALS	REPORTED NET SAVINGS	VERIFIED GROSS SAVINGS	NTGR	VERIFIED NET SAVINGS	% OF VERIFIED NET TO GOALS
Electric Energy Savings (MWh)	31,073	10,773	11,742	71%	8,321	27%
Summer Peak Demand Reduction (kW)	7,362	2,466	3,194	71%	2,261	32%

Customers were satisfied with the HEIP program; most customers (96%) were either very satisfied or satisfied with the HEIP program overall and all aspects of the program were rated highly. Customers, particularly those who participated through the Whole House pathway, highlighted improved comfort as a top motivator for program participation. Cost was identified as the primary barrier for customers who had heard of the Whole House pathway but chose to participate in the Individual Improvements pathway instead. Customers, particularly those who participated in the Whole House and Manufactured Homes pathways, reported low awareness of other Georgia Power Energy Efficiency programs. Given the in-person nature of program delivery for these channels, this indicates an opportunity to educate customers about other programs during these interactions.

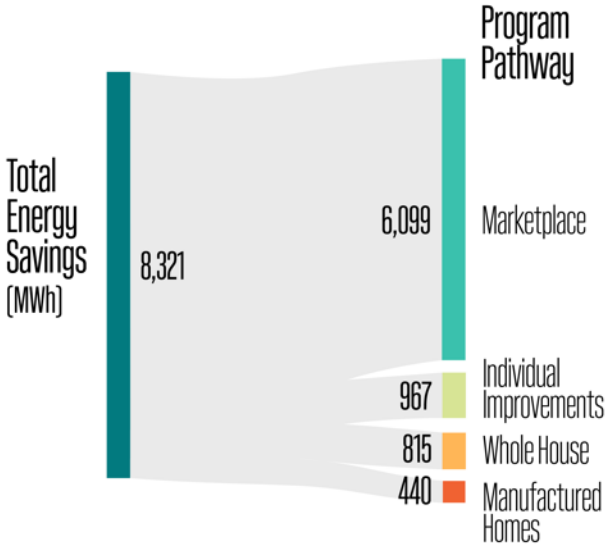
[20] Manufactured homes customers without a central HVAC system are still eligible to receive direct install measures.

Home Energy Improvement Program

Program Savings Overview

The Home Energy Improvement Program (HEIP) achieved 27% of its energy savings goal with 8,321 MWh verified net savings. HEIP incentivized the installation of over 35,000 energy efficiency measures in over 19,000 residences.

Of the program's reported savings, smart thermostats, including those rebated through the Online Marketplace, accounted for 68% of the program's total savings. LED lighting in the Manufactured Homes and Whole House pathways contributed 8% of savings and air sealing contributed 4%.



Conclusions & Recommendations

CONCLUSION 1

Comfort is a top motivator for customers to participate in HEIP, especially for the Whole House path. Fifty-five percent of Whole House participants said making their home more comfortable was a top motivator for program participation. Most (86%) of Whole House path respondents said their home is more comfortable since participating.

RECOMMENDATION

Consider highlighting potential improvements to comfort in program marketing materials.

CONCLUSION 2

Cost is top of mind for customers and a barrier to participation in the Whole House path. Respondents most often chose to participate in the Individual Improvements path instead of the Whole House path because they thought the Whole House path was too expensive. Respondents indicated that price increases and inflation impacted their ability to make improvements to their home this year.

RECOMMENDATION

Explore ways to educate customers about additional funding opportunities for home energy assessment and other upgrades to help customers overcome the cost barriers associated with the Whole House path.

CONCLUSION 3

Customers who participated in the Whole House and Manufactured Homes paths report lower awareness of other Georgia Power energy efficiency programs compared to Individual Improvements participants.

RECOMMENDATION

Encourage contractors and third-party implementers to cross-promote other Georgia Power programs in their direct interactions with customers.

Program Overview

The Home Energy Improvement Program (HEIP) is composed of multiple distinct subcomponents designed to serve different households in the residential customer class.

- **Whole House:** Encourages single-family and multifamily property owners to have a home energy assessment conducted and to implement energy efficiency measures using a comprehensive approach.
    - **Single-family** customers who complete a home energy assessment and sufficient recommended improvements to achieve a 20% electric energy reduction receive a rebate for 50% of the cost of the improvements, up to $1,100 plus up to a $150 incentive for the home energy assessment. The required home energy reduction is lower than last cycle (25%).
    - **Multifamily** projects that achieve 20% electric energy reduction can receive rebates for 50% of the cost, up to $500 per housing unit. Multifamily projects that achieve 35% electric energy reduction can receive rebates for 50% of the cost, up to $1,000 per housing unit. New to this program cycle, there are higher incentives available to properties with IQ tenants. These incentives cap at $1,100 per housing unit for 20% electric energy reduction and $1,500 per housing unit for 35% electric energy reduction. Multifamily projects can also receive an incentive for the home energy assessment, $75 per unit for market rate properties and $150 per unit for IQ properties.
- **Individual Improvements:** Offers incentives for energy efficiency upgrades in single-family homes on an a la cart basis. Some measures require participants to use an approved program contractor, while other measures can be self-installed or installed by a licensed professional not affiliated with the program. Customers can receive a rebate of 50% of the cost of the improvements, up to $750 depending on the rebated measure. HVAC and water heating equipment do not count toward the Individual Improvements cap.
    - **Georgia Power's Online Marketplace (Online Marketplace):** Allows Georgia Power residential customers to shop for and purchase energy-efficient equipment at up to 50% off the retail price. The Online Marketplace includes smart, Wi-Fi enabled thermostats. This cycle, Georgia Power added APS, EV chargers, and dehumidifiers. Customers can also purchase their own equipment outside the Online Marketplace at a store of their choosing and apply for a rebate online. Thermostat rebates are offered at 50% of the eligible thermostat cost up to a cap of $75 for single-family homes and $38 for multifamily units.
- **Manufactured Homes:** A new pathway this year, customers in manufactured homes receive home energy assessments and direct install measures at no cost. These home energy assessments are not Building Performance Institute (BPI) level assessments, but rather are used to determine which direct install measures would be a good fit for each home.

The Whole House track utilizes the Beacon HEA software tool to model the energy performance of the participating residence, identify upgrades, and estimate the energy and peak demand savings from the identified upgrades. The program planned to switch modeling software to Snugg Pro this cycle; however, they had not yet transitioned to the software for this 2023 evaluation.

Program Participation and Achievements

HEIP incentivized the installation of over 35,000 energy efficiency measures in over 19,000 participating Georgia residences in 2023. All pathways included an array of measures affecting multiple energy end uses in the homes, including HVAC, water heating, and lighting energy use.

Table 47 summarizes savings for the program, including program savings goals. Savings goals are net, inclusive of NTG assumptions applied to the measure-level savings. The program achieved 34.67% of its kWh goals. This difference from goal is driven by lower than planned smart thermostat participation, a major driver of program savings. However, participation was lower than anticipated in other program pathways as well, notably Whole House. In 2023, the program transitioned from implementing the program in house to a third-party implementer. This implementer came onboard and ramped up program activities in the first half of 2023, potentially impacting the program's ability to meet goals. Additionally, during interviews program implementer staff highlighted inflation as a barrier to meeting program goals. Both implementer onboarding and the impacts of inflation are discussed in more detail in the Process Evaluation section of this report.

Table 47. 2023 HEIP Participation and Savings

	NUMBER OF MEASURES	NET SAVINGS GOALS	REPORTED NET SAVINGS[a]	% OF GOAL REPORTED
Electric Energy Savings (kWh)	35,865	31,072,997	10,772,552	35%
Summer Peak Demand Reduction (kW)		7,362	2,466	33%

[a]Minor differences exist between values reported by Georgia Power in its Q42023 PSC Report and those tracked in VisionDSM. The Q42023 PSC Report understated program savings. Throughout the balance of the report, savings are taken from VisionDSM and are referred to as "tracked" savings.

The shares of tracked savings by measure within HEIP are listed in Table 48. The Online Marketplace Smart Thermostat measure accounted for 65% of the program total. Among the various non-thermostat measures, air sealing was the largest single Individual Improvements measure in 2023, contributing 4% of the overall energy savings. LED Lighting was the single largest contributor to the Whole House and Manufactured Home pathways, contributing 4% of overall energy savings in each pathway.

Table 48. 2023 HEIP Participation and Savings

PROGRAM PATHWAY	NUMBER OF PARTICIPANTS	MEASURE	NUMBER OF MEASURES	TRACKED SAVINGS (kWh)	% OF TRACKED SAVINGS (kWh)
Individual Improvements	1,475	Air Sealing	392	432,729	4%
		Attic Insulation	535	233,187	2%
		Heat Pump Water Heater	119	247,126	2%
		Smart Thermostat	440	155,144	1%
		Other[a]	250	154,048	1%
		TOTAL	**1,736**	**1,222,234**	**11%**
Whole House	792[b]	Air Sealing	203	25,972	0%
		Attic Insulation	348	250,503	2%
		Duct Sealing	178	115,805	1%
		Water Heating	233	110,493	1%
		HVAC Tune Up	225	98,839	1%
		LED Lighting	7,463[c]	416,788	4%
		Other[d]	259	103,034	1%
		Multifamily[e]	112	189,941	2%
		TOTAL	**9,021**	**1,311,375**	**12%**
Manufactured Home	622	Advanced Power Strip	706	63,611	1%
		Water Heating	1,236	253,126	2%
		LED Lighting	6,876	418,600	4%
		Smart Thermostat	378	222,341	2%
		TOTAL	**9,196**	**963,579**	**9%**
Online Marketplace	16,219	Advanced Power Strip	1,649	198,441	2%
		Dehumidifier	62	8,000	0%
		Electric Vehicle Charger	977	36,333	0%
		Home Energy Management System	6	4,543	0%
		Smart Thermostat	20,341	7,030,867	65%
		TOTAL	**23,035**	**7,278,184**	**68%**
HEIP TOTAL	**19,108**		**35,865**	**10,775,371**	**100%**

[a]Measures included Ceiling Fans, Dehumidifiers, Duct Sealing, Ductless Mini Split Heat Pumps, EV Chargers, Ground Source Heat Pumps, Pool Pumps, Advanced Power Strips, and HVAC Tune Ups.
[b]Whole House number of participants is 354 premises that installed measures, 437 premises that received an assessment only, and 1 multifamily property.
[c]Number of installed bulbs is not directly tracked by the program for Whole House projects. This value is estimated using the reported per-bulb kWh savings observed for evaluated projects.
[d]Measures included Central AC, Clothes Washers, Smart Thermostats, Dishwashers, Freezers, Furnace Replacement, Heat Pumps, ECM Blower Fans, DHW Pipe Insulation, Basement/Wall/Rim Joist Insulation, Low-Flow Showerheads, Door Replacement, Window AC, Window and Glass Door Improvement.
[e]One Whole House multifamily project affecting 112 housing units was reported in 2023. Similar measures were included (attic insulation, air sealing, etc.) but were not broken out in tracking data.

Methodology

The evaluation sought to address both process and impact evaluation questions.

Process evaluation questions focused on customer experience with the program and contractors, barriers to service, and satisfaction with the program offerings and elements.

Impact evaluation questions focused on verifying savings against planned and, where necessary, adjusting savings based on factors such as inaccurate inputs or customer-specific data, resulting in a summary of adjustments and recommendations for future planning.

Table 49 summarizes the activities completed to address these research questions followed by a detailed description of approach to complete the impact and process evaluations. Appendix 5D. Detailed Study Methodology For HEIP provides a more detailed summary of the evaluation research questions and methodology.

Table 49. 2023 Process and Impact Evaluation

EVALUATION ACTIVITY	COMPLETED
Program staff and implementer interviews	3
Tracking system analysis	✓
Participant surveys	185
Contractor interviews	8
Residential general population survey	350 across multiple res. programs
Desk Reviews	62
Participant Site Visits	26
Billing Analysis for thermostat net savings	✓
Calculate gross savings (unit energy savings)	✓

Impact Evaluation Findings

This section presents findings from the impact evaluation for HEIP. Key findings include:

- The verified net savings for the HEIP program were 8,321 MWh for 2023, which is 77% of savings reported by Georgia Power in its Q42023 PSC Report.
- Approximately 71% of savings are attributed to program activities (NTGR).

Table 50 summarizes energy and summer peak demand savings delivered by the three HEIP program pathways – Individual Improvements (including measures incentivized through the Online Marketplace), Whole House, and Manufactured Home. Verified gross and net savings values are derived through the evaluation activities as described in the Impact Evaluation Approach section. As discussed previously, tracked savings throughout this section savings are taken from VisionDSM.

Table 50. 2023 HEIP Savings by Component

PROGRAM PATHWAY	TRACKED SAVINGS		VERIFIED GROSS SAVINGS		VERIFIED NET SAVINGS	
	ENERGY (MWh)	SUMMER PEAK DEMAND (kW)	ENERGY (MWh)	SUMMER PEAK DEMAND (kW)	ENERGY (MWh)	SUMMER PEAK DEMAND (kW)
Individual Improvements	1,222	349	1,362	384	967	273
Whole House	1,311	447	1,182	410	815	283
Manufactured Home	964	203	611	96	440	69
Online Marketplace	7,278	1,469	8,588	2,304	6,099	1,636
Total	**10,775**	**2,467**	**11,742**	**3,194**	**8,321**	**2,261**

Table 51 shows the percentage of net tracked savings achieved and NTG factors determined through the impact evaluation by program component. Specific observations that contributed to these ratios are described by the program pathway in the following sections of this chapter. In Table 51 and throughout the balance of this section where LED lighting measures are included, we show savings with LED lighting removed in addition to total program savings to provide an understanding of program performance without LED lighting measure savings. In Chapter 3. Residential Specialty Lighting Program, the evaluation team recommends removing screw-based LED lighting from the residential portfolio.

Table 51. 2023 HEIP Adjustment Factors by Program Pathway

PROGRAM PATHWAY	METRIC	GROSS SAVINGS AS A % OF TRACKED	GROSS SAVINGS AS A % OF TRACKED – W/O LIGHTING	FREE-RIDERSHIP	SPILLOVER	NTGR	NET SAVINGS AS A % OF TRACKED
Individual Improvements	Electric Energy Savings (kWh)	111%	NA	34%	5%	71%	79%
	Peak Demand Reduction (kW)	110%	NA				78%
Whole House	Electric Energy Savings (kWh)	90%	102%	33%	2%	69%	62%
	Peak Demand Reduction (kW)	92%	93%				63%
Manufactured Home	Electric Energy Savings (kWh)	63%	77%	28%	0%	72%	46%
	Peak Demand Reduction (kW)	47%	76%				34%
Online Marketplace	Electric Energy Savings (kWh)	118%	NA	29%	0%	71%	84%
	Peak Demand Reduction (kW)	157%	NA				111%

Individual Improvements

Table 52 shows the *tracked* deemed savings (net) and *verified* gross savings for the 2023 HEIP Individual Improvements measures. Results are mixed across the measures offered through this pathway. For most measures the average verified energy savings were closely aligned or higher. The most significant discrepancy was observed for attic insulation measures.

Table 52. 2023 HEIP Individual Improvements Average Per Measure Tracked and Verified Gross Savings

MEASURE	AVERAGE TRACKED SAVINGS			AVERAGE VERIFIED SAVINGS		
	kWh	SUMMER kW	WINTER kW	kWh	SUMMER kW	WINTER kW
Air Sealing	1,104	0.55	n/a	1,100	0.51	0.11
Attic Insulation	436	0.10	n/a	710	0.19	0.19
Heat Pump Water Heater	2,077	0.16	n/a	2,288	0.18	0.49
Smart Thermostat	353	0.07	n/a	397	0.11	0.11
Other[a]	616	0.13	n/a	416	0.05	0.10

[a] Measures included Ceiling Fans, Dehumidifiers, Duct Sealing, Ductless Mini Split Heat Pumps, EV Chargers, Ground Source Heat Pumps, Pool Pumps, Advanced Power Strips, and HVAC Tune Ups.

Table 53 highlights notable differences between *tracked* savings and *verified* gross savings estimates for key measures. Additional details on the results of the Smart Thermostat analysis are included in Appendix 5C. HEIP Thermostat Net Impact Analysis. For attic insulation measures, the evaluation team updated the algorithm to use cooling degree days (CDDs) for consistency within the algorithm, which also includes heating degree days (HDDs) as well as with other shell measures. The tracked savings values for this measure were developed through the 2021 evaluation which employed an algorithm using cooling degree hours (CDHs) instead of CDDs. The evaluation team used the updated algorithm coupled with site-specific information including starting and ending R-values and attic square footage to calculate estimated savings. Details of the algorithm used are included in Appendix 5B. HEIP Non-Thermostat Impact Calculation Overview.

Table 53. 2023 HEIP Individual Improvements Notable Differences Between *Tracked* and Verified *Gross*

MEASURE	TRACKED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES AND ASSUMPTIONS	PRIMARY REASONS FOR DIFFERENCES
Air Sealing	*Tracked* energy and demand savings align with the gross verified savings values attained from the prior evaluation conducted in 2021 with a NTG adjustment of 93%.	Algorithm based on Georgia Power Energy Efficiency Technical Reference Manual Version 3.0 (Georgia Power TRM 3.0) with site-specific pre- and post-improvement blower door test results used as inputs.	The specific pre- and post-improvement blower door test results vary somewhat with the 2021 evaluation due to differences in participating homes. One instance of a miscategorized home heating type was also observed.

MEASURE	TRACKED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES AND ASSUMPTIONS	PRIMARY REASONS FOR DIFFERENCES
Attic Insulation	*Tracked* energy savings align with the gross verified savings values attained from the previous evaluation conducted in 2021, with a NTG adjustment of 93%.	Algorithm from Illinois TRM v12[21] with adjustments to weather variables for GA climate. Site specific R-values based on project documentation and site visit measurements.	Difference in algorithm's treatment of savings achieved during the cooling season.
Heat Pump Water Heater	*Tracked* energy savings align with the gross verified savings values attained from the previous evaluation conducted in 2021, using an assumed average UEF of 3.66, with a NTG adjustment of 93%.	Algorithm from 2021 Georgia Power evaluation, with site-specific UEF of installed water heaters.	Gross values are similar. The primary reason for difference with reported is the 93% NTG adjustment.
Smart Thermostat	Tracked kWh and kW savings are taken from the prior evaluation results for net savings achieved per home.	Verified kWh savings are based on regression analysis of 2022 participants with a matched control group.	The primary differences between the two studies are (1) details of the evaluation methodologies were different, and (2) the evaluation timeframe of the prior evaluation included the peak of the COVID-19 pandemic.[22]

Table 54 and Table 55 show the program's tracked savings (net) and verified gross savings. Verified gross energy savings achieved 111% of the program's tracked energy savings.

Table 54. 2023 HEIP Individual Improvements *Tracked* and *Verified* Gross Electric Energy Savings

MEASURE	TRACKED ELECTRIC ENERGY SAVINGS (kWh)	VERIFIED GROSS ELECTRIC ENERGY SAVINGS (kWh)
Air Sealing	432,729	431,099
Attic Insulation	233,187	379,825
Heat Pump Water Heater	247,126	272,305
Smart Thermostat	155,144	174,467
Other	154,048	104,079
Total Savings	**1,222,234**	**1,361,775**

[21] Illinois Statewide Technical Reference Manual, Version 12.0

[22] The prior evaluation was based on 2019-Q1 2020 participants, so the analyzed post installation billing data ranged from February 2019 through March 2021.

Table 55 includes tracked and verified demand savings for summer and winter peak periods. These were developed by considering the coincidence of each evaluated measure with Georgia Power's defined summer and winter peak periods. For summer peak, population totals were developed by extrapolating evaluated RRs for sampled projects to the population. Because Georgia Power does not collect or report winter peak demand savings, the evaluation team extrapolated winter peak savings for the evaluation sample to the population by applying a ratio of verified winter peak demand reduction to verified energy savings.

Table 55. 2023 HEIP Individual Improvements *Tracked* and *Verified* Gross Peak Demand Reduction

MEASURE	TRACKED SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS WINTER PEAK DEMAND REDUCTION (kW)
Air Sealing	217	200	45
Attic Insulation	52	101	104
Heat Pump Water Heater	19	21	58
Smart Thermostat	29	50	47
Other	33	12	25
Total Savings	**349**	**384**	**279**

Whole House

Table 56 shows the *tracked* deemed savings (net) and *verified* gross savings for the 2023 HEIP Whole House measures. Results are mixed across the measures offered through this pathway. Some measures, primarily air sealing and duct sealing, were found to be underreporting energy savings on average. Other measures, including some water heating measures and LED lighting measures, were conversely found to be overreporting savings.

Table 56. 2023 HEIP Whole House Average Per Measure Tracked and Verified Gross Savings

MEASURE TYPE	AVERAGE TRACKED SAVINGS			AVERAGE VERIFIED SAVINGS		
	kWh	SUMMER kW	WINTER kW	kWh	SUMMER kW	WINTER kW
Air Sealing	128	0.05	n/a	535	0.27	0.01
Attic Insulation	720	0.45	n/a	782	0.36	0.09
Duct Sealing	651	0.36	n/a	824	0.40	0.08
Water Heating	474	0.07	n/a	134	0.01	0.02
HVAC Tune Up	439	0.23	n/a	269	0.05	0.03
LED Lighting	1,226	0.18	n/a	794	0.15	0.16
Other [a]	398	0.18	n/a	396	0.20	0.03
Multifamily [b]	1,696	0.37	n/a	1,696	0.37	0.00

[a]Measures included Central AC, Clothes Washers, Smart Thermostats, Dishwashers, Freezers, Furnace Replacement, Heat Pumps, ECM Blower Fans, DHW Pipe Insulation, Basement/Wall/Rim Joist Insulation, Low-Flow Showerheads, Door Replacement, Window AC, Window and Glass Door Improvement

[b]One Whole House multifamily project was reported in 2023. Similar measures were included in this project (attic insulation, air sealing, etc.) but were not broken out in tracking data.

LED lighting measures were observed to be a part of most Whole House projects in 2023. Site visits showed that tracked quantities of installed bulbs were inflated in some cases, with an average in-service rate (ISR) across homes visited by the evaluation team of 82%. Additionally, the Beacon model assigns approximately 56 kWh savings per interior bulb replaced, which was found to be overstated for the types of lamps replaced. The evaluation team used a blended baseline assuming a mixture of halogen and CFL baseline lamp types. Incorporating these findings into the evaluation for LED lighting measures resulted in a reduction of verified energy savings.

The evaluation team also observed overstated energy savings for 'Temperature Turn Down' measures, which are setpoint reductions, changing the water heater setpoint from a higher temperature to 120°F. The evaluation team applied an industry-standard algorithm from the Georgia Power TRM 3.0 to calculate energy savings associated with this change, incorporating inputs for the specific water heater size at each affected home in the evaluation sample. The Beacon model's estimates for this measure, averaging about 660 kWh per water heater, were found to be significantly higher than algorithm-based values.

For air sealing measures, the program-tracked energy savings values were determined to be conservative. The evaluation team applied industry standard algorithms for these measures, with consistency to the algorithms used for Individual Improvements and incorporating site-specific CFM50 reductions and HVAC system efficiencies. The Beacon model's estimate of energy savings from air sealing was approximately 128 kWh savings per home on average, while the evaluation results determined a higher value of 535 kWh on average.

Table 57 highlights the algorithms used to develop *verified* gross estimates for key measures. All *tracked* savings are developed using Beacon energy models and are intended to be site-specific incorporating the specific baseline conditions of each home as well as the package of installed measures. The applied engineering algorithms were selected for consistency with Individual Improvements measures where appropriate.

Table 57. 2023 HEIP Whole House Notable Differences Between *Tracked* and Verified *Gross*

MEASURE	TRACKED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES AND ASSUMPTIONS
Air Sealing	Site-specific tracked savings developed from outputs of customized Beacon energy models for each home.	Algorithm based on Georgia Power TRM 3.0 with site-specific pre- and post-improvement blower door test results used as inputs.
Attic Insulation		Algorithm from Illinois TRM v12 with adjustments to weather variables for GA climate. Site specific R-values based on project documentation and site visit measurements.
Duct Sealing		Algorithm based on 2021 Georgia Power evaluation report with average CFM25 reduction value based on project documentation, when provided.
LED Lighting		Algorithm based on 2021 Georgia Power evaluation report. ISRs developed from site visit verifications.
Temperature Turn Down		Algorithm from Illinois TRM v12 using pre- and post-temperature set points and water heater capacity based on project documentation and site visit measurements.

Table 58 and Table 59 show the program's tracked savings and verified gross savings for energy and demand respectively. Verified gross energy savings achieved 90% of the program's tracked energy savings.

Table 58. 2023 HEIP Whole House *Tracked* and *Verified* Gross Electric Energy Savings

MEASURE	TRACKED ELECTRIC ENERGY SAVINGS (kWh)	VERIFIED GROSS ELECTRIC ENERGY SAVINGS (kWh)
Air Sealing	25,972	108,548
Attic Insulation	250,503	271,985
Duct Sealing	115,805	146,724
Water Heating	110,493	31,233
HVAC Tune Up	98,839	60,501
LED Lighting	416,788	269,934
Other	103,034	102,662
Whole House Multifamily [a]	189,941	189,941
Total Savings	**1,311,375**	**1,181,529**
Total Savings Excluding Lighting	**894,587**	**911,594**

[a] VisionDSM does not provide a breakout of Whole House multifamily savings by measure. There are likely lighting savings within this group, but the evaluation team is unable to disaggregate these savings from other measure savings.

Table 59 includes tracked and verified demand savings for summer and winter peak periods. These were developed by considering the coincidence of each evaluated measure with Georgia Power's defined summer and winter peak periods. For summer peak, population totals were developed by extrapolating evaluated RR for sampled projects to the population. Because Georgia Power does not collect or report winter peak demand savings, the evaluation team extrapolated winter peak savings for the evaluation sample to the population by applying a ratio of verified winter peak demand reduction to verified energy savings.

Table 59. 2023 HEIP Whole House *Tracked* and *Verified* Gross Peak Demand Reduction

MEASURE	TRACKED SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS WINTER PEAK DEMAND REDUCTION (kW)
Air Sealing	9	55	2
Attic Insulation	156	125	30
Duct Sealing	64	71	14
Water Heating	16	3	5
HVAC Tune Up	52	12	7
LED Lighting	63	51	54
Other	46	51	9
Whole House Multifamily [a]	41	41	0
Total Savings	**447**	**410**	**121**
Total Savings Excluding Lighting	**384**	**359**	**67**

[a] VisionDSM does not provide a breakout of Whole House Multifamily savings by measure. There are likely lighting savings within this group, but the evaluation team is unable to disaggregate these savings from other measure savings.
Note: Totals may not sum properly due to rounding.

Manufactured Homes

Table 60 shows the *tracked* deemed savings (net) and *verified* gross savings for the 2023 HEIP Manufactured Homes measures. Verified energy savings values were found to be lower than tracked savings values for these measures. Apart from the Smart Thermostat measure, lower RR were attributed to equipment ISRs and variations in baseline assumptions. Installed equipment quantities were found to vary due to multiple reasons including inaccuracy in originally tracked values and later the homeowner's decision to remove installed equipment.

Table 60. 2023 HEIP Manufactured Homes Per Unit Tracked and Verified Gross Savings

MEASURE	PER UNIT TRACKED SAVINGS			PER UNIT VERIFIED SAVINGS		
	kWh	SUMMER kW	WINTER kW	kWh	SUMMER kW	WINTER kW
Advanced Power Strip	90	0.017	n/a	10	0.002	0.002
Water Heating	205	0.020	n/a	169	0.023	0.026
LED Lighting	61	0.004	n/a	29	0.004	0.004
Smart Thermostat	588	0.156	n/a	527	0.115	0.106

Poor ISRs were particularly impactful for APS. The evaluation team observed very few instances of correct APS usage, resulting in an evaluated ISR of 13%. Several participants said they had ceased to use their APS because of confusion over how to use (comments to the effect of "several of the plugs don't work"). For APS still in use, the evaluation team primarily observed usage of only the 'always on' plugs, with no loads connected to the controlled plugs where energy savings are achieved.

For LED lighting measures and Water Heating measures, assumptions in place for energy savings were found to be overstated. The evaluation team developed energy savings using data collected on-site and engineering algorithms to develop gross verified energy savings. For interior and exterior lighting, verified savings were based on a blended baseline lamp wattage assumption that incorporated a mixture of inefficient lighting types. For Water Heating measures, the primary adjustment was due to the observed equipment ISR of 88%. Aerators and showerheads in several homes in the evaluation sample were uninstalled at the time of the evaluation.

Table 61 highlights and summarizes notable differences between tracked and verified gross estimates for key measures, including ISR results for all measure types.

Table 61. 2023 HEIP Manufactured Homes Notable Differences Between Tracked and Verified Gross

MEASURE	TRACKED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES AND ASSUMPTIONS	PRIMARY REASONS FOR DIFFERENCES
Advanced Power Strip	*Tracked* energy savings align with the savings values attained from the 2021 TEAPOT study. Tracked values are specific to manufactured homes.	Algorithm from Illinois TRM v12. Savings dependent on number of plugs in the installed advanced power strip, which is based on project documentation and site visit measurements.	Equipment ISRs as observed through participant self-reports and site visit data collection. ISR 13%.
Water Heating	*Tracked energy savings* from AEG planning resources. The original source of reported values is unclear	Algorithms based on 2021 Georgia Power evaluation. Number of faucet aerators and showerheads installed determined via project documentation and site visits measurements.	Equipment ISRs as observed through participant self-reports and site visit data collection. ISR 88%.
LED Lighting	*Tracked* energy savings align with the savings values attained from the 2021 TEAPOT study. Tracked values are specific to manufactured homes.	Algorithm based on 2021 Georgia Power evaluation with site-specific baseline and retrofit lamp wattages used as inputs.	Equipment ISRs as observed through participant self-reports and site visit data collection. ISR 98%.
Smart Thermostat	*Tracked* energy savings align with the savings values attained from the 2021 TEAPOT study. Tracked values are specific to manufactured homes.	Billing analysis as described in Appendix 5C. HEIP Thermostat Net Impact Analysis	Results of 2023 billing analysis were slightly higher for single-family homes as compared to 2021 results. ISR 100%.

Table 62 and Table 63 show the program's tracked net savings and verified gross savings, respectively. Verified gross savings achieved 63% of the program's tracked net electric savings.

Table 62. 2023 HEIP Manufactured Homes Tracked and Verified Gross Electric Energy Savings

MEASURE	TRACKED ELECTRIC ENERGY SAVINGS (kWh)	VERIFIED GROSS ELECTRIC ENERGY SAVINGS (kWh)
Advanced Power Strip	63,611	7,038
Water Heating	253,126	209,183
LED Lighting	424,501	195,585
Smart Thermostat	222,341	199,187
Total Savings	**963,579**	**610,992**
Total Savings Excluding Lighting	**539,078**	**415,407**

Note: Totals may not sum due to rounding

Table 63 includes tracked and verified demand savings for summer and winter peak periods. These were developed by considering the coincidence of each evaluated measure with Georgia Power's defined summer and winter peak periods.[23] For summer peak, population totals were developed by extrapolating evaluated RRs for sampled projects to the population. Because Georgia Power does not collect or report winter peak demand savings, the evaluation team extrapolated winter peak savings for the evaluation sample to the population by applying a ratio of verified winter peak demand reduction to verified energy savings.

Table 63. 2023 HEIP Manufactured Homes Tracked and Verified Gross Peak Demand Reduction

MEASURE	TRACKED SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS WINTER PEAK DEMAND REDUCTION (kW)
Advanced Power Strip	12	2	2
Water Heating	25	28	32
LED Lighting	106	23	30
Smart Thermostat	59	43	40
Total Savings	**203**	**96**	**104**
Total Savings Excluding Lighting	**96**	**73**	**74**

Note: Totals may not sum due to rounding

Online Marketplace

Table 64 shows the *tracked* deemed savings (net) and *verified* gross savings for the 2023 HEIP Online Marketplace measures. For non-thermostat measures, verified energy savings values were found to be the same or higher than tracked savings values. For Dehumidifiers, the algorithm in use was found to be accurate

[23] Summer peak window is defined as a one-hour period, 4pm to 5pm, on July weekdays. Winter peak window is defined as a one-hour period, 8am-9am on January weekdays.

but tracked savings were based on a smaller capacity dehumidifier than what was incentivized on average in 2023 (planned 38.9 pints per day vs 2023 average of 62 pints per day).

Results of the panel regression billing analysis conducted for Smart Thermostats results in a per-unit verified gross energy savings of 410 kWh on average, factoring in the NTG result for 2023.

Table 64. 2023 HEIP Online Marketplace Per Unit Tracked and Verified Gross Savings

MEASURE	PER UNIT TRACKED SAVINGS			PER UNIT VERIFIED GROSS SAVINGS		
	kWh	SUMMER kW	WINTER kW	kWh	SUMMER kW	WINTER kW
Advanced Power Strip	120	0.023	n/a	120	0.013	0.020
Dehumidifier	129	0.017	n/a	204	0.040	0.051
Electric Vehicle Charger	37	0.005	n/a	37	0.004	0.004
Home Energy Management System	757	0.165	n/a	757	0.165	0.079
Smart Thermostat	346	0.070	n/a	410	0.112	0.146

Table 65 highlights and summarizes notable differences between tracked and verified gross estimates for key measures.

Table 65. 2023 HEIP Online Marketplace Notable Differences Between Tracked and Verified Gross

MEASURE	TRACKED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES AND ASSUMPTIONS	PRIMARY REASONS FOR DIFFERENCES
Dehumidifiers	*Tracked* energy savings align with the Georgia Power TRM 3.0, for average capacity of 39 pints per day.	Algorithm from the Georgia Power TRM 3.0, adjusted for average capacity recorded in 2023 tracking data (62 pints per day).	Dehumidifier capacity is higher on average than planned value.
Smart Thermostats	Tracked kWh and kW savings are averaged from the prior evaluation results for gross savings achieved per home, with a 93% NTG adjustment.	Verified kWh savings are based on regression analysis of 2022 participants with a matched control group.	The primary differences between the two studies are (1) details of the evaluation methodologies were different, including matching processes and regression analysis methods, and (2) the evaluation timeframe of the prior evaluation included the peak of the COVID-19 pandemic.[a] Non-routine customer behavior during this period may have affected the prior study's results.

[a] The prior evaluation was based on 2019-Q1 2020 participants, so the analyzed post installation billing data ranged from February 2019 through March 2021.

Table 66 and Table 67 show the program's tracked savings and verified gross savings, respectively. Verified gross savings achieved 118% of the program's tracked electric savings.

Table 66. 2023 HEIP Online Marketplace Tracked and Verified Gross Electric Energy Savings

MEASURE	TRACKED ELECTRIC ENERGY SAVINGS (kWh)	VERIFIED GROSS ELECTRIC ENERGY SAVINGS (kWh)
Advanced Power Strip	198,441	198,441
Dehumidifier	8,000	12,670
Electric Vehicle Charger	36,333	36,333
Home Energy Management System	4,543	4,543
Smart Thermostat	7,030,867	8,336,173
Total Savings	**7,278,184**	**8,588,160**

Table 67 includes tracked and verified demand savings for summer and winter peak periods. These were developed by considering the coincidence of each evaluated measure with Georgia Power's defined summer and winter peak periods.[24] For summer peak, population totals were developed by extrapolating evaluated RR for sampled projects to the population. Because Georgia Power does not collect or report winter peak demand savings, the evaluation team extrapolated winter peak savings for the evaluation sample to the population by applying a ratio of verified winter peak demand reduction to verified energy savings.

Table 67. 2023 HEIP Online Marketplace Tracked and Verified Gross Peak Demand Reduction

MEASURE	TRACKED SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED GROSS WINTER PEAK DEMAND REDUCTION (kW)
Advanced Power Strip	38	21	33
Dehumidifier	1	2	3
Electric Vehicle Charger	5	4	4
Home Energy Management System	1	1	0
Smart Thermostat	1,424	2,276	2,962
Total Savings	**1,469**	**2,304**	**3,003**

Net-to-Gross

The following sections describe the NTGRs for all program pathways, including HEIP measures rebated through the Online Marketplace.

Whole House, Individual Improvements, Manufactured Homes

As described above, the evaluation team developed NTGRs based on surveys with HEIP program participants. Findings from contractor interviews were used as a consistency check.

[24] Summer peak window is defined as a one-hour period, 4pm to 5pm, on July weekdays. Winter peak window is defined as a one-hour period, 8am-9pm on January weekdays.

Table 68 shows the NTGRs by program pathway (i.e., Whole House, Individual Improvements, and Manufactured Homes), along with the margin of error and confidence of these estimates. Table 69 provides the program's tracked and verified net electric energy savings. Appendix 5B. HEIP Non-Thermostat Impact Calculation Overview provides comprehensive inputs and calculations for each of these values. The NTG estimate for the Whole House pathway did not achieve 90/10 confidence and precision due to low survey response for this group. Although this confidence and precision is outside the ideal margin of error (+/- 10%), the evaluation team recommends applying this NTGR given its similarity to the other channels and its consistency with contractor interview findings.

Table 68. 2023 HEIP Program NTGRs by Pathway

PATHWAY	NTGR	MARGIN OF ERROR [a]	SAMPLE SIZE
Whole House	69%	13%	37
Individual Improvements	71%	10%	69
Manufactured Homes	72%	9%	68

[a] Margin of error at 90% confidence interval

Table 69. 2023 HEIP Program Tracked and Verified Net Electric Energy Savings

PATHWAY	TRACKED ENERGY SAVINGS (MWh)	VERIFIED NET ENERGY SAVINGS (MWh)	TRACKED PEAK DEMAND REDUCTION (kW)	VERIFIED NET PEAK DEMAND REDUCTION (kW)
Whole House	1,311	815	447	283
Individual Improvements	1222	967	349	273
Manufactured Homes	964	440	203	69
Total Savings	**3,497**	**2,222**	**998**	**625**

Table 70 highlights the yearly differences in the program free-ridership, spillover, and NTG values of the HEIP program. The NTG for the Individual Improvements pathway is closely aligned with the value from last cycle, which chose to carry forward the NTGRs from the 2017 evaluation, without nonparticipant spillover. The NTG for the Manufactured Homes pathway is likely a conservative estimate.[25] To allow for free-ridership questions to be asked for each included measure, the evaluation team included a simplified free-ridership battery that asked about the respondent's intention, but not the influence of specific program elements on their decision making.

[25] This NTGR is applicable for those customers who participate through the Manufactured Homes channel, where participants receive a limited number of direct install measures. The Individual Improvements NTGR is applicable for participants who live in manufactured homes but participate through the Individual Improvements channel.

Other free-ridership sections for Individual Improvements and Whole House respondents included questions about influence, which in the case of the Manufactured Homes channel, would have allowed the evaluation team to impress upon respondents that the measures were received for free and direct install, and ask how these factors changed their decision making. In this case, we believe that influence questions would increase the NTG value. Additional details are discussed in Appendix 5B. HEIP Non-Thermostat Impact Calculation Overview.

Table 70. 2017/2020 and 2023 HEIP NTG Benchmarks

	FREE-RIDERSHIP		SPILLOVER		NTGR	
PATHWAY	2017/2020	2023	2017/2020	2023	2017/2020	2023
Whole House	27%	33%	1%	2%	74%	69%
Individual Improvements	38%	34%	4%	5%	66%	71%
Manufactured Homes	NA	28%	NA	0%	NA	72%

Online Marketplace

As noted previously, the results of the billing analysis are inclusive of all adjustments typically made to thermostat impact results, including ISRs and NTG. However, previous evaluation results for thermostats resulted in gross savings, making comparisons of program savings across cycles challenging. To facilitate comparisons across cycles and provide an estimate of gross energy and demand savings, the evaluation team developed NTGRs based on the Online Marketplace survey.

The Online Marketplace included free-ridership and spillover batteries for customers who purchased thermostats. Table 71 shows the NTGRs by measure, and Table 72 provides the program's tracked and verified net electric energy savings. Appendix 5B. HEIP Non-Thermostat Impact Calculation Overview provides comprehensive inputs and calculations for each of these values.

Table 71. 2023 Online Marketplace NTGR

MEASURE	NTGR
Thermostats	71%

Table 72. 2023 HEIP Program – Online Marketplace Tracked and Verified Net Electric Energy Savings

PATHWAY	TRACKED ENERGY SAVINGS (MWh)	VERIFIED NET ENERGY SAVINGS (MWh)	TRACKED PEAK DEMAND REDUCTION (kW)	VERIFIED NET PEAK DEMAND REDUCTION (kW)
Online Marketplace	7,278	6,099	1,469	1,636
Total Savings	7,278	6,099	1,469	1,636

Table 73 highlights the yearly differences in the NTG values for thermostats. Last cycle, the evaluation team conducted a secondary literature review of NTG values developed for peer utilities. For this review, the evaluation team focused on similar program designs, where thermostats are rebated and self-installed by the customer. The evaluation team included the 2017 Georgia Power evaluation NTG results in this review, excluding nonparticipant spillover. The evaluation team then averaged the NTG results, resulting in an average 77% NTGR.

Table 73. 2020 and 2023 HEIP Thermostat NTG Benchmarks

YEAR	THERMOSTAT NTGR
2023	71%
2020	77%

Process Evaluation Results – Whole House, Individual Improvements, and Manufactured Homes Channels

Key findings include:

- Customers continue to report low awareness of other Georgia Power Energy Efficiency programs, with lower awareness among respondents who participated in the Whole House pathway.
- A third of customers said making their home more comfortable was a top motivator for program participation.
- Respondents who participated in the Individual Improvements pathway and were aware of the Whole House pathway most often decided to participate in Individual Improvements instead because they thought the Whole House pathway was too expensive.
- Nearly all customers were either very satisfied or satisfied with HEIP overall and all aspects of HEIP were also rated very highly: at least 90% were very satisfied or satisfied with the contractor experience, the quality of improvements, the amount of time it took to receive the rebate, energy savings since participation, and the rebate amount.

Participant and Contractor Feedback

The evaluation team surveyed 185 customers who participated in the program: 47 who completed the Whole House pathway (or Whole House combined with Individual Improvements), 70 who completed the Individual Improvements pathway, and 68 who completed the Manufactured Homes pathway. The survey was fielded mid-November to early December of 2023. Customer surveys were mixed mode, meaning they were fielded via both the web and phone. The survey was available in Spanish due to feedback from Georgia Power and the program implementer that there were many Spanish-speaking participants in the Manufactured Homes pathway. There were 33 respondents that completed the survey in Spanish, 31 of whom participated through the Manufactured Homes pathway.

Responses were analyzed by pathway for some questions. If not specified, the reported results are from the full survey excluding Online Marketplace participants. Responses related to HEIP measures that are available on the Online Marketplace are reflected in the following section.

In addition to customer surveys, we completed eight interviews with contractors that conducted work for HEIP. Of those contractors that did both Individual Improvements and Whole House projects, the balance varied from mostly Whole House projects to "99%" Individual Improvements. Four also do work for the EASE program. The contractors we spoke to have varying levels of participation in the program, from 2 to 15 years. Most of the contractors we spoke to are near a metro area, either Savannah or Atlanta. Findings from contractor interviews are woven throughout the following sections where applicable.

The following sections describe the results related to awareness, decision-making around participation, program experience, and satisfaction with the program, ending with an overview of additional contractor interview findings.

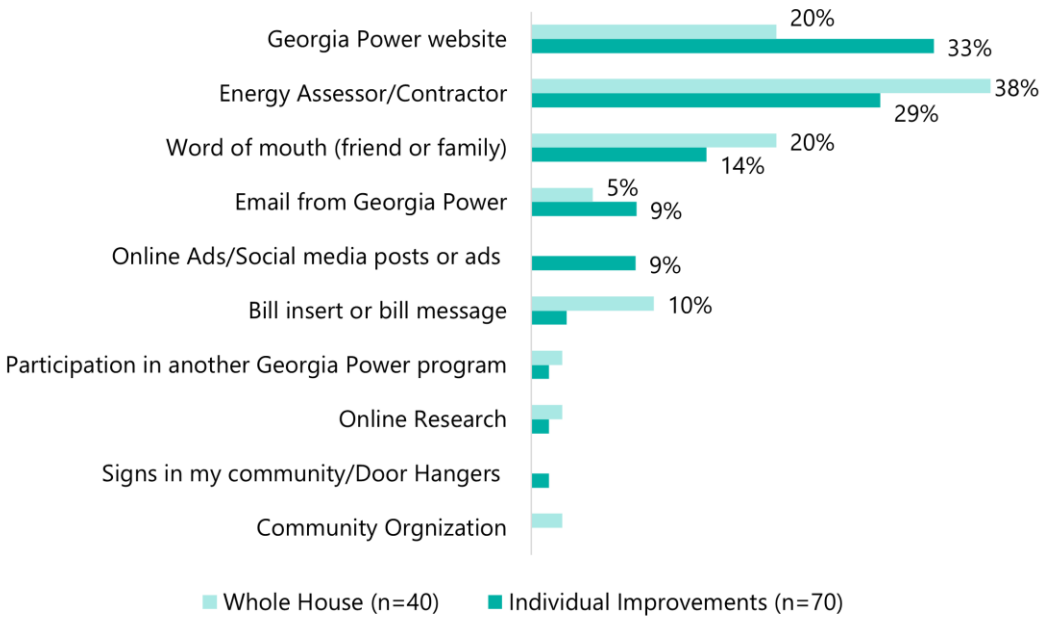
Program Awareness

The top three ways customers learned about HEIP were through contractors, Georgia Power's website, and word of mouth. Considerably fewer Whole House participants said they learned of the program through word of mouth compared with last cycle (20% and 50%, respectively). Conversely, more Whole House respondents mentioned contractors as a source of awareness of this cycle (38%) compared to last cycle (13%). Last cycle, program participation was driven by one contractor working in a specific region of Georgia, and customer demographics differed from typical program participation. This contractor and a partner organization they work with have deep connections in their community and rely on word of mouth to market the program. It's possible that how this single contractor spread awareness of the program impacted findings about awareness last cycle. These unique factors could be driving differences in program awareness between this cycle and last.

There were distinctly different trends for awareness by program pathway (Figure 22). Respondents in the Whole House pathway were more likely to learn about the program through a contractor, while Individual Improvements respondents most often heard about the program from the Georgia Power website. This greater awareness through a contractor in the Whole House pathway could be a result of the requirement that customers work with a participating Program Contractor; we heard from interviewed contractors that they often tell their customers about Georgia Power programs and encourage participation.

Interviews with Whole House and Individual Improvements contractors underscored that the two most common sources of program awareness are the Georgia Power website and contractor education. Contractors said that the Georgia Power website is a source of awareness about the program, and they will educate customers about the HEIP program if they did not already know about it.

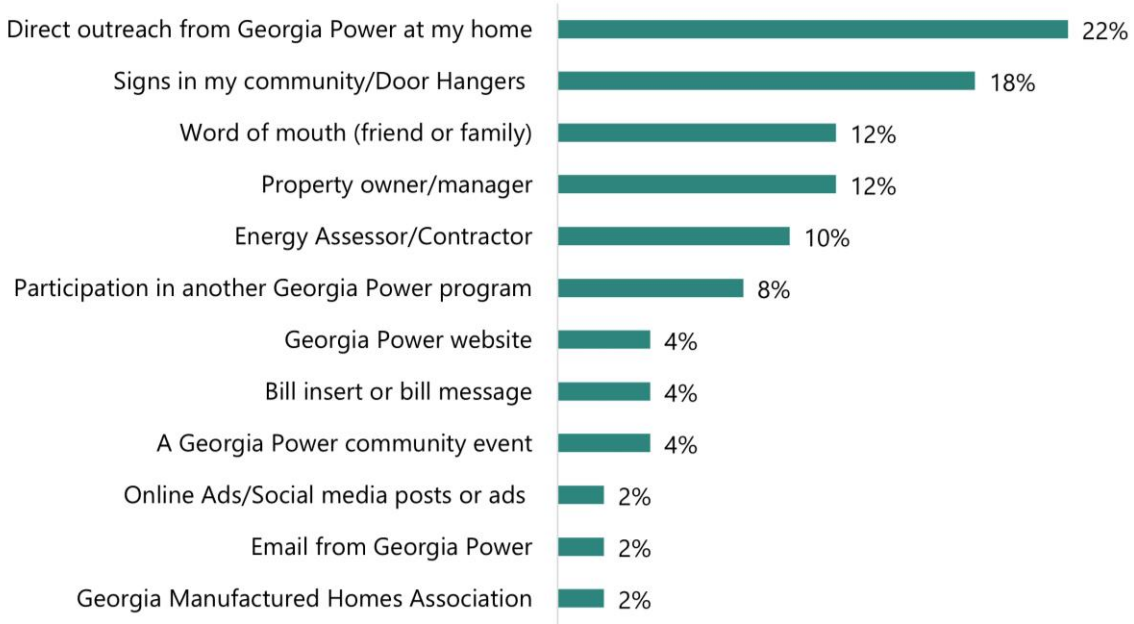
Figure 22. 2023 Sources of Program Awareness for Whole House/Combined and Individual Improvements



Source: HEIP customer survey. B1. How did you first learn about the Georgia Power Home Energy Improvement Program?

Manufactured Homes respondents were most likely to learn about the program through direct outreach from Georgia Power followed by from their property owner/ manager and word of mouth (22%, Figure 23). This source of awareness is consistent with Georgia Power's reported marketing channels for this initiative; the program implementer and Georgia Power are responsible for marketing the program.

Figure 23. 2023 Sources of Program Awareness for Manufactured Homes (n=50)

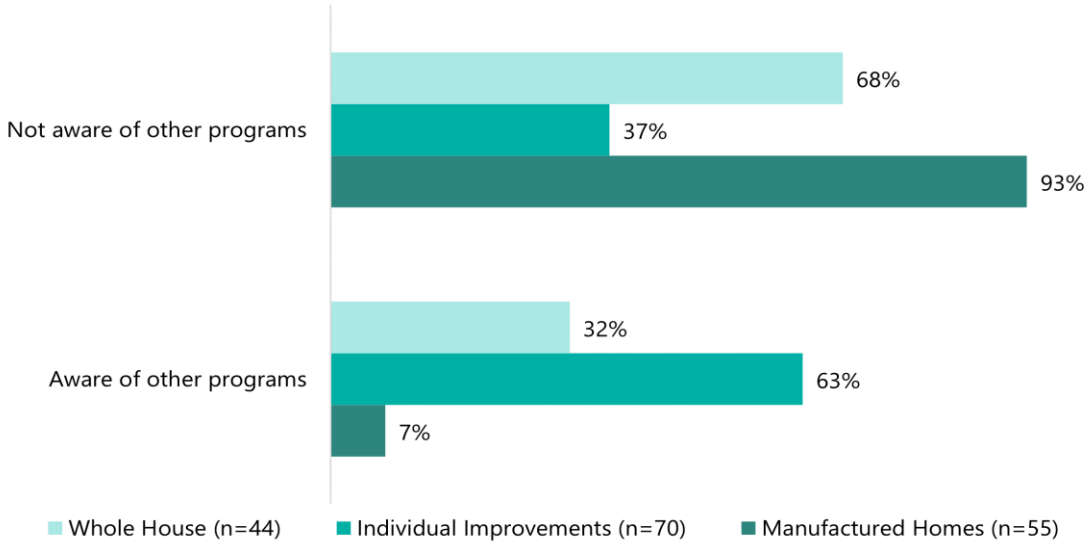


Source: HEIP customer survey. B1. How did you first learn about the Georgia Power Home Energy Improvement Program?

In the general population study, 19% of respondents were aware of HEIP. HEIP had the highest awareness of all programs asked about in the general population survey. Awareness of other Georgia Power Energy Efficiency programs was low across channels, and lowest among Manufactured Homes respondents, as shown in Figure 24, indicating an opportunity to increase awareness through cross-promotion. The direct install offering for Manufactured Homes in Georgia Power's service territory is new as of 2023, and is continuing to ramp up, working to find the best strategies for communicating with this hard-to-reach customer segment; this could be a driver of low awareness of other Georgia Power Energy Efficiency programs among Manufactured Homes respondents. For HEIP participants overall, under half (37%) reported that they were aware of any other Georgia Power Energy Efficiency programs, including Online Marketplace. Respondents that participated in the Individual Improvements pathway were most aware of other programs (63%). Some Whole House respondents (32%) and few Manufactured Homes respondents (7%) were aware of other programs. However, more Whole House and Individual Improvement respondents were aware of other programs (51%) compared to last cycle (44%).

Whole House and Manufactured Homes participants both interact with a Program Contractor or Georgia Power representative yet are less likely to be aware of other programs than Individual Improvements participants, indicating an opportunity for these contractors and auditors to cross-promote other Georgia Power programs.

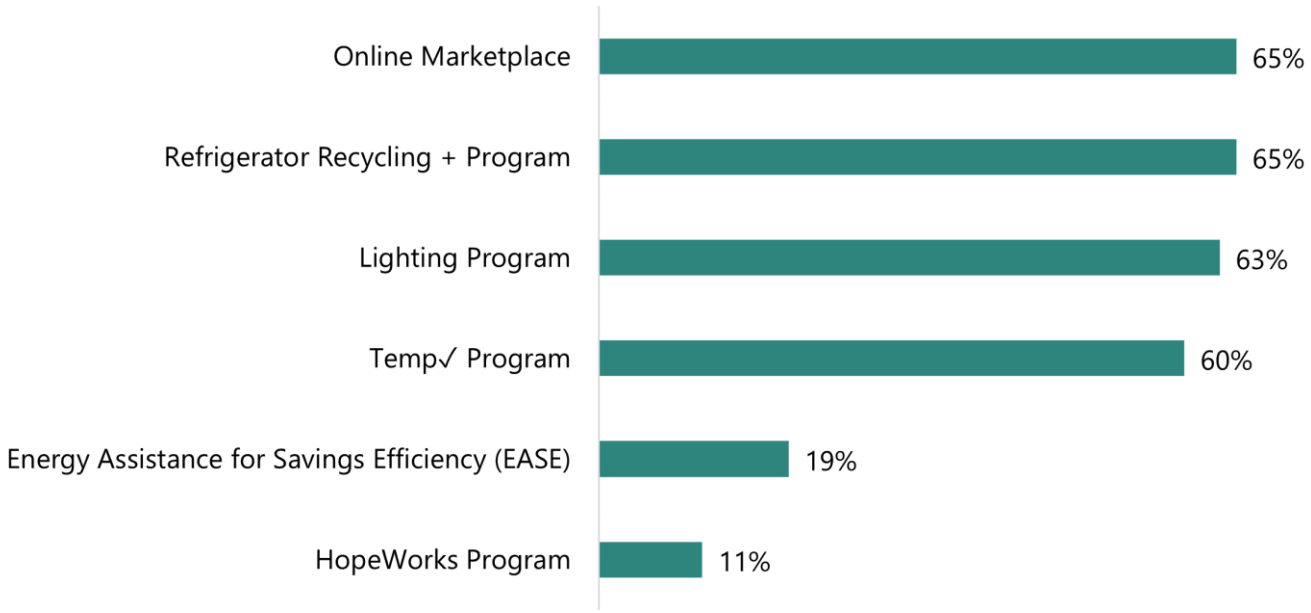
Figure 24. 2023 Awareness of Georgia Power Energy Efficiency Programs



Source: HEIP customer survey. B2. Are you aware of any other Georgia Power Energy Efficiency programs?
Note the percentages may not sum to 100% due to rounding.

Figure 25 shows that HEIP respondents were most frequently aware of Online Marketplace (65%), Refrigerator Recycling Plus Program (65%), Lighting program (65%), and Temp✓ program (60%).

Figure 25. 2023 Awareness of Specific Georgia Power Programs for HEIP Respondents (n=57)



Source: HEIP customer survey. B3. What energy efficiency programs are you aware of? We removed responses in open ends. Please select all that apply. Note the percentages may not sum to 100% because multiple response options were allowed.

Motivations and Decision-Making

The evaluation team asked respondents why they chose to participate in HEIP to understand factors driving participation, and factors that could be leveraged to increase participation further. Saving money on their utility bills, saving energy, receiving a rebate, and comfort were primary reasons.

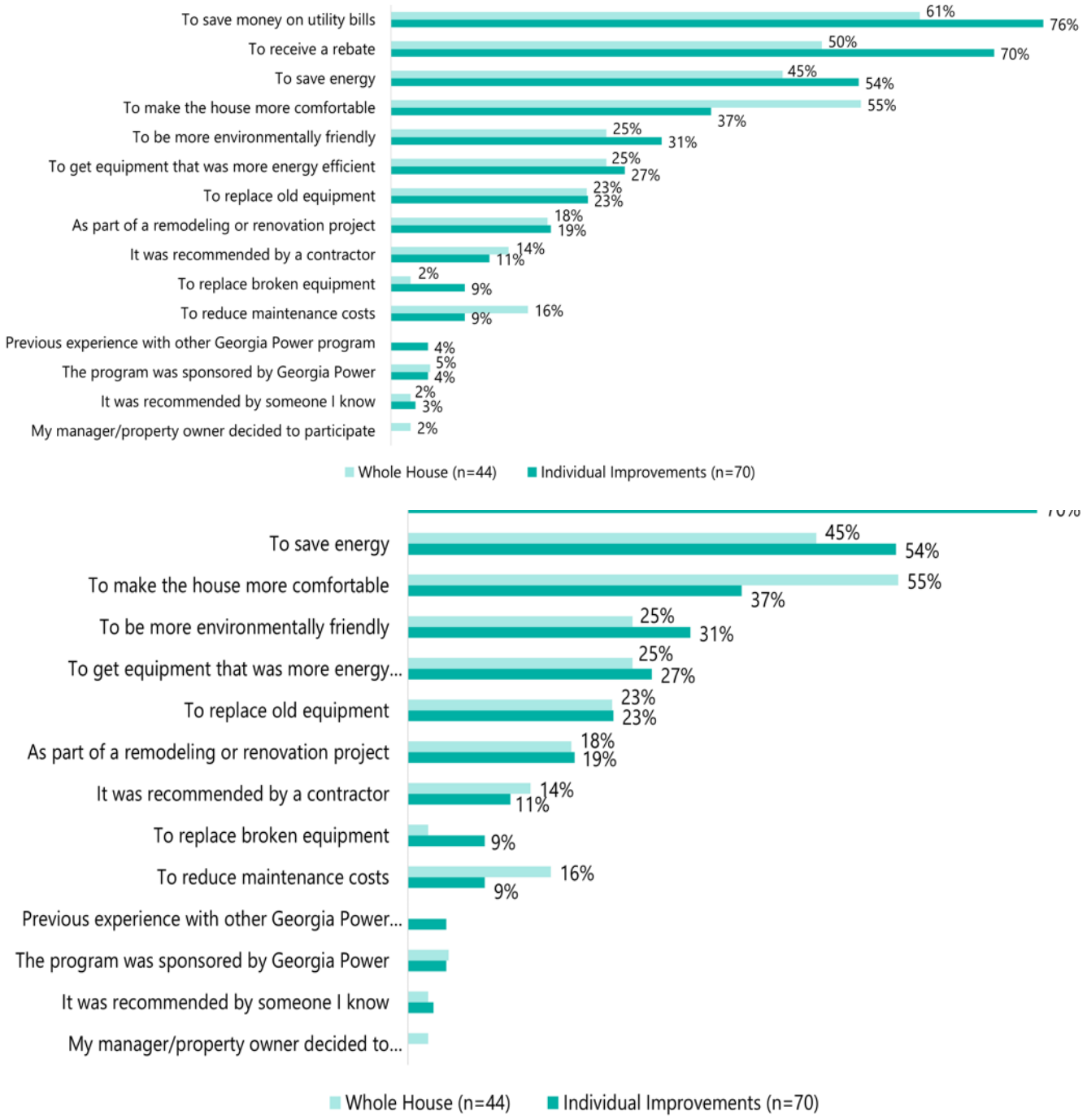
Whole House and Individual Improvements participants had slightly different motivations (Figure 26). Whole House participants focused more on making the house more comfortable than Individual Improvements participants, whereas Individual Improvements participants focused more on the financial benefits (saving more on their energy bills and the rebate) than Whole House participants.

While it is typical for customers to report saving money as a motivator, it could be especially top of mind for customers at this moment due to cost-of-living increases. Almost half of respondents (43%) indicated that price increases and inflation impacted their ability to make improvements to their home in the past year "a lot." These considerations will likely affect customers' decisions to install new equipment, as well as increase the importance of the bill and cost savings. These findings were echoed by the general population survey as well. Both owner and renter general population survey respondents were more likely to agree that they are worried about whether there is enough money to pay their bills than in the previous evaluation cycle in 2021.

Customers' stated motivations to participate in the Whole House and Individual Improvements pathways were echoed by the contractor interviews. Contractors said that customers' main drivers to participate in the

program are saving money, increasing comfort, and reducing emissions. They also said that Whole House is a better pathway for customers who want to prioritize comfort.

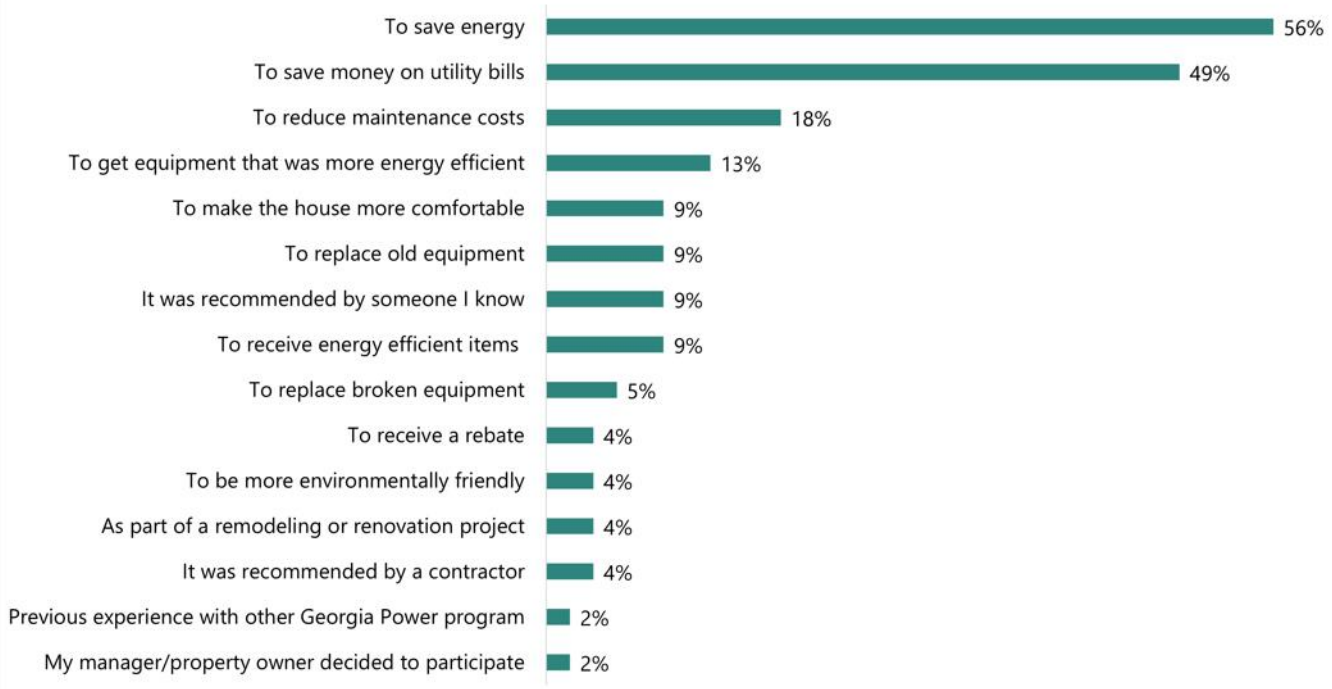
Figure 26. 2023 Motivations for HEIP Participation Whole House/Combined and Individual Improvements



Source: HEIP customer survey. C1. What motivated you to participate in the Home Energy Improvement Program? Please select all that apply. Note the percentages may not sum to 100% because multiple response options were allowed.

Motivations to participate in the Manufactured Homes pathway were similar, but more focused on saving money and energy (Figure 27). The top three motivations for this pathway were saving money on utility bills, saving energy, and reducing maintenance costs. Motivations to participate also differed some by the language that the respondent speaks. Spanish-speaking respondents were significantly more likely to say that they chose to participate to save energy. Consider emphasizing the energy-saving benefits of the program in Spanish marketing materials.

Figure 27. 2023 Motivations for HEIP Participation Manufactured Homes (n=169)



Source: HEIP customer survey. C1. What motivated you to participate in the Home Energy Improvement Program? Please select all that apply. Note the percentages may not sum to 100% because multiple response options were allowed.

Program Pathway Selection

Most (64%) Individual Improvements respondents knew about the Whole House pathway. This is higher than the last cycle when only 43% of respondents knew about the Whole House pathway. It is possible the increase in awareness is reflective of increased marketing of the program. The last evaluation was completed in 2021 and reflected customers' experience during COVID. Since then, the program returned to marketing all program pathways at a regular cadence following a pandemic-related pause. The increase in awareness may, in part, reflect the effectiveness of these marketing efforts.

Those who were aware of the Whole House pathway most often decided to participate in the Individual Improvements pathway because:

- They thought the Whole House pathway was too expensive (56%).
- They did not think they needed the other measures offered in the Whole House option (31%).

Whole House respondents decided to participate in the Whole House pathway for long term utility bill savings (21%), because they wanted their home to be more comfortable (16%), and because of the rebate amount (16%). Last cycle, a quarter of respondents were unsure why they participated in Whole House while none responded that they did not know this cycle.

Contractor influence and experience also factored into several customers' decisions to participate in the Individual Improvement versus the Whole House pathway. Of those respondents that chose to participate in Individual Improvements, two said it was due to the recommendation of the contractor, two said they couldn't find a contractor in their area (these respondents live in Suwanee and Dahlonega), two said they wouldn't be able to use the contractor they wanted, and one had a challenging experience with their contractor.

Contractors interviewed reported discussing the different pathways customers can take through the program to help them select the right pathway. However, they also report several challenges the Whole House pathway poses and reasons for promoting the Individual Improvements pathway.

First, they perceive upfront costs for improvements to be a primary barrier for customer participation in the Whole House pathway. This is consistent with customers' reports.

Two contactors also said they do not recommend the Whole House approach because they find that savings targets can be difficult to achieve. Two HEIP contractors that we spoke with said that they don't participate, or rarely participate, through the Whole House pathway because their companies don't offer enough improvements to reach targets or because customers have been unsatisfied with the savings they've seen after participation. Contractors that offer a subset of measures covered under the program, like just insulation and air sealing services or HVAC services only, were more likely to mention that Whole House savings targets are hard to meet. Whole House contractors that provide limited services said they've benefited from partnering with or referring customers to other contractors that offer additional services. Taken together with findings from the participant research, this suggests that what services contractors offer, and a lack of partnerships across contractors, could impact customer ability to participate through the Whole House pathway. Helping contractors to identify these partnerships could spur further Whole House participation.

Contractors that participate regularly through Whole House said that they work closely with customers and talk with them about Georgia Power rebates upfront to make sure they're a good fit for the program. Two contractors shared that it's important that customers understand the benefits of the improvements they're making beyond a pathway to a rebate. Some contractors believe that Whole House is a good fit for customers that want to maximize energy efficiency or comfort in their home.

Awareness Of Home Energy Assessment Tax Credits

In addition to incentives available through HEIP, there are tax credits available through the IRS that customers who do itemized tax reporting could use to offset the cost of energy-efficient upgrades. Homeowners and renters are eligible for tax credits up to 30% of total improvement expenses for qualified energy efficiency improvements and home energy audits. The program and evaluation teams were interested in understanding awareness of other available energy efficiency improvement funding, including these tax credits. Among respondents that received a home energy assessment, about half (48%) of respondents were aware of federal

income tax credits for energy efficiency home improvements and of those respondents, a third (30%) were aware of the IRS Home Energy Audit Tax Credit. This level of awareness suggests an opportunity for Georgia Power to continue to help customers understand the availability of additional incentives for a home energy assessment.

Currently, additional incentives and funding opportunities are limited to tax credits such as the IRS Home Energy Audit Tax Credit, The Georgia Environmental Finance Authority (GEFA) will be implementing additional incentive opportunities that the program could highlight for participants as they become available.

Helping customers understand the opportunity for braiding funds could help customers who participate in the Individual Improvements pathway overcome the cost barriers associated with participating in the Whole House pathway and achieve deeper savings.

Factors Impacting Home Improvement Decisions

As noted earlier, inflation and cost-of-living increases affect purchasing and home improvement decisions. These higher costs impress the importance of cost savings through program rebates especially to motivate decisions to purchase high-efficiency options.

In addition to cost savings, respondents also value quality. When making improvements in their home, respondents ranked quality over price and appearance. This, along with the motivation of improving comfort, emphasizes the value of non-energy and non-monetary benefits to customers.

Satisfaction with the Program

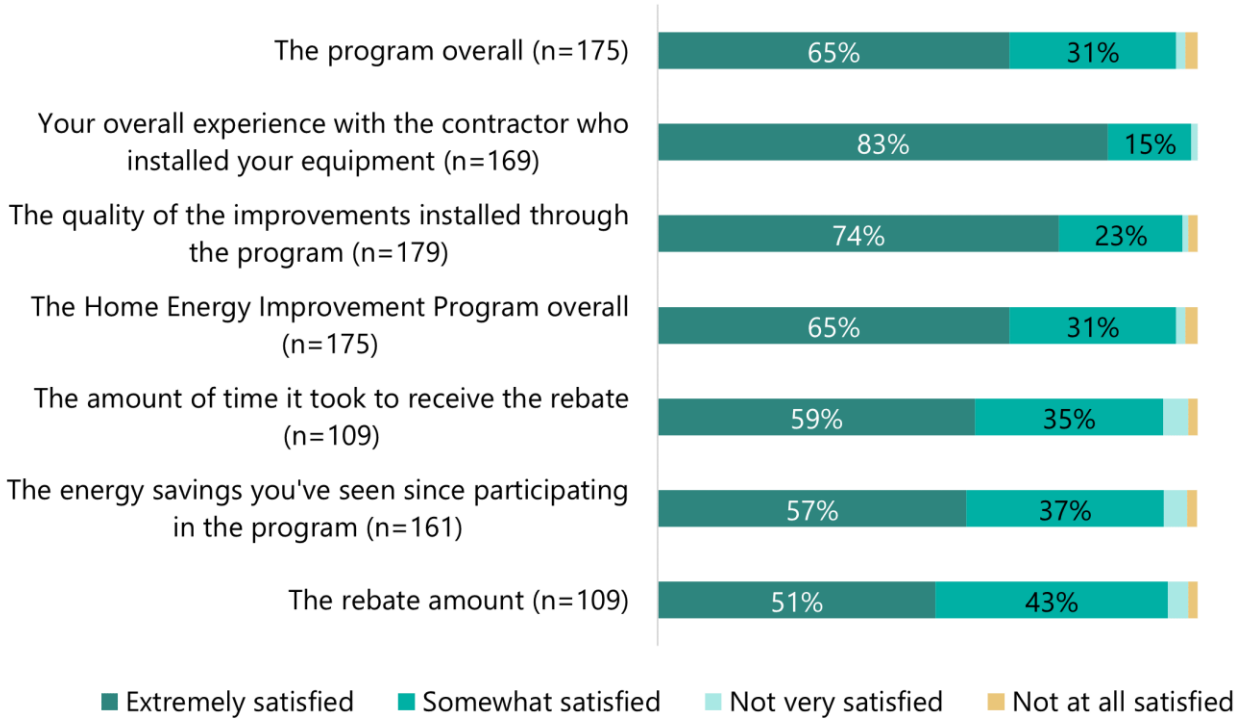
The following section describes respondents' satisfaction with HEIP and Georgia Power overall. For both, respondents were satisfied overall with their experiences.

Satisfaction with HEIP

Nearly all customers (96%) were either very satisfied or satisfied with HEIP overall (Figure 28) and all aspects of HEIP were also rated very highly; at least 90% were very satisfied or satisfied with the contractor experience, the quality of improvements, the amount of time it took to receive the rebate, energy savings since participation, and the rebate amount. Customers' satisfaction with energy savings increased from the prior cycle (94% compared with 88% in the prior cycle reported they are satisfied).

There were no major differences in satisfaction with the program overall between pathways. Satisfaction with the rebate amount was higher for Whole House respondents (100%) compared to Individual Improvements respondents (94%). Eleven percent of Manufactured Homes customers were not very satisfied or not at all satisfied with the energy savings they have seen since participating in the program compared to 3% of Individual Improvements and Whole House respondents.

Figure 28. 2023 Satisfaction with HEIP



Source: HEIP customer survey. N1. Please answer a few questions about your satisfaction with your experience with the Home Energy Improvement Program. How satisfied are you with the following aspects of the Home Energy Improvement Program?

Most (72%) participants said they would likely recommend HEIP to a friend or colleague. These participants rated their likelihood to recommend the program a 9 or 10 on a scale of 1 to 10 where 1 was "not at all likely" and 10 was "extremely likely". A sixth of respondents (16%) rated their likelihood as a 6 or below.

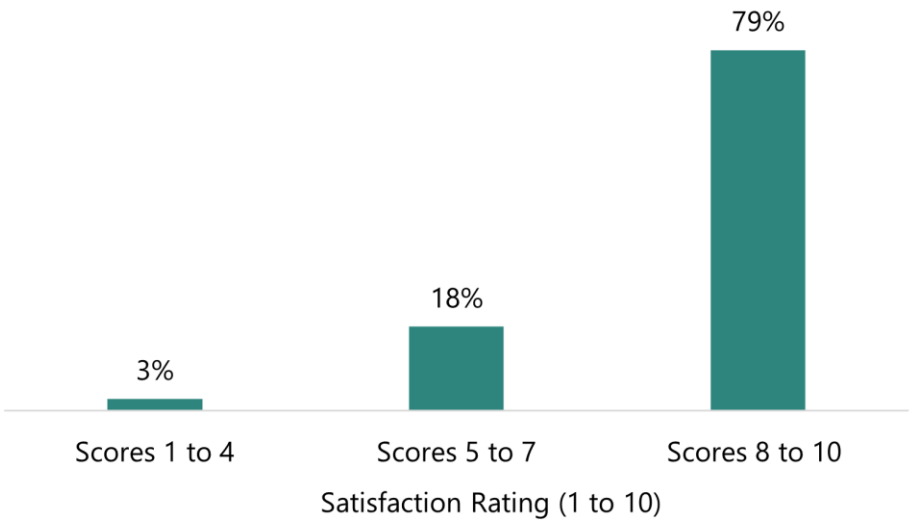
Changes to Comfort

Most Whole House and Individual Improvements homeowners (80%) said their home is more comfortable since participating in the program and only 1% said their home is less comfortable. This is especially true within the Whole House pathway where 86% reported that their home is more comfortable.

Satisfaction with Georgia Power

Overall, HEIP participants were satisfied with Georgia Power (Figure 29). Over three-fourths (79%) of customers rated their satisfaction as an 8, 9, or 10 on a scale of 1 to 10 where 1 was "not at all satisfied" and 10 was "extremely satisfied." The mean satisfaction score was 8.6 out of 10. Satisfaction is very similar to the last cycle, when 78% of respondents rated their satisfaction as an 8, 9, or 10 and the mean satisfaction score was 8.4 out of 10.

Figure 29. 2023 Satisfaction with Georgia Power (n=185)



Source: HEIP customer survey. N4. Taking into consideration all aspects of your utility service experience, please rate your current satisfaction with Georgia Power overall.
Note the percentages may not sum to 100% due to rounding.

Participant Survey Demographics

This section summarizes participant living and household characteristics. See Appendix 5A. Survey Demographics for more detailed demographic data.

With some exceptions, Whole House and Individual Improvement customers are characteristically similar. They:

- Live in single-family homes (87%).
- Moved recently, having lived in their homes for three years or less (54%).
- Have a four-year college degree or graduate or professional degree (81% Whole House and 78% Individual Improvement).
- Had no recent employment change (86%).
- Identified English as their primary language (95%).

Characteristics for respondents who participated in Manufactured Homes differed from those of Whole House and Individual Improvements respondents. Manufactured Homes respondents had lower annual household income than Whole House and Individual Improvements customers. Approximately three quarters (73%) of Manufactured Homes respondents had incomes under 200% of the Federal Poverty Line (FPL), meeting income qualification requirements for EASE. Over a third of Manufactured Homes respondents (66%) identified English as the language they speak at home as well as Spanish (59%).

Contractor Engagement and Experience

Contractors are a critical trade ally partner to the program. Through interviews, they provided valuable insight into their engagement and experience with the program. This insight is summarized below, where not discussed with similar participant survey findings.

The eight HEIP contractors we spoke to engaged with the program to varying degrees; this ranges from one contractor who only participates when customers request it to others for whom the program makes up 99% of their business. Contractors with limited engagement in the program also had more limited awareness of the program. One contractor that wasn't very engaged expressed interest in learning more about the program to potentially participate more. Contractors that are very engaged expressed gratitude for the program, saying their "whole livelihood [is] based on the program." Engaged contractors value the credibility the program provides them. They noted that being part of the program improves their ability to sell their services and "close deals" with customers.

"Having GPC's name on it is helpful for small businesses like us, [we've] got GPC's name behind us." - HEIP program contractor

Third-party implementer. The evaluation team found that things seemed to be going more smoothly later in 2023 with the third-party implementer, after a rockier start. For contractors that feel uncertainty around the program, the transition in implementer added to that uncertainty of the program. The main pain points contractors have experienced with the third-party implementer of the HEIP program relate to technical knowledge of the program, and speed of communication.

Multiple contractors have struggled in interactions with implementer employees that don't have a lot of technical knowledge of the program yet. Some of these contractors understand that these employees are learning while others are frustrated by their experiences. A few contractors said they notice this with applications and paperwork. More of their applications get "kicked back" by the implementer for not having information that is already included than when the program was implemented in-house. In addition, contractors shared that it seems like there has been a lot of turnover for the third-party implementer which impacts the speed at which their staff can gain familiarity with the program.

A few contractors have had a hard time getting timely responses from implementer staff, particularly on questions related to the program. A contractor suggested this could be due to their lack of familiarity with the program. One contractor that struggled with hearing back from implementer staff has a new contact and said communication is getting better now. Another contractor said that it took them about six months to get into the program because pieces were moving slowly on the implementer's side. One contractor who has been in the program for a long time said they will just reach out to Georgia Power staff if they have any questions.

Process Evaluation Results – Georgia Power Online Marketplace

This section provides the key process evaluation findings for customers that purchased smart thermostats through the Online Marketplace. The Online Marketplace is a channel for Individual Improvements; however, due to the different program design models we are reporting the process findings in a separate section. Lighting measures purchased through the Online Marketplace are captured in the Specialty Lighting program. Therefore, Chapter 3. Residential Specialty Lighting Program Evaluation also addresses some components of the Online Marketplace (e.g., source of awareness).

Key findings include:

- Rebates and lower product costs are the major drivers of customers' decision to purchase thermostats on the Online Marketplace.
- Manufacturer sale events were effective strategies driving Online Marketplace participation where customers were aware of a sale, however, only about half of customers who purchased a thermostat during a sale event were aware of the sale.
- Respondents are overall satisfied with the Online Marketplace but are interested in seeing a wider variety of products and better product descriptions.

Participant Feedback

ILLUME fielded a survey in October 2023 to customers that had purchased lighting products, thermostats, EV chargers, and APS. The survey results for lighting products can be found in Chapter 3. Residential Specialty Lighting Program. This section will primarily focus on respondents that purchased thermostats but will include some overall findings relevant for all respondents.

The evaluation team surveyed 147 customers who purchased thermostats through the Online Marketplace between January and October 2023. The evaluation team also fielded a general population survey which yielded 350 respondents.

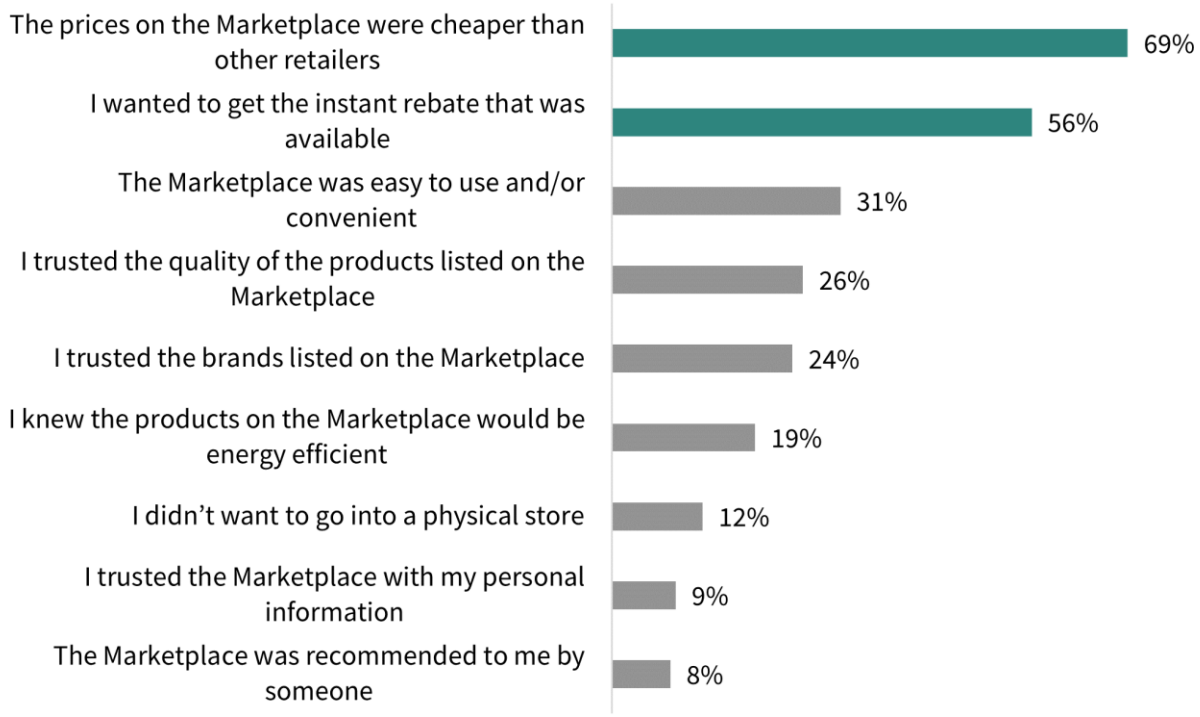
The following sections describe the results for customers who purchased thermostats related to source of awareness, purchase decision making, and how respondents use their thermostat. Then, sections detail experience and satisfaction with the Online Marketplace overall. We focus on thermostats below because 97% of the savings associated with the Online Marketplace measures included in HEIP were from thermostats.

Online Marketplace Thermostat: Motivations and Awareness

This section summarizes motivations and awareness for customers who purchased a thermostat through the Online Marketplace.

Customers predominantly used the Online Marketplace to purchase a thermostat because of the product cost, rebate, and the site's convenience/ease of use (Figure 30). When asked why they chose to purchase a thermostat through the Online Marketplace instead of another retailer, more than two-thirds of customers (69%) said that the prices on the Online Marketplace were cheaper than other retailers.[26] Another half said that they used the Online Marketplace to get the instant rebate that was available (56%). Over one-third of customers also reported choosing to purchase from the Online Marketplace because it was easy to use and/or convenient (31%). Most customers said they would use the Online Marketplace if they were to purchase a thermostat again in the future (95%, n=128).

Figure 30. 2023 Reasons for Purchasing from the Online Marketplace Instead of Another Retailer (n=141)



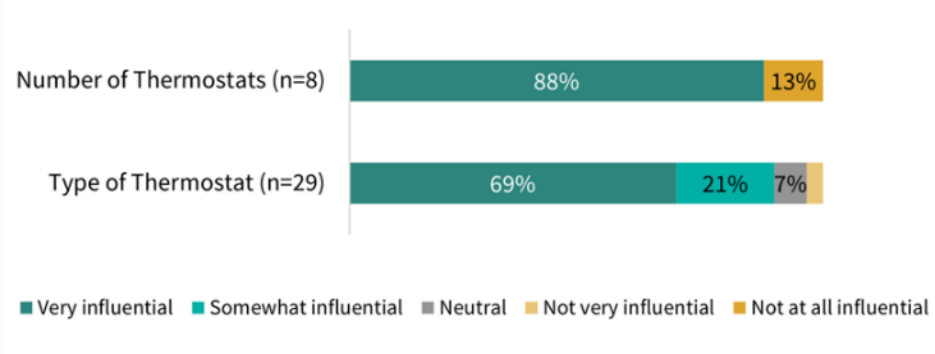
Source: Online Marketplace customer survey. F5. Why did you decide to buy a smart thermostat from the Georgia Power Online Marketplace instead of another retailer? Please select all that apply. Note the percentages may not sum to 100% because multiple response options were allowed.

Manufacturer sale events were an effective strategy to drive thermostat purchases through the Online Marketplace, however survey responses indicated opportunities to improve their effectiveness. When customers were aware of the manufacturer sale, customers indicated that it was influential. With that said, a high number of customers did not indicate awareness.

[26] Prices for thermostats on the Online Marketplace appear lower because Georgia Power's instant rebate is automatically incorporated into the price displayed on the website.

Forty-one percent of customers purchased a thermostat during a manufacturer sale. Of the 60 customers that did, around half were aware of the sale at the time of purchase. Of those 29 people, 90% indicated that the sale was either "very" or "somewhat" influential in their decision to purchase the *type* of thermostat that they purchased (Figure 31).

Figure 31. 2023 Influence of Manufacturer Sales on Thermostats Purchased

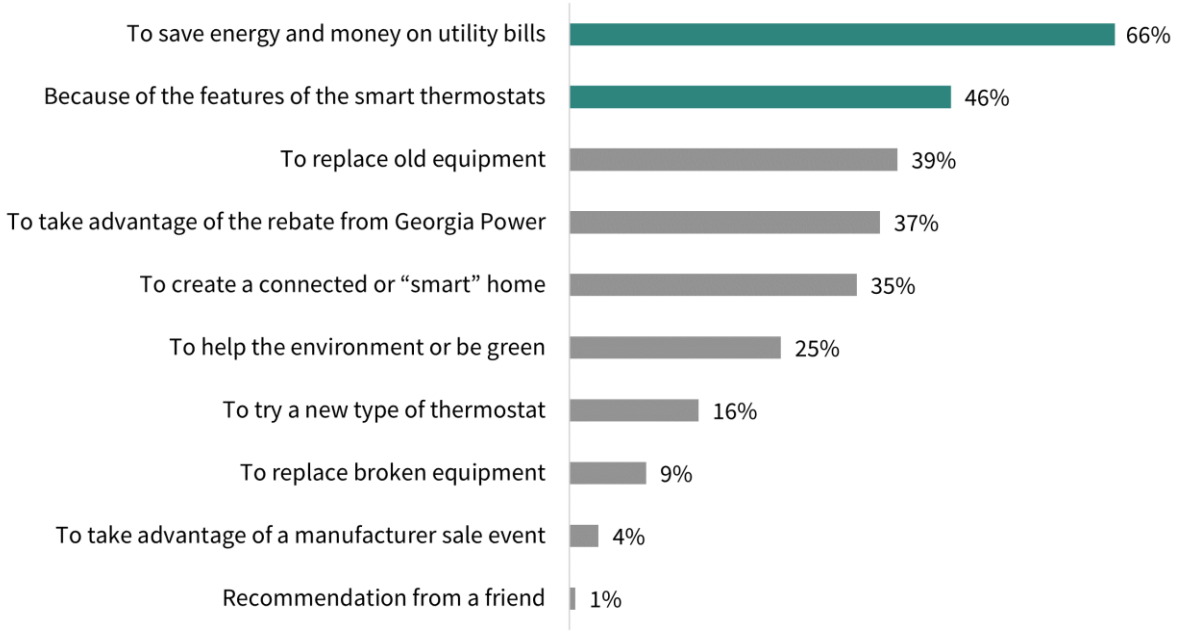


Source: Online Marketplace customer survey. F8, F9. How influential was the sale on your decision to purchase the type/number of thermostats that you did?

Online Marketplace Thermostat: Purchase Decision-Making

Most respondents purchased smart thermostats to save money on their utility bills (66%) as well as for the features of the smart thermostats (46%, Figure 32). Respondents also indicated that they wanted to replace old equipment or take advantage of the rebate from Georgia Power. As noted above, for customers who recalled purchasing a thermostat during a manufacturer sale, those additional discounts also motivated customer purchases.

Figure 32. 2023 Reasons for Decision to Purchase a Smart Thermostat (n=142)



Source: Online Marketplace customer survey. F1. Why did you decide to buy a smart thermostat at the time you did? Please select all that apply. Note the percentages may not sum to 100% because multiple response options were allowed.

Using the Online Marketplace

The Online Marketplace is easy for participants to use. The evaluation team asked how easy it was to use the Online Marketplace on a scale from one to five where one meant "not at all easy" and five meant "very easy". Most (86%) respondents reported that the Online Marketplace was "very easy" to use. Of the four respondents that said it was difficult to use, two discussed difficulties with the products they purchased, one person said that getting the rebate was difficult, and another said that it was not as intuitive as they hoped.

Additionally, the product descriptions are useful components of the Online Marketplace. Only 12 of the respondents said the product descriptions were not useful. Of these, four mentioned a desire for more detail about the products they were buying, including instructions on how to install and use the product.

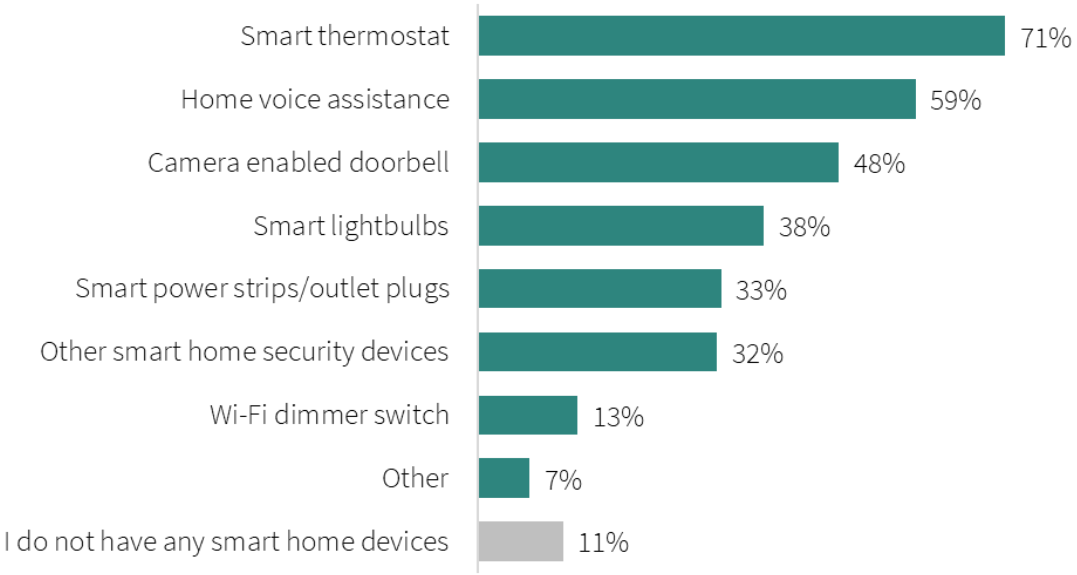
Interest in Smart Home Devices

Online Marketplace survey respondents were familiar with the idea of smart home devices, and while many have smart home devices in their home, there was low interest in purchasing additional devices in the next five years. Where there was interest in purchasing smart home products, smart thermostats were the most popular product type of interest. The majority (92%) of Online Marketplace survey respondents were familiar with the term "smart home," with about half of respondents (49%, n=171) reporting that they were "very" familiar. Just 8% said they were not at all familiar with the term.

When asked about existing smart home devices in their homes, 71% said they had a smart thermostat, and 59% said they had home voice assistance like Alexa or Google Assistant. Few respondents (11%) said they did

not have any smart home devices. Other smart home devices respondents owned are seen below in Figure 33.

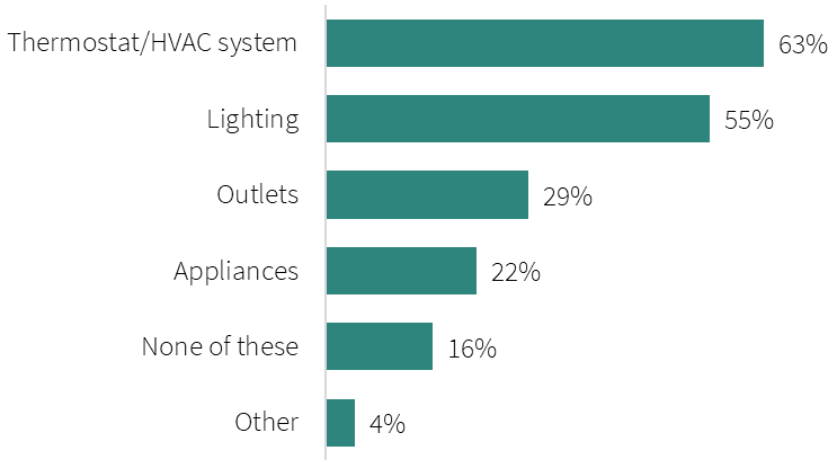
Figure 33 2023 Existing Smart Home Devices (n=349)



Source: Online Marketplace customer survey. B5. Which of the following smart home devices do you have in your home, if any? Multiple responses allowed so percents may not add to 100%.

When asked what systems in their home they were most interested in controlling with a smart device, most respondents were interested in their thermostat/HVAC (63%), followed by lighting (55%), and outlets (29%), as seen below in Figure 34.

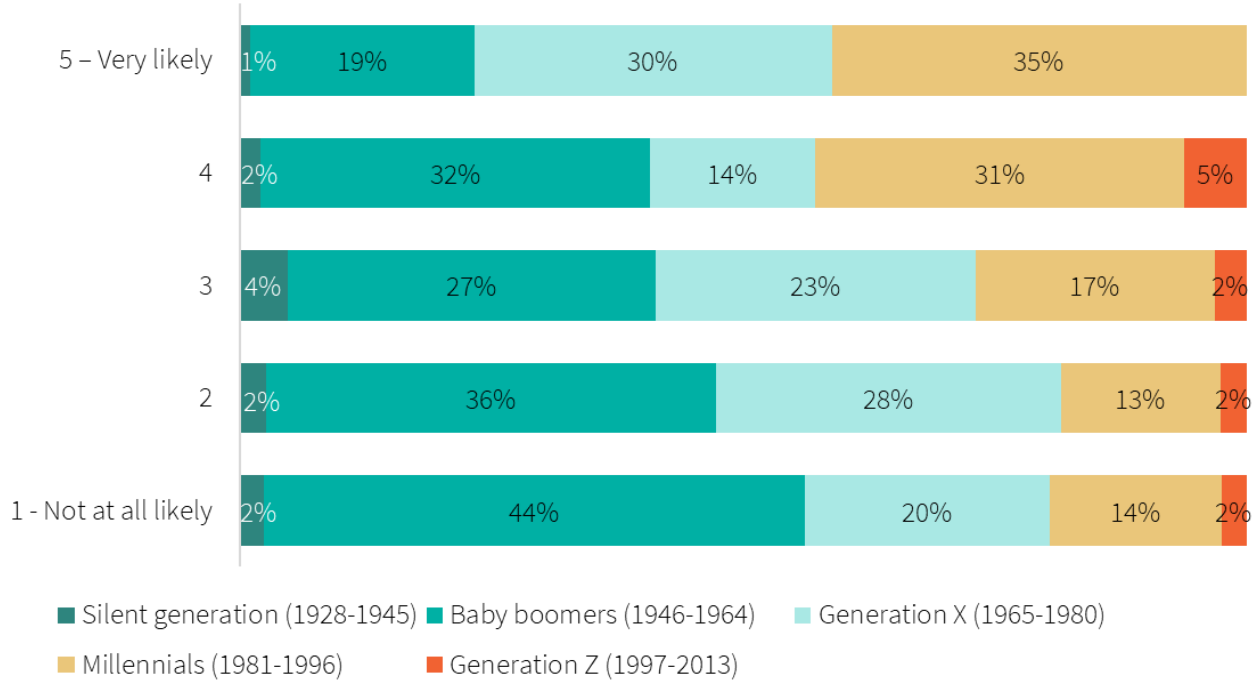
Figure 34 2023 Systems of Interest to Control with a Smart Device (n=348)



Source: Online Marketplace customer survey. B6 What systems in your home are you most interested in controlling with a smart device? Multiple responses allowed so percents may not add to 100%.

When asked how likely it would be for them to purchase any smart home device in the next year on a scale from one to five, where one means "not at all likely" and five means "very likely," 31% of respondents gave a 5. The average response was 3.4. The evaluation team was curious to know if there were differences between generations and their reported likelihood of purchasing a smart home device. While almost one third of respondents reported they were very likely to purchase a smart home device in the next year, these were mostly younger customers, primarily Millennials and Generation X respondents. Older customers, like those in the Baby Boomer generation, were less likely to purchase smart home devices. There were only seven Generation Z respondents. If Georgia Power were to include additional smart home devices in the Online Marketplace, the primary purchasers of these devices may be younger generations, thus it may be more effective to target marketing of these devices to these demographics. The distribution of responses by generation is seen below in Figure 35.

Figure 35 203 Likelihood of Purchasing a Smart Home Device in the Next Year by Generation (n=349)



Source: Online Marketplace customer survey. B6 What systems in your home are you most interested in controlling with a smart device?

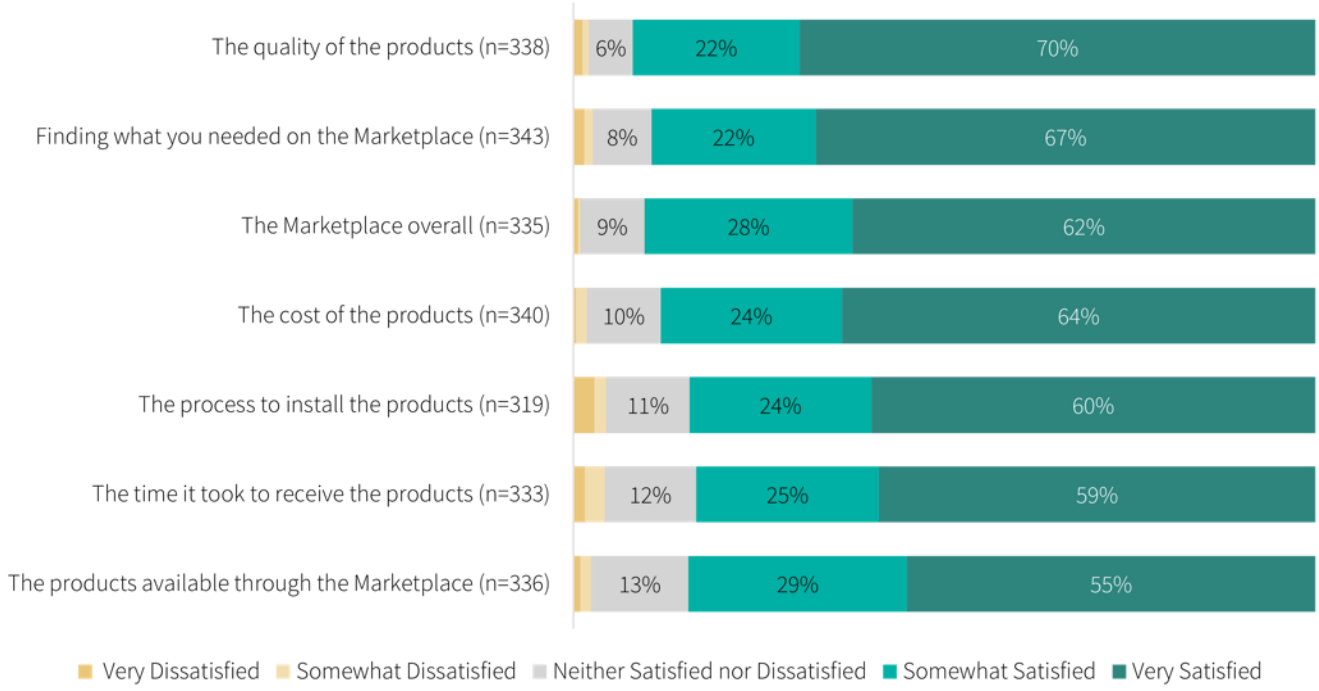
As discussed previously, there was only one respondent in this survey that purchased smart lightbulb(s). As such, we are unable to draw conclusions about motivations for purchasing smart lighting products from included survey questions.

Satisfaction with the Online Marketplace

Overall, survey respondents were satisfied with the Online Marketplace, indicating that the Online Marketplace is working well for customers. Respondents were asked to rate their satisfaction on a scale from one to five where one meant "very unsatisfied" and five meant "very satisfied". Most (90%) of respondents said they were either "very satisfied" or "satisfied" with the Online Marketplace overall, which is very similar to last

cycle where 92% of respondents reported the same. Respondents were most satisfied with the quality of the products, followed by finding what they needed in the Online Marketplace. Figure 36 below shows satisfaction with other elements of the Online Marketplace.

Figure 36. 2023 Satisfaction with the Online Marketplace



Source: Online Marketplace customer survey. L1. Please rate your satisfaction with each of the following aspects of the Georgia Power Online Marketplace.

For those that rated satisfaction with the Online Marketplace overall a three, two, or one (n=32), many gave that score because they thought that it was average and had no complaints (n=8) or wanted more product options (n=4). When asked if they would recommend the Online Marketplace to a friend of colleague on a scale from one to ten where one meant "not at all likely" and ten meant "extremely likely", 69% gave a nine or ten, which is slightly higher than last cycle where 64% of respondents gave the same rating.

Participation Suggestions for Improvement

Just 14% of respondents had suggestions for how to improve the Online Marketplace. Of those, most were interested in expanded product offerings and better product descriptions. Other common suggestions included increasing the rebate amounts, faster and/or cheaper shipping, and removing the limit on the number of products that can receive a rebate. To incorporate these suggestions, the program could:

- Consider adding other cost-effective items to the Online Marketplace, which could include exhaust fans and smart switches requested by respondents.

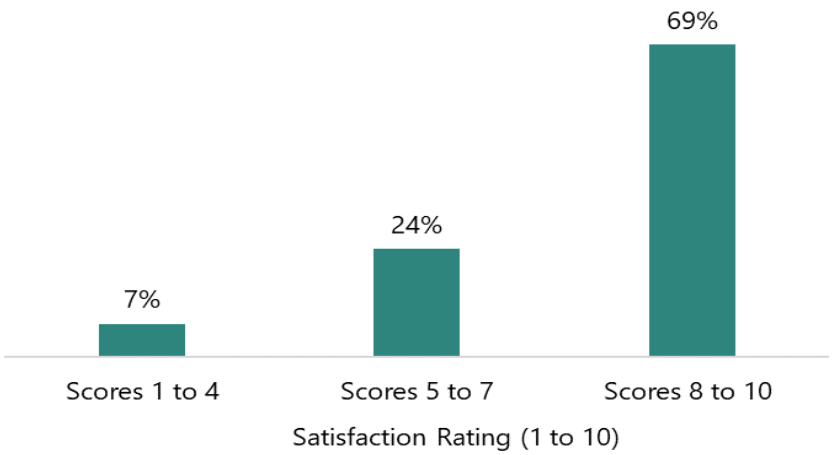
- Consider adding additional information to help customers understand which products are a good fit for their home and how they might save the customer money.

Customers requested information about products that may or may not work in older homes, which EV chargers will work with their EV, and how to know what thermostat will work with their house. Finally, the program could consider providing installation instructions or information on how to use products. Fact sheets like those hyperlinked on the landing page for lighting products on the Online Marketplace webpage could provide additional product descriptions elsewhere that customers are looking for.

Satisfaction with Georgia Power

Overall, respondents' satisfaction with Georgia Power as their utility fell compared to last cycle (Figure 37). The average satisfaction this year was an 8 on a scale from one to ten, where one means "not at all satisfied" and ten means "very satisfied." Sixty nine percent of Online Marketplace respondents gave an eight or higher, which is significantly lower than the last evaluation where 81% of respondents gave the same score (p=0.001). There is no evidence in the data or elsewhere to suggest why satisfaction decreased with this group of participants, especially as other programs' satisfaction levels with Georgia Power remained consistent.

Figure 37. 2023 Satisfaction with Georgia Power (n=345)



Source: Online Marketplace customer survey. L4. Taking into consideration all aspects of your utility service experience, please rate your current satisfaction with Georgia Power overall.

Participant Survey Demographics

Most participant respondents own their homes (95%), and primarily live in single-family homes (91%). About three quarters of respondent homes were less than 45 years old (73%), and less than half of respondents (42%) had lived in their home longer than four years. Many were still relatively new to their home and had lived there three years or less (58%). Respondents evenly reported heating their home with electricity (51%) and gas (47%).

About half of respondents that reported their age said they were 43 or older (55%), though many respondents chose not to respond (20%). About half of respondents were White (55%), followed by Black or African American (19%). The most reported language spoken daily by respondents besides English was Spanish (4%).

A little over one fourth of respondents declined to provide their income, but of the 72% that did, 44% made over $100,000 annually. About two thirds of respondents had a four-year college degree or higher (68%), and 22% said they were retired.

CONCLUSIONS AND RECOMMENDATIONS

Individual Improvements Conclusions and Recommendations

Conclusion 1: Verified gross savings for HEIP's Individual Improvements pathway achieved 120% of tracked savings. Per-unit energy savings values in use by the program are generally accurate and reflective of the level of gross energy savings being achieved by the program. Per-unit energy savings for some key measures were found to be conservative.

RECOMMENDATIONS:

- **Consider revising the per-unit gross savings values for Attic Insulation.** The evaluation team found that the per-unit savings values in use for Attic Insulation are conservative and should be updated to improve accuracy of tracked savings.
- **Consider revising the per-unit gross savings values for Smart Thermostats.** Because of the relative magnitude of the Smart Thermostat offering, Georgia Power should consider revising gross savings estimates to reflect the findings of this evaluation.

Whole House Conclusions and Recommendations

Conclusion 2: Verified gross savings for HEIP's Whole House pathway achieved 90% of tracked savings. However, the Beacon energy model's accuracy at the measure level is mixed, with some measure types significantly overstated and other measures understated. These inaccuracies have adverse outcomes by directing trade ally attention away from more expensive retrofits like air sealing towards easier wins like water heater temperature reset and LED lighting.

RECOMMENDATIONS:

- **Since the Beacon model is being replaced with a new software tool, Georgia Power should consider reviewing results from the new tool at the measure level as well as the per-home level to ensure that tracked savings are realistic.**

Conclusion 3: Gross verified energy savings for LED lighting were 65% of tracked savings. This result stemmed from a combination of lower ISR and overstated baseline assumptions in use by the Beacon model. In some cases, contractors reported higher LED bulb installation rates than were observed on site. Baseline assumptions in use by the Beacon model were found to be outdated, assuming unrealistically high baseline lamp wattages for LED replacements.

RECOMMENDATIONS:

- **If Georgia Power continues to include direct install LED bulbs in the Whole House pathway, require contractors to include photos of removed non-LED bulbs to ensure accurate lamp counts and baseline lamp types.** Baseline lamp wattages in algorithms for energy savings should be updated to reflect current market baseline.

Manufactured Homes Conclusions and Recommendations

Conclusion 4: Gross verified savings for HEIP's Manufactured Homes pathway achieved 67% of tracked savings. Evaluation site visits showed that a few advanced power strips were correctly installed, with an evaluated ISR of 11%. For LED bulbs, savings for both interior and exterior bulbs were overstated.

RECOMMENDATIONS:

- **Increase customer training on advanced power strip usage.** Customers reported they had stopped using some advanced power strips, stemming from confusion around how to use them. Advanced power strips must be correctly installed to result in energy savings. Additional training on how and where to use these devices could increase their effectiveness.
- **If Georgia Power continues to include direct install LED bulbs in the Manufactured Homes pathway, it should require the implementation contractor include photos of removed non-LED bulbs to ensure accurate lamp counts and baseline lamp types.** Baseline lamp wattages in algorithms for energy savings should be updated to reflect current market baseline.

Georgia Power Online Marketplace Conclusions and Recommendations

Conclusion 5: Rebates and lower product costs are major drivers of customers purchasing thermostats on the Online Marketplace. When asked why they chose to purchase a thermostat through the Online Marketplace instead of another retailer, more than two-thirds of customers (69%) said that the prices on the Online Marketplace were cheaper than other retailers.

Conclusion 6: Manufacturer sale events were effective strategies driving Online Marketplace participation where customers were aware of the sale, however, only about half of customers who purchased a thermostat during a sale event were aware of the sale. Forty-one percent of customers purchased a thermostat during a manufacturer sale. Of the 60 customers that did, around half were aware of the sale at the time of purchase. Of those 29 people, 90% indicated that the sale was either "very" or "somewhat" influential in their decision to purchase the *type* of lightbulb that they purchased.

RECOMMENDATIONS:

- **Increase marketing of manufacturer sale events to drive additional Online Marketplace thermostat purchases, as well as purchases of other measures.**

Conclusion 7: Respondents are satisfied overall with the Online Marketplace but are interested in seeing a wider variety of products and better product descriptions. Almost all customers were either very satisfied or satisfied with the Online Marketplace overall (90%) and most other aspects of the Online Marketplace were also rated very highly. The majority (69%) of all survey respondents said they would recommend the Online marketplace to a friend or colleague.

Customers reported that the Online Marketplace was easy to use but are interested in seeing a wider variety of products. Those that gave suggestions for improvement mostly suggested expanding product offerings and improving product descriptions.

RECOMMENDATIONS:

- **Include linked PDFs with product descriptions and benefits, like those hyperlinked on the landing page for lighting products on the Online Marketplace webpage, for more products in the Online Marketplace.**
- **Explore what new and cost-effective products could be included on the Online Marketplace.**

Conclusion 8: Interest and knowledge of smart devices is still relatively low, but stronger in younger generations like Millennials and Generation Z.

While 71% of survey respondents said they already had a smart thermostat, 11% reported not having any smart home devices. About half (48%) of respondents reported that they were likely to purchase any in the next year. There was higher interest among younger generations , and 55% of respondents were interested in purchasing smart lighting products. However, the survey did not have enough responses from customers that purchased smart lighting products to make any conclusions about their motivations and experience.

RECOMMENDATIONS:

- **If Georgia Power decides to market smart lighting products, it may be more effective to target marketing at younger demographics.**

Overall Conclusions and Recommendations

Conclusion 9: Customers highlight comfort as a top motivator for program participation. A third of customers said making their home more comfortable was a top motivator for program participation. Making the house more comfortable motivated more respondents to participate in the Whole House pathway than other program pathways. Most (86%) of Whole House pathway respondents indicated that their home is more comfortable since participating in the program.

RECOMMENDATIONS:

- **Consider highlighting potential improvements to comfort in program marketing materials.** While some current marketing materials note that a home energy assessment will give participants recommendations for upgrades to make the home more efficient and comfortable, comfort is not discussed in all marketing materials and is not a highlight where it does exist. Highlighting comfort could drive additional program participation or help to encourage deeper participation through the Whole House pathway.

Conclusion 10: Cost is top of mind for customers and a barrier to participating in the Whole House pathway. Respondents who participated in the Individual Improvements pathway and were aware of the Whole House pathway most often decided to participate in Individual Improvements instead because they thought the Whole House pathway was too expensive. Survey responses also indicated that recent cost-of-living increases is top of mind for customers. Respondents indicated that price increases and inflation impacted their ability to make improvements to their home this year.

Conclusion 11: Many participants are still not aware of additional funding opportunities for energy efficiency upgrades, including the IRS Home Energy Audit Tax Credit. This low awareness suggests an opportunity for Georgia Power to help customers understand the availability of additional incentives for a home energy assessment.

RECOMMENDATIONS:

- **Explore ways to educate customers about additional funding opportunities for home energy assessment and other upgrades.** This could include providing educational materials for Participating Contractors to share with customers or including information about other funding opportunities in marketing materials. Helping customers understand how to braid these funds together, specifically funds related to the Whole House pathway's assessment requirement, could help customers overcome the cost barriers associated with the Whole House pathway and drive additional participation.

Conclusion 12: Customers who participated in the Whole House and Manufactured Homes pathways report lower awareness of other Georgia Power Energy Efficiency programs compared to those who participated in the Individual Improvements pathway. Among the Whole House and Manufactured Homes customers, many (68% and 93% respectively) reported they did not know about any other Georgia Power programs, while the Individual Improvements customers were more aware with 63% reporting they were aware of other programs.

RECOMMENDATIONS:

- **Encourage contractors and third-party implementers to cross-promote other Georgia Power programs in direct interactions with customers.** Due to the in-person nature of the program delivery of the Whole House and Manufactured Homes pathways, there is an opportunity for Georgia Power approved contractors and auditors to educate customers about other Georgia Power programs while they are interacting with customers during program participation.

Conclusion 13: Respondents reported high satisfaction with the HEIP program. Nearly all customers (96%) were either very satisfied or satisfied with HEIP overall and all aspects of HEIP were also rated very highly: at least 90% were very satisfied or satisfied with the contractor experience, the quality of improvements, the amount of time it took to receive the rebate, energy savings since participation, and the rebate amount.

Conclusion 14: The evaluation team estimated that the HEIP program achieved 28% of its goal. This difference from goal is largely driven by lower than planned smart thermostat participation through the Online Marketplace, a major driver of program savings.

RECOMMENDATIONS:

- **If smart thermostat savings remain a major component of planned savings, consider making Online Marketplace a standalone program to help more closely track progress toward goal and drivers of participation.**

5. ENERGY ASSISTANCE FOR SAVINGS AND EFFICIENCY (EASE) PROGRAM

The Energy Assistance for Savings and Efficiency (EASE) program, implemented by Utility Energy Services (UES) in 2023, offers up to $5,000 per home in free energy efficiency improvements to Georgia Powers' income-qualified (IQ) customers whose household income is 200% or less of the Federal Poverty Line (FPL). Program contractors complete home energy assessments and install improvements, including lighting, smart thermostats, attic insulation, air sealing, duct sealing, and servicing HVAC equipment. The program also includes a charitable donation component, which allows residents, businesses, and other groups to contribute funds to support additional participant home improvements beyond the $5,000 program cap. Last cycle, the program was referred to as Home Energy Efficiency Assistance Program (HEEAP) and was implemented by Georgia Power.

EASE achieved 7,790 MWh verified net energy savings and 2,434 kW summer peak demand savings in 2023 (Table 74). Assuming a NTGR of 100%, the program achieved 75% of the program's energy savings goal.

Table 74. 2023 EASE Savings

	NET SAVINGS GOALS	REPORTED NET SAVINGS	VERIFIED GROSS SAVINGS	NTGR	VERIFIED NET SAVINGS	NET SAVINGS AS A % OF GOAL
Electric Energy Savings (MWh)	10,391	10,647	7,790	100%	7,790	75%
Summer Peak Demand Reduction (kW)	2,041	3,130	2,434	100%	2,434	119%

Industry standard practice for programs targeting IQ population deems NTG at 100%. However, per stakeholder request, the evaluation team calculated an NTGR for the EASE program. The evaluation estimated a NTGR of 94% with an 8% margin of error and 90% confidence. Based on these results, we recommend keeping NTG at 100% for the EASE program, as 100% NTGR is standard practice for IQ energy efficiency programs and within the margin of error. These findings could also support keeping NTG at 100% for other IQ programs, such as HopeWorks.

Customers were satisfied with the EASE program; nearly all customers (91%) were either very satisfied or satisfied with the program overall. The Georgia Power website is the primary driver of program awareness, few customers learn about the program through community action agencies or community-based organizations. Most respondents had concerns in their homes that they were hoping the program could help address. Slightly more than half of respondents indicated that the program was not able to help with their concern (61%). Customers indicated interest in measures not offered by the program, including new windows, duct cleaning, or HVAC equipment.

Chapter Five

EASE Program

Program Savings Overview

The Energy Assistance for Savings and Efficiency (EASE) program achieved 75% of its energy savings goal with 7,790 MWh verified net savings and 119% of its demand savings goal with 2,434 kW verified net savings. EASE incentivized the installation of over 59,000 energy efficiency measures in over 1,400 residences.

The program included two components – single-family and multifamily – with similar measures offered in each. Of the program's verified net savings, the single-family pathway accounts for 57% of the program savings. Among single-family measures, air sealing was the single largest contributor at 26% of single-family verified net savings. Attic insulation was the largest multifamily measure, contributing 28% of multifamily verified net savings.

Conclusions & Recommendations

CONCLUSION 1

The Georgia Power website is the primary driver of program awareness among survey respondents, few customers learn about the program through community action agencies or community-based organizations.

RECOMMENDATION

Consider partnering with community-based organizations to raise awareness of EASE.

RECOMMENDATION

Continue to look for ways to partner with community action agencies to raise awareness of EASE, especially for those on the waitlist for the Federal Weatherization Assistance Program (WAP). This partnership could help alleviate the waitlist for WAP services and bring customers that are already income-qualified into the program.

CONCLUSION 2

The program helped about half of respondents with all of the concerns in their home they hoped it could address. Contractors said that customers often come to them with a different understanding of what the program covers compared to what it actually does.

RECOMMENDATION

Clarify communication of measures that are included in the program to customers in marketing materials and during the sign-up process to set expectations about the program. Help customers understand the benefits of measures that are offered in the EASE program.

CONCLUSION 3

Some contractors are struggling to receive payment from the program implementer. Contractors also reported that work orders are being approved more slowly under the new implementer than when Georgia Power ran the program.

RECOMMENDATION

Discuss payment with the program implementer to understand the source of delays. Work with them to address the issues that are causing these delays.

RECOMMENDATION

Consider offering additional training to implementer staff to help the work order approval process run more efficiently and smoothly.

Program Overview

Georgia Power's Energy Assistance for Savings and Efficiency (EASE) program works with a network of approved contractors to deliver free home energy assessments and improvements, including lighting, smart thermostats, attic insulation, air sealing, duct sealing, and servicing HVAC equipment, to Georgia Power IQ residential customers. Customers living in privately or publicly owned single-family or multifamily homes with an income level 200% or less of the current year U.S. FPL are eligible to participate. All customers are required to go through an income verification process prior to participation. The program requires a participating program contractor to complete an initial home energy assessment and diagnostic testing for building envelope improvements (e.g., air sealing).

Georgia Power provides up to $5,000 per home for energy efficiency improvements through the EASE program. The program includes a charitable donation component, which allows residents, businesses, and other groups to contribute funds to support additional participant home improvements beyond the $5,000 program cap.

Program Participation and Achievements

The EASE program installed over 59,000 measures in over 1,400 Georgia residences in 2023. The program included two pathways – single-family and multifamily – with similar measures offered in each. Installed measures included lighting, smart thermostats, attic insulation, air sealing, duct sealing, and HVAC equipment servicing.

Table 75 summarizes reported energy and demand savings for the program in 2023, including program savings goals. Reported energy savings totaled 102% of the program's 2023 goal. Savings goals are net, inclusive of NTG assumptions applied to measure-level savings. Since EASE is an IQ program, all measures were reported with an assumed NTG value of 100%.

Table 75. 2023 EASE Participation and Savings

	NUMBER OF MEASURES	NET SAVINGS GOALS	REPORTED NET SAVINGS	REPORTED SAVINGS AS A % OF GOAL
Electric Energy Savings (kWh)	59,669	10,390,904	10,646,902	102%
Summer Peak Demand Reduction (kW)		2,041	3,130	153%

Reported savings values in Table 75 are taken from Georgia Power reports filed to the Georgia Public Service Commission. However, tracked savings represented in VisionDSM are slightly different than values reported by Georgia Power in its Q42023 PSC Report filing. VisionDSM includes tracked savings of 10,596,511 kWh and 3,112 kW which is lower than the reported savings by 50,391 kWh and 18 kW.

In the EASE program, project statuses continually shift in the program tracking systems (i.e., VisionDSM) based on project progress and payment to contractors; therefore, this slight difference is expected, and very minor (less than a half a percent difference). The evaluation made no adjustments based on these differences.

Georgia Power tracks and reports savings by single-family and multifamily participants. The shares of tracked savings by pathway and measure within EASE are listed in Table 76. Most measures and savings were provided to single-family homes, with a third directed to multifamily. Attic insulation was the largest single-family measure, contributing 26% of overall energy savings.

While the total savings in VisionDSM are consistent with what is reported, the proportion of savings attributed to multifamily and single-family differ, with the reported savings showing a greater proportion of savings provided to multifamily homes (62% based on data reported in the Q42023 PSC Report compared with 34% in the tracking system data). This difference is due to a dwelling categorization issue Georgia Power is aware of and working through with their implementer. The evaluation confirmed the tracked data is the correct source to reference for dwelling unit type, and recorded savings align with planned savings for that dwelling type.

Table 76. 2023 EASE Participation and Savings

PROGRAM PATHWAY	NUMBER OF PARTICIPANTS	MEASURE	NUMBER OF MEASURES	TRACKED SAVINGS (kWh)	% OF TRACKED SAVINGS (kWh)
Single-Family	1,191	Air Sealing	3,367	1,356,170	13%
		Attic Insulation	1,575	2,772,079	26%
		Duct Sealing	1,215	843,689	8%
		LED Lighting	24,793	1,236,117	12%
		Smart Thermostat	1,009	388,454	4%
		Other[a]	4,542	408,697	4%
		TOTAL	**36,501**	**7,005,206**	**66%**
Multifamily	216	Air Sealing	1,889	973,344	9%
		Attic Insulation	1,038	409,224	4%
		Duct Sealing	1,002	875,034	8%
		LED Lighting	14,600	773,723	7%
		Smart Thermostat	747	361,548	3%
		Other[1]	3,522	198,432	2%
		TOTAL	**22,798**	**3,591,306**	**34%**
EASE TOTAL	**1,407**		**59,299**	**10,596,511**	**100%**

[a]Other measures in both pathways included pipe insulation, HVAC maintenance and tune ups, low flow showerheads, faucet aerators, water heater blankets, and advanced power strips. Totals may not sum due to rounding.

Methodology

Research Questions and Activity Overview

The evaluation sought to address both process and impact evaluation questions.

Process evaluation questions focused on customer experience with the program and contractors, barriers to service with a particular focus on multifamily participants and public housing authorities, and satisfaction with the program offerings and elements.

Impact evaluation questions focused on verifying savings against planned and, where necessary, adjusting savings based on factors such as inaccurate inputs or customer-specific data, resulting in a summary of adjustments and recommendations for future planning.

Table 77 summarizes the activities completed to address these research questions followed by a detailed description of approach to complete the impact and process evaluations. Appendix 6A. Detailed Study Methodology for EASE Program Evaluation provides a more detailed summary of the evaluation research questions and methodology.

Table 77. 2023 Program Activities and Research Questions

EVALUATION ACTIVITY	COMPLETED
Program staff and implementer interviews	2
Tracking system analysis	✓
Participant surveys	100
Contractor interviews	8
Public Housing Authority interviews	3
Residential general population survey	350 across multiple res. programs
Desk Reviews	60
Participant site visits	31
Calculate gross savings (unit energy savings)	✓

Impact Evaluation Findings

This section presents findings from the impact evaluation for EASE. Key findings include:

- The evaluation verified the program achieved 74% of net savings reported by Georgia Power in its Q42023 PSC Report filing.
- The most substantial contributor to the savings difference was attic insulation. While adjusting inputs from the tracking data and engineering analysis contributed to adjustments, the on-site visits also identified issues such as lower insulation installed than recorded and differences in heating fuel type.
- Nearly all, if not all, savings are attributed to program intervention, and would not have happened otherwise (per both customer and contractor self-reports), resulting in a recommended 100% NTGR.

Table 78 summarizes energy and summer peak demand savings delivered by the two EASE program pathways – Single-Family and Multifamily. In Table 79 and throughout the balance of this section where LED lighting measures are included, we show savings with LED lighting removed in addition to total program savings to provide an understanding of program performance without LED lighting measure savings. In Chapter 3. Residential Specialty Lighting Program, the evaluation team recommends removing screw-based LED lighting from the residential portfolio.

Table 78. 2023 EASE Savings by Pathway

PROGRAM PATHWAY	TRACKED SAVINGS			VERIFIED NET SAVINGS		VERIFIED NET SAVINGS AS A % OF TRACKED	
	ENERGY (MWh)	SUMMER PEAK DEMAND (kW)	NTGR	ENERGY (MWh)	SUMMER PEAK DEMAND (kW)	ENERGY (MWh)	SUMMER PEAK DEMAND (kW)
Single-Family	7,005	2,027	100%	4,467	1,379	64%	68%
Multifamily	3,591	1,085	100%	3,322	1,055	93%	97%
Total	**10,597**	**3,112**	**100%**	**7,790**	**2,434**	**74%**	**78%**
Total w/o Lighting	**8,587**	**2,586**	**100%**	**6,309**	**2,226**	**73%**	**86%**

Table 79 shows the average *tracked* deemed savings and *verified* savings for the 2023 EASE measures for both pathways. Results are mixed across the measures offered through this pathway. For Smart Thermostat measures the average verified energy savings were higher than tracked values. The most significant discrepancy was observed for attic insulation measures.

Table 79. 2023 EASE Average Per Measure Tracked and Verified Gross Savings

PROGRAM PATHWAY	MEASURE	AVERAGE TRACKED SAVINGS			AVERAGE VERIFIED SAVINGS		
		kWh	SUMMER kW	WINTER kW	kWh	SUMMER kW	WINTER kW
Single-Family	Air Sealing	403	0.19	n/a	345	0.15	0.02
	Attic Insulation	1,760	0.38	n/a	424	0.12	0.09
	Duct Sealing	694	0.25	n/a	694	0.25	0.13
	LED Lighting	50	0.01	n/a	39	0.01	0.01
	Smart Thermostat	385	0.09	n/a	407	0.11	0.14
	Other[1]	90	0.02	n/a	94	0.03	0.02
Multifamily	Air Sealing	515	0.24	n/a	238	0.10	0.02
	Attic Insulation	394	0.07	n/a	892	0.33	0.01
	Duct Sealing	873	0.25	n/a	873	0.25	0.10
	LED Lighting	53	0.01	n/a	36	0.01	0.12
	Smart Thermostat	484	0.09	n/a	241	0.11	0.00
	Other[a]	56	0.01	n/a	104	0.03	0.31

[a] Other measures included pipe insulation, HVAC maintenance and tune ups, low flow showerheads, faucet aerators, water heater blankets, and advanced power strips.

For **attic insulation** measures, the low RR stems from multiple compounding factors.

- Site visits indicated that installation practices were inconsistent. Actual final insulation levels were found to be lower than reported in some single-family homes.
- Some homes reported as electric fuel heat were found to be gas heated homes.
- The program used two sets of values for attic insulation measures in 2023, denoted in the program plan as "Insulation – Ceiling Installation" and "Insulation – Ceiling Upgrade". The "Insulation – Ceiling Installation" values were found to be significantly overstating savings for homes that had some level of existing insulation prior to participation in EASE. These values were more often applied to single-family homes; 95% of single-family attic insulation measures use this value. The evaluation team used an algorithm that uses starting and final R-values (based on inches of insulation), HVAC system efficiency, and weather variables for the Georgia climate (cooling degree days (CDDs) and heating degree days (HDDs) for homes with electric heat). Details of the algorithms used are included in Appendix 6D. EASE Impact Calculation Overview.

LED lighting, specifically LED lighting with daylight sensors, were also adjusted considerably. The deemed savings for LED lighting with daylight sensors is like what is recorded in the Specialty Lighting evaluation chapter (295 kWh). As noted in the Specialty Lighting chapter, the deemed savings reference a commercial application from the Illinois TRM v9[27] which essentially assumes a whole room of controlled lighting rather

[27] Illinois Statewide Technical Reference Manual, Version 9.0

than a single lamp. The evaluation adjusted the savings to reflect a residential use-case and lower hours of use. For interior lighting, program assumptions were found to be reasonable for the types of bulbs replaced, with photo documentation showing bulb types included in project files.

Table 80 highlights notable differences between *tracked* savings and *verified* gross savings estimates for key measures.

Table 80. 2023 EASE Notable Differences Between *Tracked* and Verified *Gross*

MEASURE	TRACKED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES AND ASSUMPTIONS	PRIMARY REASONS FOR DIFFERENCES
Air Sealing	*Tracked* energy savings align with the gross verified savings values attained from the previous evaluation conducted in 2021.	Algorithm based on Georgia Power TRM 3.0 with site-specific pre- and post-improvement blower door test results used as inputs.	The specific pre- and post-improvement blower door test results vary somewhat with the 2021 evaluation due to differences in participating homes. Additionally, some instances of mischaracterized heating fuel type were observed.
Attic Insulation	Program uses two sets of values. One set is aligned with the gross verified savings values attained from the previous evaluation conducted in 2021. The other set was developed from potential study results.	Algorithm from Illinois TRM v12 with adjustments to weather variables for GA climate. Site specific R-values based on project documentation and site visit measurements.	Site visits indicated inconsistent installation practices where less insulation was added in some cases. Additionally, some instances of mischaracterized heating fuel type were observed.
LED Lighting	For exterior bulbs with daylight sensors, tracked savings are from the IL TRM v9 for a commercial interior daylighting sensor controlling multiple fixtures.	Algorithm based on 2021 Georgia Power evaluation with site-specific baseline and retrofit lamp wattages used as inputs.	Residential single lamp exterior use case is significantly different than the assumptions included in the tracked savings calculation.
Smart Thermostat	Reported kWh and kW savings are taken from the prior evaluation results for net savings achieved per home.	Verified kWh savings are based on regression analysis of 2022 HEIP Online Marketplace participants.	Details of the analysis are provided in Chapter 4.

Table 80 and Table 81 show the program's tracked and verified savings, which incorporate adjustments for these findings, along with the total and percent difference between tracked and verified savings to illustrate the magnitude of the changes by measure type. As shown in Table 80, overall differences in tracked and verified savings are largely driven by attic insulation, LED lighting, smart thermostats, and air sealing, as described above.

Table 81. 2023 EASE *Tracked* and *Verified* Net Electric Energy Savings

PROGRAM PATHWAY	MEASURE	TRACKED ELECTRIC ENERGY SAVINGS (kWh)	VERIFIED NET ELECTRIC ENERGY SAVINGS (kWh)	TOTAL DIFFERENCE	% DIFFERENCE
Single-Family	Air Sealing	1,356,170	1,161,814	-194,356	-14%
	Attic Insulation	2,772,079	668,114	-2,103,965	-76%
	Duct Sealing	843,689	843,689	0	0%
	LED Lighting	1,236,117	957,027	-279,090	-23%
	Smart Thermostat	388,454	410,719	22,265	6%
	Other	408,697	426,072	17,375	4%
	TOTAL	**7,005,206**	**4,467,435**	**-2,537,771**	**-36%**
	TOTAL W/O LIGHTING	**5,769,089**	**3,510,408**	**-2,258,681**	**-39%**
Multifamily	Air Sealing	973,344	449,450	-523,894	-54%
	Attic Insulation	409,224	925,630	516,406	126%
	Duct Sealing	875,034	875,034	0	0%
	LED Lighting	773,723	524,178	-249,545	-32%
	Smart Thermostat	361,548	180,325	-181,223	-50%
	Other	198,432	367,711	169,279	85%
	TOTAL	**3,591,306**	**3,322,328**	**-268,978**	**-7%**
	TOTAL W/O LIGHTING	**2,817,582**	**2,798,150**	**-19,432**	**-1%**
EASE Total		**10,596,511**	**7,789,763**	**-2,806,749**	**-26%**
EASE Total w/o Lighting		**8,586,671**	**6,308,558**	**-2,278,113**	**-27%**

Table 82 includes tracked and verified demand savings for summer and winter peak periods. These were developed by considering the coincidence of each evaluated measure with Georgia Power's defined summer and winter peak periods.[28] For summer peak, population totals were developed by extrapolating evaluated RRs for sampled projects to the population. Because Georgia Power does not collect or report winter peak demand savings, the evaluation team extrapolated winter peak savings for the evaluation sample to the population by applying a ratio of verified winter peak demand reduction to verified energy savings. Factors

[28] Summer peak window is defined as a one-hour period, 4pm to 5pm, on July weekdays. Winter peak window is defined as a one-hour period, 8AM-9AM on January weekdays.

used to calculate winter peak demand savings for key measures in the evaluation sample are included in Appendix 6D. EASE Impact Calculation Overview.

Table 82. 2023 EASE *Tracked* and *Verified* Net Peak Demand Reduction

PROGRAM PATHWAY	MEASURE	TRACKED SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED NET SUMMER PEAK DEMAND REDUCTION (kW)	VERIFIED NET WINTER PEAK DEMAND REDUCTION (kW)	TOTAL DIFFERENCE (SUMMER PEAK)	% DIFFERENCE (SUMMER PEAK)
Single-Family	Air Sealing	646	518	70	-128	-20%
	Attic Insulation	595	193	195	-402	-68%
	Duct Sealing	303	303	162	0	0%
	LED Lighting	319	136	116	-183	-57%
	Smart Thermostat	90	116	107	26	29%
	Other	75	114	101	39	52%
	TOTAL	**2,027**	**1,379**	**751**	**-648**	**-32%**
	TOTAL W/O LIGHTING	**1,709**	**1,244**	**635**	**-465**	**-27%**
Multifamily	Air Sealing	445	191	28	-254	-57%
	Attic Insulation	75	341	175	266	355%
	Duct Sealing	254	254	199	0	0%
	LED Lighting	209	74	77	-135	-65%
	Smart Thermostat	66	86	79	20	30%
	Other	37	110	102	73	197%
	TOTAL	**1,085**	**1,055**	**659**	**-30**	**-3%**
	TOTAL W/O LIGHTING	**877**	**982**	**583**	**105**	**12%**
EASE Total[a]		**3,112**	**2,434**	**1,410**	**-678**	**-22%**
EASE Total w/o Lighting		**2,586**	**2,226**	**1,218**	**-360**	**-14%**

[a]Totals may not sum due to rounding.

Net-to-Gross

Through a self-report survey battery, the evaluation found a NTGR for the EASE program to be 94% with an 8% margin of error and 90% confidence. Based on these results, we recommend Georgia Power continue to assign a 100% NTGR for the EASE program. Not only is 100% NTG a standard practice for -IQ energy efficiency programs, but it is also within the margin of error.

Table 83 shows the calculated free-ridership, spillover, and the NTGR for the EASE program. One respondent indicated that they completed duct sealing due to program participation, qualifying for spillover. However, the spillover resulting from this improvement was negligible (0.001).

Table 83. 2023 EASE Program Free-Ridership, Spillover, and NTGR

FREE-RIDERSHIP	SPILLOVER	NTGR
6%	0%	94%

To confirm these results, the evaluation team reviewed respondent open-ended responses. All respondents indicated that the program was important for making the improvements to their home at the time they did. Respondents most often noted that the program was "very important" to their ability to make improvements or noted that they would not have been able to complete upgrades without the program.

Contractors echoed these sentiments, underscoring the importance of the program in customers' ability to install measures included in the EASE program. Overall, EASE contractors said that they wouldn't be able to do the work that they currently do through the EASE program (i.e., work for the same customer types or the same quantity of work) without the program. Contractors noted that customers that participate in the program wouldn't be able to complete these upgrades without the program and other programs that serve IQ customers don't have the same capacity as the Georgia Power program.

Contractors said that most customers they serve would not be able to install the measures EASE provides on their own. Contractors mentioned a few measures that customers may install on their own, like light bulbs, but that overall customers cannot make these improvements on their own.

"They would not be able to afford to do the work on their own or without the program."

"These people [are] barely getting by, [it's] kind of binary, [they] wouldn't have it otherwise. [The program is] enabling a lot of low-income people to weatherize and deal with health and safety issues."

Process Evaluation Results

Key findings include:

- The Georgia Power website is the primary driver of program awareness among survey respondents; few customers learn about the program through community action agencies or community-based organizations, which could be an opportunity to expand program awareness.
- Most respondents said an energy assessor discussed the findings from the home energy assessment with them, but some said the energy assessor did not.
- The home energy assessment identified new energy efficiency opportunities for the home that many participants were not aware of.
- Participants are satisfied with the EASE program and the various elements of their experience with the program.
- Contractors reported that work orders are being approved more slowly under the new implementer than when Georgia Power ran the program. Some contractors that prefer to complete the assessment and improvements in one visit will complete the improvements before the work order is approved and only install the measures they are sure will be approved.

- Some contractors are struggling to receive direct install materials and payment from the program implementer.
- The EASE Program has been effective in enhancing energy efficiency and comfort for tenants in public housing, with housing authorities noting significant benefits such as reduced energy costs and improved living conditions. The positive feedback from tenants, especially regarding the upgrades to heating systems and lighting, highlights the tangible impact on residents' quality of life.

The evaluation team invited 385 EASE participants to complete a web- and phone-based survey through an email invitation and phone calls between November and December 2023. In addition to these customer surveys, the evaluation team interviewed eight contractors who participated in the EASE program and conducted three interviews with public housing authority staff who participated in the EASE program.

Below provides greater detail on these key findings, organized to reflect program experiences and feedback provided by program participants, participating EASE contractors, and public housing authorities.

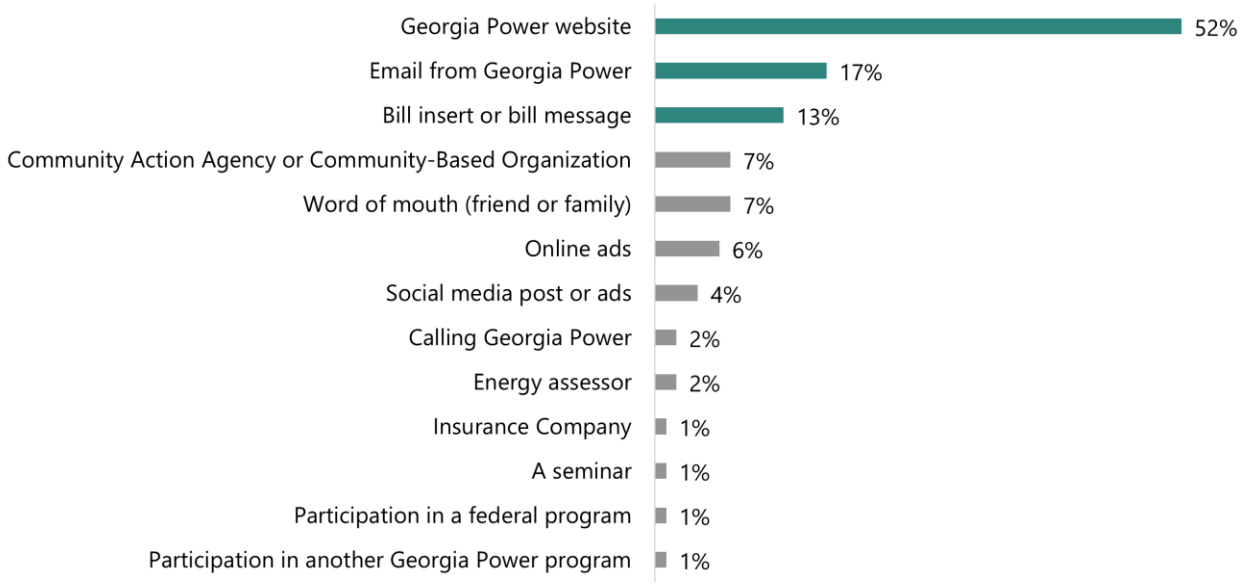
Program Participant Experiences and Feedback

The following sections describe the results related to sources of awareness, reasons for participation, participant experience with the program, and satisfaction with the program.

Program Awareness

The Georgia Power website is the primary driver of program awareness for the EASE program (52%, Figure 38). This source of awareness is strikingly higher than any other source; the next most noted is email, mentioned by 17%. Additionally, it is higher than reported by any other residential program. As a reference point, 20% of HEIP Whole Home and 33% of HEIP Individual Improvement participants learned of the program through Georgia Power's website. This could indicate that EASE participants actively search for support, resources, and/or opportunities to improve their home. The program also partners with Propel, an app that allows users to track food stamps and government balances. In-app advertisements direct customers to the EASE program website. The evaluation team did not ask customers about this source of awareness, and customers did not specifically mention Propel in open end responses, but it is possible that given the direct link to the Georgia Power website, program awareness garnered through Propel may be captured within this category.

Figure 38. 2023 Sources of Program Awareness (n=95)



Few (n=7) respondents heard of the EASE program through community action agencies or community-based organizations. This is notable given the overlap in target populations, and the ability for EASE to support community action agencies, which typically have waiting lists for the Federal Weatherization Assistance Program (WAP) in serving customers.

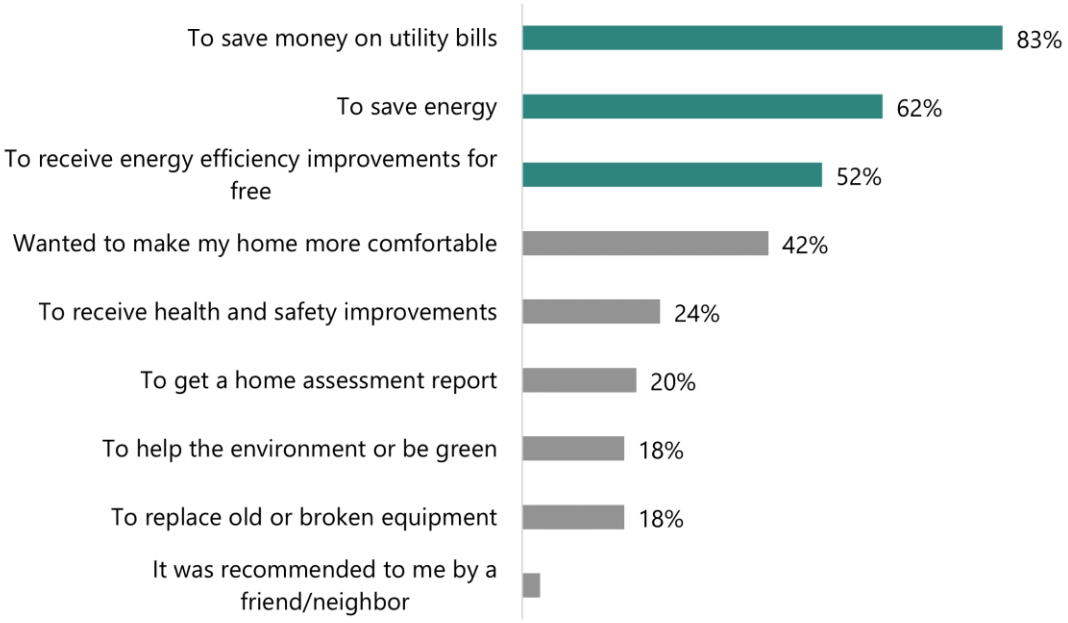
EASE contractors interviewed also mentioned that EASE could help alleviate WAP waiting lists. Those that provide services for both programs confirm long waitlists for customers to receive services through WAP in Georgia and believe there is an opportunity for community action agencies to educate customers about EASE to help the customers they service receive weatherization services more quickly. Georgia Power could continue to reach out to community action agencies and look for opportunities for partnership to reach mutual goals.

Overall, Georgia Power customers are generally unaware of EASE. About 17% of respondents from the general population study said they were aware of the program. However, EASE has the second highest awareness of all programs asked about in the general population survey, second to HEIP (19% aware).

Motivations and Program Impact on Concerns

Most respondents decided to participate in EASE to save money or energy. Respondents said their motivations to participate were to save money on utility bills (83%, Figure 39), to save energy (62%), and to receive energy efficiency improvements for free (52%).

Figure 39. 2023 Participation Motivation (n=80)



Source: EASE Participant Survey. D1. Why did you decide to participate in Georgia Power's EASE Program?

Participants also wanted the program to address concerns in their home (82%, n=96). The most common concern among respondents was addressing air leakage/air sealing (n=27). Respondents were also hoping the program could help with windows (n=14), insulation (n=13), and HVAC equipment (n=13).

While many said the program addressed their concerns, most didn't feel it did, primarily due to not receiving improvements they thought they needed. Fewer than half of respondents indicated that the program helped with their concern (39%, n=71). When asked why the program was unable to address the problem, half of those respondents indicated that the program did not cover it (n=19) or that they did not receive the measures they were hoping for (n=6). These customers were often looking for new windows or doors, duct cleaning, HVAC equipment upgrades, basement insulation, or measures for garages or storage spaces.

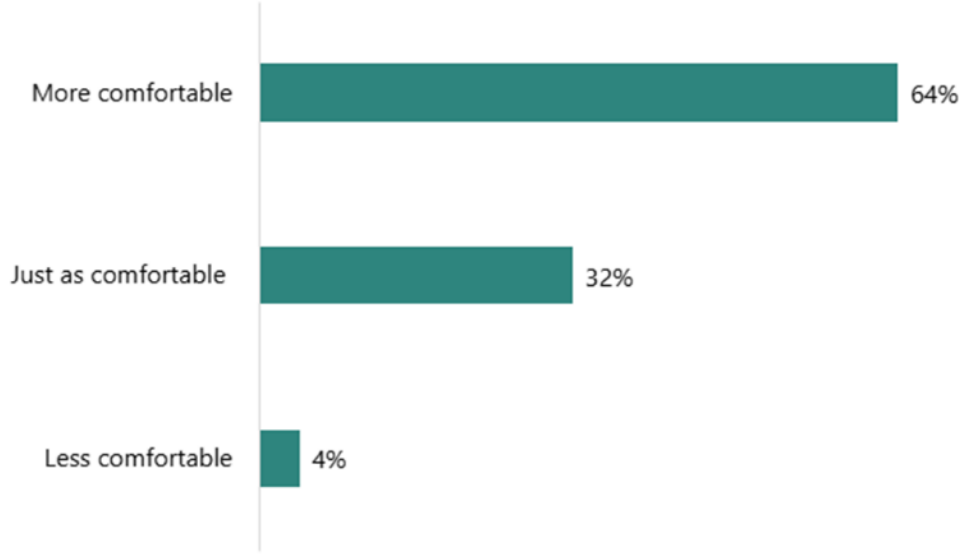
It is important to note that customers receive measure recommendations based on the results of a Building Performance Institute (BPI) assessment, which may have indicated that customers did not need the measures they were hoping to receive. However, some suggested measures that are not currently included in the program. Some of these measures that customers were hoping for provide little energy benefit (e.g., duct cleaning) or may not be cost-effective (e.g., windows), and as such may not be good candidates for inclusion in the EASE program.

EASE contractors underscored survey findings that customers are interested in measures not eligible for the EASE program. One contractor estimated that 75% of EASE customers want windows and another said, "everybody wants windows." Contractors recommended that program representatives further clarify during the application process what customers can receive through participation (i.e., which measures are included, and which are not).

This feedback and review of program marketing indicate there are opportunities to more clearly outline measures included—and excluded—in the EASE program so that customers have a better understanding prior to participation. The program website includes a video that indicates which measures are available. Additionally, customers are responsible for signing a work order that outlines the measures to be installed in their home prior to the completion of work through the program. Although measure-level information is available, this research suggests that there are still gaps in customer understanding and comprehension. The program should consider adding measure-level information in plain text on the website as well so that it is easy to refer to and accessible to customers that may not be able (or interested) to watch the video. One way to do this could be to add in the Frequently Asked Questions (FAQs) specific information about available improvements, as well as clarification that the program does not include windows (like what is currently included on the HopeWorks program page). The program could also consider clarifying the presentation of measures in work orders provided to customers to include measure descriptions and benefits, or work with contractors to ensure that these benefits are explained to all customers in a clear and consistent manner.

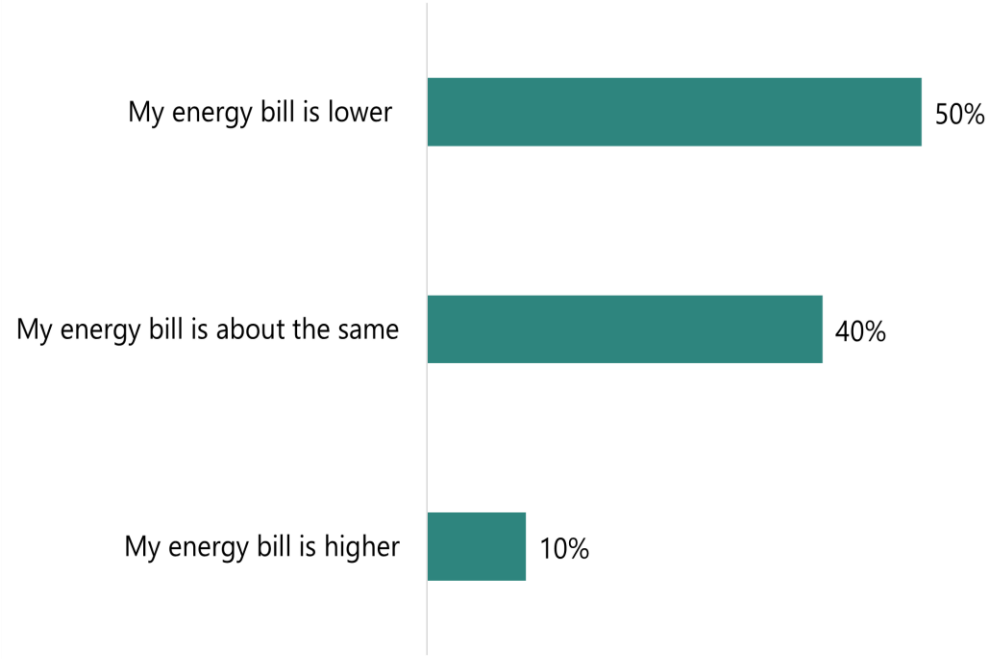
Finally, there were some respondents who expressed the program didn't address their concerns because they are still experiencing air leakage or high bills. It is worth noting that fully addressing these issues may not be in the control of the program or Georgia Power. Additionally, there is evidence that the program is addressing these issues for many customers. Two-thirds of customers say their home is more comfortable (potentially influenced by reduction in air leakage) and half of customers said their energy bills decreased (Error! Reference source not found., Figure 41Error! Reference source not found.).

Figure 40. 2023 Changes in Home Comfort (n=98)



Source: EASE Participant Survey. E19. Since participating in the program, would you say your home is…?

Figure 41. 2023 Changes in Energy Bill (n=88)



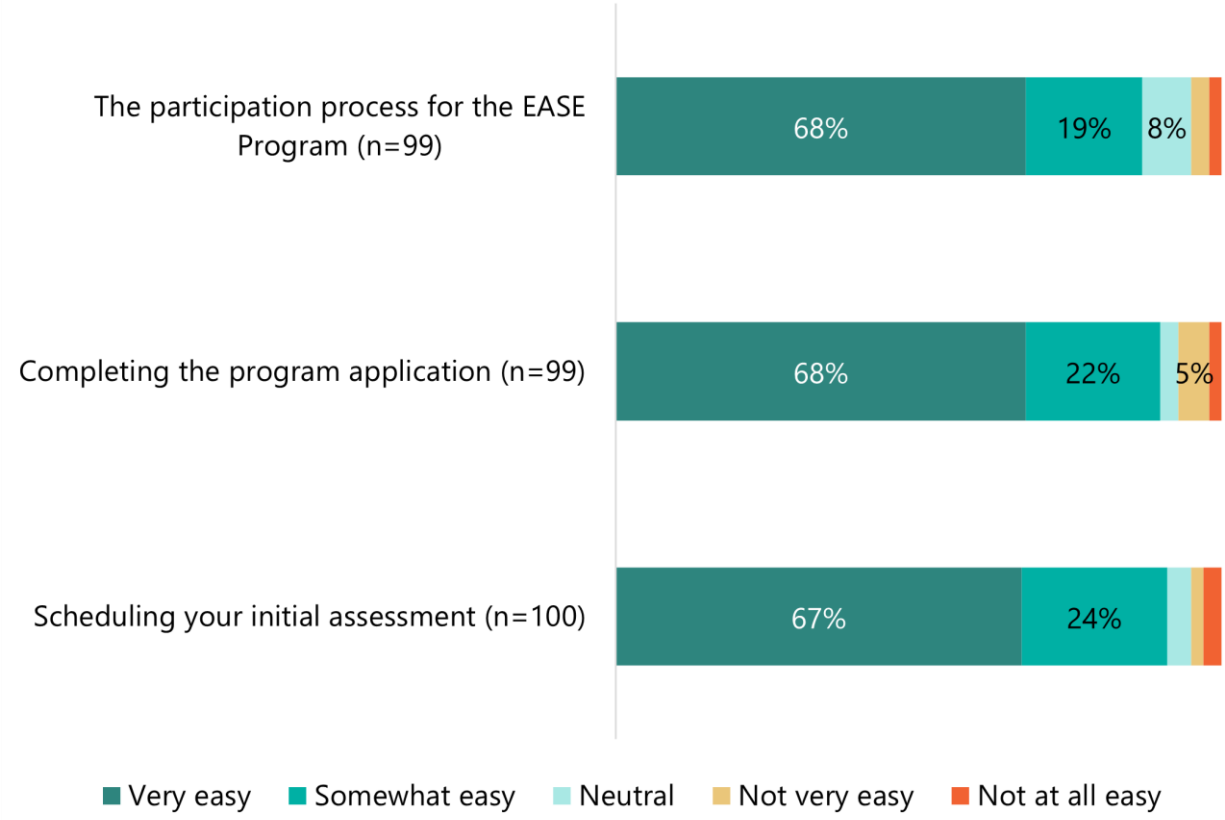
Source: EASE Participant Survey. E20. Since participating in the program, did you notice any changes in your energy bills?

Participation Process

Below provides an overview of how customers experience the program in terms of the participation process and the home energy assessment.

Most respondents said the participation process for EASE overall was somewhat or very easy (87%, Figure 42). Where customers reported challenges, they most often related to communication and long wait times. The few customers that reported challenges mentioned confusion or challenges submitting the application and related forms.

Figure 42. 2023 Ease of Application and Participation Process



Source: EASE Participant Survey. E1. How easy were the following aspects of participation on a scale from not at all easy to very easy? E1_A. Completing the program application? E1_B. Scheduling assessment? E1_C. The participation process for EASE?

Not all EASE participants recalled receiving a home energy assessment, which they should receive as part of the program participation process. It is at this time that contractors review the findings and recommendations for improvements with customers. Eighty percent of respondents remember their Energy Advisor discussing the assessment findings and recommendations with them.

Customers generally had positive experiences with the assessment, which many said provided them with information they were not aware of. Almost all participants that remember receiving information from the assessment said the information shared was very or somewhat helpful (91%, n=78). Further, over half of respondents indicated that the home energy assessment identified new energy efficiency opportunities for the home that they were not aware of (57%, n=91). The opportunities most mentioned included:

- Air sealing (n=18)
- Insulation (n=13)
- Thermostats (n=8)
- Lighting (n=8)
- HVAC servicing (n=5)
- Ducting Sealing (n=4)

The assessment also effectively identified and confirmed many of the participants' concerns. For respondents that had concerns in their home they were hoping the program could help with, over half of these respondents (59%) said the assessment identified **all** their concerns. Customers whose concerns were not identified by the assessment were most often interested in improvements that are not included in the program such as HVAC equipment (n=5), windows (n=4), crawl space insulation (n=2), and doors (n=2). However, some customers also mentioned improvements that are included in the program, like air sealing (n=3) and HVAC maintenance (n=2).

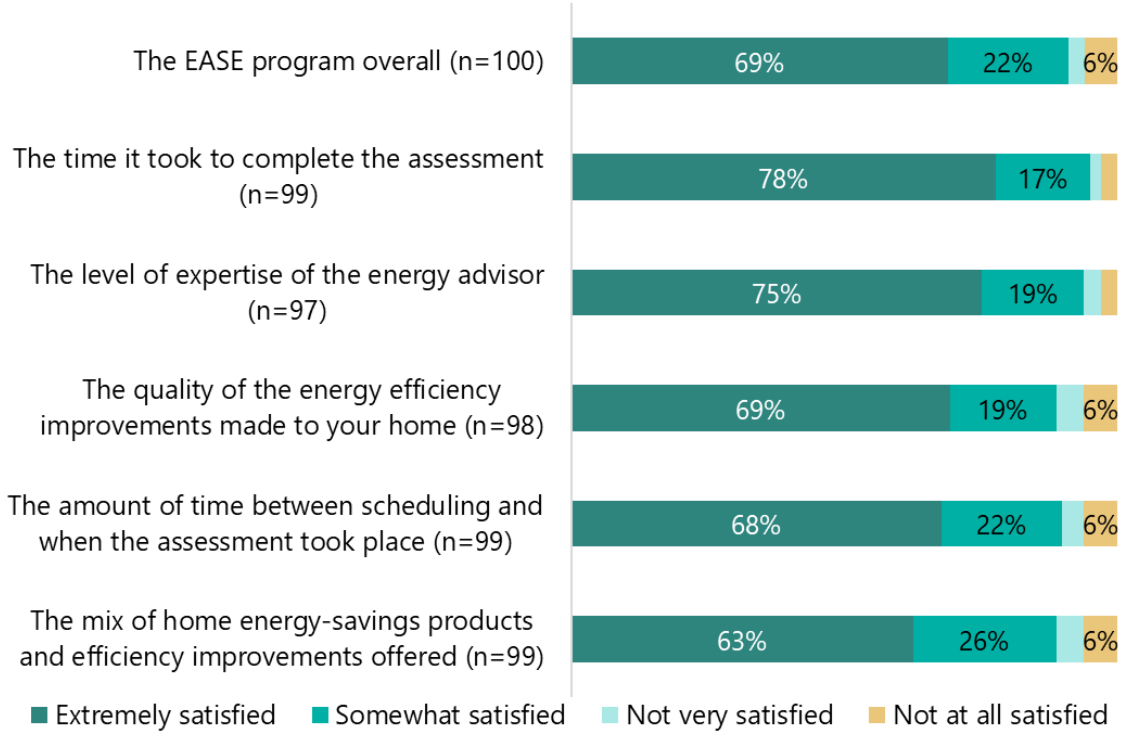
Some respondents (n=24) had suggestions to improve the information that was provided during the assessment, the most common related to improvements to communication and customer interactions with program contractors. These included:

- Improving communication, specifically about the program process (n=4)
- Providing information about additional resources for income-qualified customers (n=2)
- Ensuring contractors perform the assessment and discuss findings with customer (n=2)

Satisfaction with the Program

Customers are highly satisfied with the program. Most (91%) were extremely satisfied or somewhat satisfied with the EASE program overall (Figure 43). Survey respondents also reported high levels of satisfaction with the program's various pathways, most notably with the time it took to complete the assessment (95%).

Figure 43. 2023 Program Pathway Satisfaction



Source: EASE Participant Survey. H1. How satisfied are you with the following pathways of Georgia Power's EASE Program?

Customers voiced general satisfaction and gratitude for the program, with some (n=10) saying they would not have been able to make changes to their home without the program. Others mentioned specific aspects about the program when sharing their reason for satisfaction, including that they:

- Experienced good communication (n=10)
- Found the program to be quick (n=8) or easy (n=7)
- Noticed bill savings (n=7)

Few participants voiced dissatisfaction with the program, and reasons for dissatisfaction were varied. Dissatisfaction typically stemmed from the program not meeting their expectations, support, or communication needs. Those dissatisfied with the EASE program (n=27) said they:

- Did not receive what they wanted from the program, or they wished more measures were offered (n=9).
- Needed more assistance, resources, or better communication (n=9).
- Didn't notice changes in their home or bills (n=4).
- Experienced delays (n=2).

Respondents shared recommendations to improve Georgia Power's EASE Program (n=40). Aligning with the earlier discussion about offerings, the most mentioned recommendation related to program measures. A

few recommendations also included suggestions for improved communication, program outreach and overall program design, including offering:

- More measures (n=2) including window replacement (n=4).
- Improvements to attached rooms and garages (n=2).
- More experienced and professional workers (n=2).
- More advertisement and promotion of the program (n=2).
- Shorter wait times (n=2).

Participating Contractor Engagement and Experience

Contractors are a critical trade ally partner to the program. Through interviews, they provided valuable insight into their engagement and experience with the EASE program.

As a reminder, the evaluation team spoke with eight contractors that completed work for the EASE program, including four that also completed work for HEIP projects. All the contractors that we spoke with are very engaged with the program and their work for EASE makes up 25% to 100% of their business.

All EASE contractors voiced that they are grateful for the work and find meaning in doing it. These contractors appreciate the opportunity to support customers and families in decreasing their energy costs and increasing the comfort of their homes. In addition, two contractors shared that they are grateful to the EASE program for treating them well and helping them to grow their businesses.

> *"[We] like the fact that we're helping people to reduce energy costs. The program can be really life changing."*

> *"It's great to be able to help out a family and reduce their energy bills so they can have a more comfortable life. Helping families reduce energy bills and have a healthier life is why we do it and appreciate what GPC is doing with this program."*

However, contractors did identify a few opportunities for improvements. This section describes their experiences transitioning to a third-party implementer and their recommendations for future program design and delivery.

Transition to Third-Party Implementer

This program cycle, a third-party implementer began implementing the EASE program; the program was implemented by Georgia Power prior to 2023. Most contractors that we spoke with said they didn't do any work through the program for about three months at the beginning of 2023 while the new implementer was onboarding to the program. Contractors described this time as a "pause" and "waiting period" or said the program was "shut down." However, during this time the program continued to intake applications.

Contractors said that there was a difficult period while the new implementer came on board. They said this period was "difficult", "nail biting", and "rocky." Though contractors noted that the program is operating more

smoothly now, contractors raise challenges with the work order process (potentially affected by implementer staff turnover), payments, and availability of direct installation materials.

Work Order Process. One area the contractors highlighted when describing the difference in program administration from last cycle with Georgia Power and this cycle's contracted implementer is the work order process. Contractors complete a work order after the home energy assessment with a proposed work scope and complete the work after approval by the program implementer. It is part of the program design that contractors can complete the assessment and measure installation in the same day if the work order is approved in the same day. The implementer outlined this process noting, "Contractors will call us when they're in the field after they've completed their assessment, and they have [their] installation truck [there]. Our team answers that phone call, reviews it over the phone with them for 15 minutes, and hits the 'go' button to keep that contractor moving." Some contractors said that they prefer to complete both assessment and improvements in the same visit, especially those that travel longer distances for projects.

Most EASE contractors said that the work order process is not working as smoothly with the new implementer and that work orders are slower to go through the approval process. They said that the implementer needs more staff that are technically educated and can approve work orders so that EASE contractors can continue to install measures while they're at a customer's home after the home energy assessment. Contractors said that work orders were more often approved on the same day when Georgia Power was approving them.

Due to the delay in receiving approval for work orders, contractors indicated that they may be less likely to complete "on the margins" upgrades that might be approved but might not be. One contractor said that they complete the work prior to a work order being approved if they don't hear back soon enough. Because this contractor can't wait for work orders to be approved consistently, they complete only work that they know will be approved, saying, "There is no way we could make our schedule work if we waited for the work order." It's possible that it's harder for contractors to make full use of the program now that some contractors are installing only the measures they know will be approved after the work is complete. This particularly impacts contractors that travel across the state to complete projects and cannot return home.

Contractors shared that turnover among implementer staff has impacted contractor interactions with the program, and this has contributed to the delay in receiving work orders. One contractor said that it has been a struggle working with the implementer this year and it's been slower due to turnover. Another contractor said that they've struggled to get straightforward answers from the implementer and "they've changed staff so many times."

Payment Timeline. Payment has also been a pain point for EASE contractors. Some have experienced slow payment, waiting up to six months to receive payment. However, some other contractors shared that they usually get their checks quickly, in about three weeks. Others mentioned that some payments were hung up as the new implementer was getting up to speed. A couple of contractors mentioned that they now receive payments by direct deposit. Taken together, these findings suggest that while payment has improved it remains a pain point for some contractors.

Direct Install Materials. Multiple EASE contractors said that they've had issues getting enough direct install materials for their projects. One contractor said that when they do not have enough materials for projects,

they must buy their own and submit paperwork for reimbursement. This additional paperwork creates difficulty for busy contractors. Since these interviews were conducted, the program implementer has set up a new portal for ordering direct install measures that is intended to streamline the ordering and shipment of direct install materials.

Use of Donation Funds. Some contractors said that it has been harder to use donation funds than it was during the previous program cycle, when Georgia Power ran the program in-house. The donation process is still managed by Georgia Power this cycle and run similarly to when Georgia Power implemented the program. However, now the implementer alerts Georgia Power of the contractor's request for donation funding compared to the previous cycle when the contractor sent the request to Georgia Power directly. In addition to these changes, the program team noted that donations have slowed due to external factors.

Contractor Recommendations

Contractors shared recommendations for what they would like to see added to the program. These recommendations included:

- A higher budget per house, especially for larger homes.
- More direct install inventory.
- Adding improvements to the program (duct cleaning, windows, HVAC equipment repair or replacement).
- A higher dollar amount available for health and safety measures through the charitable donations pathway of the program.
- Increasing the income thresholds to make the program available to more customers.

As noted previously when discussing measures requested by customers, some of the measures that contractors recommended provide little energy benefit (e.g., duct cleaning) or may not be cost-effective (e.g., windows), and as such may not be good candidates for inclusion in the EASE program. In addition to requesting additional health and safety funding, contractors expressed confusion about how the program provides funds for health and safety improvements and what improvements could be covered with those funds. Additional clarification may be needed to help contractors use these funds when available.

Public Housing Authority Experience

The evaluation team spoke with three interviewees representing five housing authorities. Qualitative insights from these interviews illustrate how EASE has benefited housing authorities and tenants alike through improved energy efficiency and reduced costs. There are six key findings from Public Housing Authority participants' experiences with the EASE Program related to: program reach and scale, program awareness and decision-making, program experience, tenant feedback and impact, overall satisfaction and recommendations, and challenges and opportunities.

Program Reach and Scale

The EASE program's reach among those interviewed has been extensive, servicing over 50 buildings and impacting more than 500 units in the past year. One interviewee commented that, "Seeing such a wide-scale

impact really underscores the value of the program." Another participant appreciated the "significant reach and impact on energy efficiency across the housing types and communities I work." Of the public housing authorities interviewed, participants noted the program's demonstrated adaptability to different housing types under management, including single-family homes, multifamily properties and senior facilities.

Program Awareness and Decision-Making

Interviews revealed that program awareness primarily comes through professional networks and direct outreach by Georgia Power. One housing authority representative mentioned, "We heard about it at a conference and the time just seemed perfect as we were looking into upgrading our facilities." This underscores the importance of strategic outreach and timing in the decision-making process. Overall, the decision to participate is primarily motivated by potential benefits of energy efficiency for IQ residents, with the timing aligning well with housing authorities' needs for upgrades.

Program Experience

The program was implemented smoothly for those interviewed. As one participant noted, "The process was quite streamlined, and both Georgia Power and their contractors were very supportive." Collectively, housing authority staff interviewed appreciated the straightforward and effective communication they experienced throughout the process. Thus, reflecting a well-organized approach to program delivery, emphasizing the value of support and clear communication.

Tenant Feedback and Impact

Overall, feedback from tenants was generally positive according to the interviews. Most tenants responded positively to the upgrades, appreciating the enhanced comfort, energy efficiency and modifications to their living spaces. One housing authority staff person shared that a tenant said, "My apartment feels warmer, and my heating bills have gone down."

Feedback and impact on seniors' appreciation for improved lighting also stood out as well. According to one participant, long-term residents in a serviced senior living facility expressed, "deep appreciation for the upgraded lighting and thermostat controls which enhanced their comfort and ease of living."

Program hurdles identified by participants were mostly around technology acceptance among tenants. "There's been some hesitation around adopting new systems," one housing authority staff member noted. Insights from interview data revealed that most of the adoption hesitation was related to not understanding how to use the new digital thermostats. Similarly, another participant shared that a tenant said, "it took me a while to figure out the new digital thermostat." This challenge can be easily addressed through targeted education sessions to meet the needs of diverse tenant populations. Through some targeted educational sessions provided as part of the program to residents at one housing authority, residents' understanding of how to use the digital thermostats increased. This led to some residents becoming advocates of the new technology, showcasing the program's ability to turn challenges into opportunities for greater engagement and awareness around energy efficiency.

Another challenge noted was tenant concerns about privacy and the amount of time needed to do [retrofitting] work. Privacy concerns may stem from the disruptions and presence of workers in personal living

spaces during the upgrade process. Better communication with tenants about what to expect may improve and alleviate these concerns.

Overall Satisfaction and Recommendations

Among the housing authorities interviewed, overall satisfaction with the EASE Program was high. “The energy assessments were thorough, and the improvements were top-notch,” one interviewee stated. Participants praised the quality of the energy assessments and improvements.

Recommendations for future improvements included enhancing awareness of the program and improving communication strategies. “More proactive communication and detailed documentation would help us manage and track benefits more effectively” suggested one housing authority staff person.

Finding a way to integrate into the timing for Housing Authority’s planning of capital improvements will be helpful for future engagement. Housing authority staff noted that they complete three- and five-year plans as part of their responsibilities as well as annual plans and specific project-based initiatives aimed at enhancing housing quality, tenant satisfaction, and operational efficiency for sites managed. One staff person noted that, “The Georgia Power EASE program has contributed significantly to my ability to address infrastructure needs...it would also be very helpful to receive additional documentation and a follow up report that I can use for my reporting and future planning.”

Participants’ responses illustrate the instrumental role that the EASE Program plays in helping housing authorities meet their strategic goals, particularly in improving infrastructure and enhancing property management. The program also contributes to their ability to do long-term planning and be proactive in managing the limited resources available for infrastructure improvements.

Summary of Findings: Challenges and Opportunities

Overall participants considered the program successful. Notably, the program excels in engaging with housing authorities with participants citing the high accessibility and responsiveness of EASE program staff and contractors as pivotal to their ability to facilitate a smooth implementation process including their ability to address concerns arising during implementation.

Challenges around adopting new technologies and the realities of implementation raised by participants were discussed earlier. However, these issues can be addressed through tenant training, education and communication materials provided by the Georgia Power EASE program to housing authority staff. The third challenge identified in participant responses is the need for more tailored communication strategies, particularly around managing tenant expectations about the realities and logistics of implementation. While it is impossible to completely prepare residents for delays or unknown problems, some information regarding issues that most frequently occur that could extend implementation time would be helpful to prepare them. Opportunities for improvement here include enhancing educational efforts and tailoring communication to better meet residents' needs.

Finally, for public housing authorities interviewed, the EASE Program stands out as a transformative initiative, successfully enhancing energy efficiency and comfort for tenants across numerous public housing settings. The insights gleaned from participants emphasize significant positive impacts on housing authorities and

residents alike along with the program's adaptability to diverse housing types. While the program is largely celebrated for its benefits, the feedback also points to areas for refinement such as improving technological adoption and addressing privacy concerns during upgrades. Strengthening awareness and communication strategies could further enhance the program's efficacy and reach. Incorporating follow-up documentation of program services provided to public housing authority staff as well as marketing and promoting how the program can assist in annual, three- and five-year planning and seeking additional funding opportunities could further enhance program participation, efficacy, and reach. Overall, the EASE Program was noted by participants as being an invaluable resource, enabling housing authorities to meet strategic goals while providing substantial benefits to tenants.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion 1: Verified gross savings for the EASE program achieved 74% of reported savings. Many per-unit energy savings values in use by the program are accurate and reflective of the level of gross energy savings being achieved by the program. Per-unit energy savings for some key measures were found to be overstating savings.

RECOMMENDATIONS:

- **Consider revising program processes to clarify appropriate usage of the per-unit gross savings values for attic insulation.** The program is currently using two sets of attic insulation to measure savings values. Attic insulation savings are very sensitive to the level of starting insulation. To improve accuracy of reported savings, Georgia Power should more clearly define which measures should be assigned the higher savings values based on starting insulation R-values or thickness.
- **Consider revising quality control (QC) practices and guidance to trade allies on measurement of attic insulation levels.** The program is currently collecting photos of installed attic insulation. To encourage high quality of installation, require submission of "pulled back" photos showing the attic overall. "Focused in" photos such as those centered on depth rulers can be misleading.
- **Revise deemed savings for daylight sensors to reflect the evaluation findings if they continue to be offered.**

Conclusion 2: The Georgia Power website is the primary driver of program awareness. Few customers learn about the program through community action agencies or community-based organizations.

Recommendations:

- **Consider partnering with community-based organizations to raise awareness of EASE.**
- **Continue to look for ways to partner with community action agencies to raise awareness of EASE, especially for those on the waitlist for the Federal Weatherization Assistance Program (WAP).** This partnership could help alleviate the waitlist for WAP services and bring customers that are already IQ into the program.

Conclusion 3: The program helped about half of respondents with all the concerns in their home they hoped it could address, including air sealing, insulation, new thermostats, and lighting. Customers who were looking for additional equipment were hoping for new windows, duct cleaning, or new HVAC equipment. Contractors said that customers often come to them with a different understanding of what the program covers compared to what it does.

RECOMMENDATIONS:

- **Clarify communication of measures that are included in the program to customers in marketing materials and during the sign-up process to set expectations about the program.** Help customers understand the benefits of measures that are offered in the EASE program.

- **Encourage contractors to explain the benefits of the measures offered through the EASE program to help customers understand what the program can offer.** In some cases, the measures offered through the program may address their concerns, even though they may not receive the specific measures they had in mind. For example, respondents cited energy loss and drafts as a reason they wanted new windows through the program. Insulation and air sealing measures may address this concern better than windows but are less visible. Program contractors can listen to customers' concerns and help them understand the benefits of the measures they can install. Through these discussions, contractors should also clearly articulate what is not included in the program so that customers understand why they are not receiving the measures they had in mind.
- **Consider adding measures and services that meet participant needs and provide additional value to the program where cost-effective.** Georgia Power could explore the cost and benefits of adding windows to the program and determine if there are situations where it would be cost-effective to do so. For example, some IQ energy efficiency programs will replace single-pane windows. Consider adding HVAC measures included within HEIP to the EASE program as well.

Conclusion 4: Customers are learning about new energy efficiency opportunities that are offered through the EASE program in the home energy assessment. Most respondents said an energy assessor discussed the findings from the home energy assessment with them, but some said the energy assessor did not.

RECOMMENDATIONS:

- **Continue to train EASE contractors to always share findings** from the home energy assessment with customers. Underscore the importance of this step to customer experience and satisfaction.

Conclusion 5: Contractors reported that work orders are being approved more slowly under the new implementer than when Georgia Power ran the program. This particularly impacts contractors that travel for projects. Some contractors that prefer to complete the assessment and improvements in one visit will complete the improvements before the work order is approved and only install the measures they are sure will be approved.

RECOMMENDATIONS:

- **Consider offering additional trainings to implementer staff to help the work order approval process run more efficiently and smoothly.**

Conclusion 6: Some contractors are struggling to receive direct install materials and payment from the program implementer. When contractors do not receive enough direct install materials from the implementer, they must purchase their own and submit paperwork for reimbursement.

RECOMMENDATIONS:

- **Discuss payment with the program implementer to understand the source of delays and lack of direct install materials. Work with them to address the factors that are causing those issues.**

- **Consider adopting a procedure to make the reimbursement process simpler for contractors that do need to purchase their own materials and apply for reimbursement.**

Conclusion 7: The EASE Program has been effective in enhancing energy efficiency and comfort for tenants in public housing, with housing authorities noting significant benefits such as reduced energy costs and improved living conditions. The positive feedback from tenants, especially regarding the upgrades to heating systems and lighting, highlights the tangible impact on residents' quality of life.

Conclusion 8: Feedback from public housing authority interviews indicated that while the technological upgrades (e.g., smart thermostats) were well received in terms of their benefits, the initial resistance and difficulties using new devices highlighted a critical gap in technology adoption and support. Addressing the challenges related to new technology adoption among tenants requires targeted educational initiatives. Providing training and comprehensive guides on using new systems like smart thermostats can help ease the transition for tenants and reduce hesitancy.

RECOMMENDATIONS:

- **Develop targeted, ongoing educational programs that cater specifically to the needs of residents, focusing on the operation of new technologies.** These could include hands-on demonstrations, easy to understand instructional materials, and possibly engaging and accessible digital literacy workshops focusing on energy-efficient technologies being upgraded through the program.
- **Regularly gather feedback from public housing authority residents where new energy efficiency technology upgrades were implemented about their experiences with using the new technologies.** Use this feedback to make iterative improvements to resident training programs and/or adjusting selection of program measures that offer more simplified features or interface designs based on user input.

Conclusion 9: The program aligns well with the strategic goals of housing authorities, aiding them in meeting infrastructure needs and improving property management. It also supports housing authorities in their planning and resource management, emphasizing the program's role in facilitating long-term operational improvements. Interviewees noted that detailed documentation at the end of program participation would help them more effectively track program benefits and inform future planning.

RECOMMENDATIONS:

- **Provide detailed documentation of program services received to housing authority participants.** Providing detailed documentation and follow-up reports to housing authorities can aid them in tracking the benefits of the program and assist in their reporting and future planning efforts. This could include the impact on energy savings, tenant satisfaction, and other key performance indicators in addition to the specific measures received.
- **Align outreach to housing authorities with three- and five-year planning cycles.** Integrating with the housing authorities planning processes and aligning the program's offerings with the housing authorities' capital improvement schedules and strategic planning cycles can optimize timing and resource allocation, making the program even more beneficial.

6. RESIDENTIAL REFRIGERATOR RECYCLING + (RR+) PROGRAM

Georgia Power's Refrigerator Recycling Plus ("RR+") program, implemented by Utility Energy Services (UES) in 2023, offers single-family customers free pick-up and an incentive of up to $35 for their secondary, working refrigerators and freezers. New in 2023, the program offered up to $20 for recycled dehumidifiers and room air conditioners (A/Cs) alongside a large appliance pickup, launched community drop-off recycling events, and distributed one energy efficiency kit (kit) to all participants. In addition, in 2024 the program began scheduling pick-ups for small appliances as a standalone option without requiring a large appliance to be picked up and recycled alongside them. Last cycle the program was implemented by Appliance Recycling Centers of America (ARCA) and was referred to as the Residential Refrigerator Recycling Program.

In 2023, RR+ achieved verified net savings of 1,110,711 kWh and a demand reduction of 221 kW (Table 84). The program reported reaching 41% of originally stated net kWh energy savings goal; verified net savings show 17% achievement. Lower savings were largely due to implementation disruptions.

Table 84. 2023 RR+ Savings

	NET SAVINGS GOALS	REPORTED NET SAVINGS	VERIFIED GROSS SAVINGS	NTGR	VERIFIED NET SAVINGS	% OF VERIFIED NET TO GOALS
Electric Energy Savings (kWh)	6,366,937	2,587,291	2,173,815	51%	1,110,711	17%
Peak Demand Reduction (kW)	788	350	345	51%	221	28%

Most participants were highly satisfied with Georgia Power, the program, and were likely to recommend the program to others. Many who were dissatisfied experienced issues related to disruptions from an implementation vendor ceasing operations. While the incentive was noted as a participation driver by some, the amount of the incentive may not be as important. Over half of respondents would have participated if the rebate had only been $20, another half said they would have participated if there had been no rebate at all. There is interest in small appliance recycling through both participation pathways – free pick-ups and drop-off events, although there was much more interest in having the appliance picked up than recycling through a drop-off event.

Chapter 6

Refrigerator Recycling+ Program (RR+)

Program Savings Overview

RR+ achieved verified net savings of 1,110,711 kWh and a demand reduction of 221 kW. The program reported reaching 41% of originally stated net kWh energy savings goal; verified net savings show 17% achievement. Lower savings were driven by implementation disruptions and market changes affecting per-unit savings values. Recycled refrigerators and distributed energy efficiency kits accounted for the majority of the program's verified net savings (55% and nearly 30%, respectively). RR+ incentivized the recycling of over 3,900 appliances for over 3,400 customers and distributed over 3,400 kits. The vast majority of appliances were picked up (97%) versus dropped off in a recycling event (3%).

Conclusions & Recommendations

CONCLUSION 1

Market changes significantly affected the per-unit savings for large, recycled appliances as well as lighting equipment provided through the kits.

RECOMMENDATION

Revise deemed savings for recycled refrigerators and freezers.

RECOMMENDATION

Do not claim savings for lighting measures in the next program cycle.

CONCLUSION 2

In-service rates (ISR) for kit measures were low, affecting savings.

RECOMMENDATION

Identify program delivery opportunities to increase kit ISRs.

CONCLUSION 3

Small appliance recycling had limited uptake in 2023, although there may be opportunity for increased participation.

RECOMMENDATION

Continue to offer and monitor small appliance recycling.

RECOMMENDATION

Consider conducting targeted small appliance recycling research studies to inform the offering for the next program cycle.

CONCLUSION 4

The program is moderately influential in customers' decisions on how to dispose large appliances, and the influence continues to decrease year-over-year (albeit slightly between 2021 and 2023).

CONCLUSION 5

Participants were satisfied with their program experiences and with Georgia Power, and many who were dissatisfied experienced issues related to disruptions from an implementation vendor ceasing operations.

Program Overview

Georgia Power's Refrigerator Recycling Plus ("RR+") program offers single-family customers free pick-up and an incentive of up to $35 for their secondary, working refrigerators and freezers. By picking up and recycling these units in an environmentally safe manner, the program creates cost-effective, long-term energy and peak demand savings, ensuring the appliance is removed from the grid completely. In addition to recycling refrigerators and freezers, the program added recycling of dehumidifiers and room A/C units as add-on measures – customers can recycle these measures along with a qualifying refrigerator or freezer, with a $20 incentive for each small appliance they recycle. The program also raises customer awareness of the economic and environmental costs of these older appliances. Finally, beginning September 2023, the program distributed by mail one free kit to all participants to provide further energy savings to customers.

To qualify:

- Customers must be a current Georgia Power residential customer.
- Appliances must be in owner-occupied single-family detached homes, condominiums and townhomes.
- Customer must own the unit being picked up or recycled.
- Appliances must be secondary units (for refrigerators/freezers), empty, and in working condition.
- Each residential address is limited to two large appliances (refrigerator/freezer only) and four small appliance units (dehumidifiers/room A/Cs) per year.

RR+ provides a rebate directly to customers of up to $35 for recycling refrigerators and freezers and $20 for recycling dehumidifiers and room A/Cs. As an additional benefit, the program covers recycling fees enabling the customer to remove the appliance for free, which is often as much as, or more of, a benefit as the monetary incentive.

New in 2023, Georgia Power added small appliance measures, dehumidifiers and room A/Cs, and began distributing one free kit to all participants, hence the new name, "RR+" (formerly, "Refrigerator Recycling Program"). All kits contain the same measures, but savings assumptions vary between electric-only and dual fuel customer status. In addition, Georgia Power added community recycling drop-off events as a new participation pathway and an alternative to scheduled curbside pick-up and began scheduling pick-ups for small appliances without a larger appliance to recycle alongside them. The kits included:

- ENERGY STAR non-dimmable 60-watt equivalent A19 bulbs, 4 count.
- Faucet aerator 1.5 gallons per minute (GPM) (bathroom), 1 count.
- Faucet aerator 1.5 GPM (kitchen), 1 count.
- Low-flow showerhead 1.5 GPM, 1 count.
- Pipe wrap insulation (6 feet), 1 count.
- Rope caulk (10 feet), 1 count.
- Switch/outlet gasket, 10 count.
- V-seal weather strip (17 feet), 1 count.

Program Participation and Achievements

RR+ incentivized the recycling of over 3,900 appliances for over 3,400 Georgia Power customers in 2023. Recycled measures included refrigerators, freezers, dehumidifiers, and room A/C's. RR+ also distributed over 3,400 kits including LED bulbs, faucet aerators, low-flow showerheads, pipe wrap, rope caulk, gaskets, and weather stripping.

In 2023, fewer customers participated in the program than anticipated resulting in fewer appliances recycled and kits distributed (7,323 total measures) than planned (15,650 total measures). In August 2023, the main vendor conducting schedule appliance pick-ups, ARCA ceased all business operations effectively halting implementation. UES, the primary implementer overseeing ARCA's activities and all other customer-facing recycling activities continued program implementation. Resource limitations included slower service overall with fewer drivers available for pick-ups and new drivers needing time to train and go through the required subcontractor compliance and approval process. During this time, UES maintained a queue of customers waiting for services that reached about 700 customers at its peak. To help address the growing list of customers waiting for services, Georgia Power paused marketing for the RR+ program between August and October 2023.

The program reported 41% of energy savings (kWh) and 44% of demand reduction (kW) goals (Table 85). Savings goals are net, inclusive of NTG assumptions applied to the measure-level savings.

Table 85. 2023 RR+ Participation and Tracked Savings

	NUMBER OF MEASURES GOAL	REPORTED NUMBER OF MEASURES	NET SAVINGS GOALS	REPORTED NET SAVINGS	% OF GOAL REPORTED
Electric Energy Savings (kWh)	15,650	7,323	6,366,937	2,587,291	41%
Peak Demand Reduction (kW)			788	350	44%

Table 86 reports RR+ participation and savings by measure and program pathway. Refrigerators accounted for the majority (55%) of program energy savings. Small appliances, new in this cycle, accounted for 8%, and kits accounted for 28% of savings. Most appliances were picked up (97%) versus dropped off in a recycling event (3%).

Note that the tracked kWh savings are slightly lower than reported (by 112 kWh). This difference was due to the timing of when the Georgia Power reporting team pulled data for the Q42023 PSC Report and an update to a project made by UES. The evaluation team verified the revised tracking data, pulled after the analysis in this report, matches the savings reported. The evaluation results are not affected by this minor difference. Tracked data will be utilized for the remainder of the report.

Table 86. 2023 RR+ Participation and Tracked Savings by Program Pathway

PROGRAM PATHWAY	NUMBER OF PARTICIPANTS	MEASURE	NUMBER OF MEASURES	TRACKED SAVINGS (kWh)	% OF TOTAL TRACKED SAVINGS (kWh)	TRACKED SAVINGS (kW)	% OF TOTAL TRACKED SAVINGS (kW)
RECYCLED APPLIANCES AND SAVINGS							
Scheduled Pick-ups	3,390	Refrigerators	3,064	1,420,164	55%	162	46%
		Freezers	529	234,083	9%	27	8%
		Dehumidifiers	97	68,784	3%	24	7%
		Room A/Cs	108	62,188	2%	40	11%
		Subtotal	**3,798**	**2,519,260**	**69%**	**315**	**72%**
Recycling Drop-off Event	66	Refrigerators	0	0	0	0	0
		Freezers	0	0	0	0	0
		Dehumidifiers	43	30,492	1%	11	3%
		Room A/Cs	65	37,428	1%	24	7%
		Subtotal	**108**	**67,920**	**2%**	**35**	**10%**
RECYCLED APPLIANCES, KITS, AND SAVINGS							
All Recycled Measures Plus Kits	3,456	Refrigerators	3,064	1,420,164	55%	162	46%
		Freezers	529	234,083	9%	27	8%
		Dehumidifiers	140	99,276	4%	35	10%
		Room A/Cs	173	99,615	4%	64	18%
		Electric Energy Kit	715	344,620	13%	23	6%
		Dual Fuel Energy Kit	2,702	389,421	15%	39	11%
		Total	**7,323**	**2,587,179**	**100%**	**350**	**100%**

Note: Due to rounding, values may not add up to 100%.

Methodology

Research Questions and Activity Overview

The evaluation sought to address both process and impact evaluation questions.

Process evaluation questions focused on customer experience with the program and contractors, experiences with new measures and program pathways, and satisfaction with the program offerings and elements.

Impact evaluation questions focused on verifying savings against planned and, where necessary, adjusting savings based on factors such as in-situ metered data for refrigerators and freezers or updated savings assumptions, resulting in a summary of adjustments and recommendations for future planning.

Table 87 summarizes the activities completed to address these research questions. Appendix – Refrigerator Recycling+ (RR+) provides a more detailed summary of the evaluation research questions and methodology.

Table 87. 2023 RR+ Primary Data Collection

EVALUATION ACTIVITY	COMPLETED
Program staff and stakeholder interviews	3
Tracking system analysis	✓
Participant surveys	246
In-situ metering	20 refrigerators, 1 freezer [a]
Residential general population survey	350 across multiple programs
Calculate gross savings (unit energy savings)	✓

[a] The evaluation team metered a total of 31 appliances as part of the study – 28 refrigerators and 3 freezers. Two meters were not returned from the field and the remaining attrition from the metering sample were because the team could only determine appliance characteristics necessary for in-situ metering study modeling for 21 of the metered appliances – 20 refrigerators and a single freezer.

Impact Evaluation Results

Key findings include:

- Market changes significantly affected the savings for large, recycled appliances as well as lighting equipment provided through the kits. As a result, the verified net savings for RR+ were 1,110,711 kWh for 2023, which is 43% of savings reported by Georgia Power in its Q42023 PSC Report.
- The NTGR for refrigerators decreased from the last evaluation, indicating higher likelihood that customers would have removed the equipment in a way that would have not been placed back on the grid in the absence of the program (50% in 2021 compared with 42% refrigerator NTGR in 2023). Freezer NTGR also decreased slightly, but the difference is not statistically significant.
- Customers reported relatively low installation rate of kit equipment, significantly reducing the ISRs and kit savings. The low ISRs may be reflective of program design and delivery of kits.

Table 88 shows the average tracked net savings and verified net savings for the 2023 RR+ measures. Verified net savings values are derived through the evaluation activities as described in the Impact Evaluation Approach section. As discussed previously, tracked savings throughout this section are taken from VisionDSM.

Table 88. 2023 RR+ Tracked and Verified Savings

MEASURE [a]	TRACKED NET SAVINGS		VERIFIED GROSS SAVINGS		VERIFIED NET SAVINGS	
	ENERGY (kWh)	PEAK DEMAND (kW)	ENERGY (kWh)	PEAK DEMAND (kW)	ENERGY (kWh)	PEAK DEMAND (kW)
Refrigerators	1,420,164	162	1,540,886	176	648,342	74
Freezers	234,083	27	290,400	33	142,989	16
Dehumidifiers	99,276	35	96,504	34	96,504	34
Room A/Cs	99,615	64	58,166	67	58,166	67
Kits – Electric [a]	344,620	23	84,549	13	74,901	11
Kits – Dual Fuel [a]	389,421	39	103,311	22	89,809	19
TOTAL	**2,587,179**	**350**	**2,173,815**	**345**	**1,110,711**	**221**

[a] Kit measures included A19 LED bulbs (no claimable savings), faucet aerators, low-flow showerhead, pipe wrap insulation, rope caulk, gaskets, and weather stripping.

Verified Gross Savings

Table 89 shows the planned per-unit deemed savings and verified gross per-unit savings for the 2023 RR+ measures. Verified per-unit savings values were lower for refrigerators, freezers, and room A/Cs. The adjustments for refrigerators and freezers are primarily driven by newer equipment being recycled than modeled. The room A/C measure savings, which were based on simulation modeled values from 2020, reflect the consumption of recycled equipment calculated through an engineering analysis.

Table 89. 2023 RR+ Planned Gross & Verified Gross Per-Unit Savings Values

MEASURE	UNIT OF MEASURE	PLANNED DEEMED GROSS PER-UNIT SAVINGS		VERIFIED GROSS PER-UNIT SAVINGS	
		kWh	kW	kWh	kW
Refrigerators	1 Refrigerator	927	0.11	503	0.06
Freezers	1 Freezer	885	0.10	549	0.06
Dehumidifiers	1 Dehumidifier	709	0.25	689	0.24
Room A/Cs	1 Room A/C	576	0.37	336	0.39
Kits – Electric [a]	1 Kit	482	0.03	118	0.02
Kits – Dual Fuel [a]	1 Kit	144	0.01	38	0.01

[a] Planned deemed kit savings include embedded ISRs.

Savings values for kits include both savings calculated through the engineering analysis as well as an ISR which reflects the percentage of equipment installed. The engineering analysis resulted in higher kWh and kW values per measure; however, the surveys found significantly lower ISRs than planned. The lower ISRs may be reflective of program design, specifically how the kits were delivered. Customers did not request the kits; rather, as a standard offering, they received the kit by mail after they recycled their appliance(s). Having customers request (or opt-in) to the kit may improve the ISR in the future.

Table 90 compares the ISR values embedded in the planned savings with those verified via the survey.

Table 90. 2023 Kit Measure ISR Comparison

MEASURE	CLAIMED ISR (EMBEDDED)	VERIFIED ISR
Bathroom aerators, 1 per unit	60%	17%
Kitchen aerators, 1 per unit	60%	25%
Low-flow showerheads, 1 per unit	62%	18%
Pipe insulation (6 feet), 1 per unit	56%	25%
Exterior switch/wall gaskets, 10 per unit	87%	13%
Rope caulk (10 feet), 1 per unit	87%	15%
V-seal Weatherstrip (17 feet), 1 per unit	87%	22%
A19 LED bulbs, 4 per unit	93%	57%

Table 91 summarizes the driving factors behind differences in savings values for each measure. Additional details on savings calculations can be found in Appendix B. Impact Calculation Overview.

Table 91. 2023 RR+ Notable Differences Between *Reported* & Verified *Gross*

MEASURE	REPORTED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES	PRIMARY REASONS FOR DIFFERENCES
Refrigerator	*Reported* energy (kWh) savings align with the gross verified savings values attained from the previous evaluation (2021) of 927 kWh. The demand savings used for planning estimates this cycle aligned with net savings from 2021 EM&V results, 464 kWh.	In-situ metering study; program tracking data; participant and nonparticipant surveys	The appliances recycled through the program in 2023 were both built more recently and were younger when they were recycled, compared to those recycled in the 2020/Q1 2021 program year. Related to this, the percentage of appliances recycled that were built after the increased 2001 efficiency standard increased as well. These factors drove a lower Existing Unit Energy Consumption (UEC) value than applied to deemed savings values.

MEASURE	REPORTED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES	PRIMARY REASONS FOR DIFFERENCES
Freezer	*Reported* energy (kWh) savings align with the gross verified savings values attained from the previous evaluation (2021) of 885 kWh. The demand savings used for planning estimates this cycle aligned with net savings from 2021 EM&V results, 443 kWh.	In-situ metering study; program tracking data; participant and nonparticipant surveys	The appliances recycled through the program in 2023 were both built more recently and were younger when they were recycled, compared to those recycled in the 2020/Q1 2021 program year. Related to this, the percentage of appliances recycled that were built after the increased 2001 efficiency standard increased as well. These factors drove a lower Existing UEC value than applied to deemed savings values.
Dehumidifiers	*Reported* energy savings align with energy and demand savings in the Georgia Power Energy Efficiency Technical Reference Manual Version 3.0 (Georgia Power TRM 3.0).	Georgia Power TRM 3.0	The evaluation team followed the methodology outlined in the Georgia Power TRM 3.0 and updated the dehumidifier capacity variable with the average capacity of dehumidifiers recycled through the program in 2023 and updated the efficiency factor with the applicable federal standard based on age and capacity. The Georgia Power TRM 3.0 approach is based on the 2021 Pennsylvania TRM[29] for dehumidifier recycling. However, the Georgia Power TRM 3.0 does not include the coincidence factor, so the evaluation team assigned the coincidence factor from the Pennsylvania TRM.
Room A/Cs	*Reported* energy savings align with the energy and demand savings in the Georgia Power TRM 3.0.	2021 Pennsylvania TRM	Deemed reported savings are based on a simulation model (from June 2020). To calculate per-unit energy consumption of recycled room A/Cs, the evaluation team referred to the savings calculation methodology documented in the 2021 Pennsylvania TRM. The team referred to the tracking data for room A/C age, capacity and EER values, referenced federal standards, and adjusted savings to reflect Atlanta climate conditions.
Kit LEDs	Baseline energy consumption is based on the 2019 Hawaii	n/a	Gross savings are not assigned to LEDs because of the Energy Independence and Security Act (EISA) backstop enforcement which went into

[29] Pennsylvania Public Utility Commission. Issued August 2019 revised February 2021. *Technical Reference Manual Volume 2: Residential Measures Act 129 Energy Efficiency and Conservation Program & Act 213 Alternative Energy Portfolio Standards* . https://www.puc.pa.gov/filing-resources/issues-laws-regulations/act-129/technical-reference-manual/

MEASURE	REPORTED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES	PRIMARY REASONS FOR DIFFERENCES
	TRM[30], and reported savings follow the Georgia Power TRM 3.0 methodology.		effect July 1, 2023, and all kits were distributed after this date. Under the backstop, the baseline general service lamp is assumed to be an LED, so there are no savings when an LED is replaced with another LED.
Kit Aerators	Aerator savings follow the Georgia Power TRM 3.0 methodology and assume *one* aerator is installed in an unknown location.	Georgia Power TRM 3.0	The evaluation team followed the Georgia Power TRM 3.0 savings methodology for *two* kit aerators, one kitchen and one bathroom. Based on survey information, the team updated values for the number of people per home and the number of bathroom faucets per home. The team adjusted verified savings to reflect the survey-based ISR and percentage of homes with electric water heaters.
Kit Showerheads	Showerhead savings follow the Georgia Power TRM 3.0 methodology.	Georgia Power TRM 3.0	The evaluation team followed the Georgia Power TRM 3.0. Based on survey information, the team updated values for the number of people per home and the number of showerheads per home. The team adjusted savings to reflect the survey-based ISR and percentage of homes with electric water heaters.
Kits Pipe Insulation	Savings are based on 5' of pipe insulation and 8,760 hours per year. The savings calculation is based on the Georgia Power TRM 3.0 methodology.	Georgia Power TRM 3.0	The evaluation team also followed the Georgia Power TRM 3.0 methodology, but calculated savings based on the 6' of insulation, as described in the program information, and 8,766 hours per year, consistent with the aerator and showerhead measures. Then, the team adjusted the savings to reflect the survey-based ISR and percentage of homes with electric water heaters.

[30] Hawaii Energy. Hawaii Energy Efficiency Program Technical Reference Manual, PY2019. https://hawaiienergy.com/wp-content/uploads/PY19-TRM-v1.pdf

MEASURE	REPORTED SOURCES AND ASSUMPTIONS	VERIFIED GROSS SOURCES	PRIMARY REASONS FOR DIFFERENCES
Kits Rope Caulk, Gaskets, and Weatherstripping	Prescriptive air sealing savings are calculated using the Illinois TRM 9[31], effective January 2021. Savings are based on Springfield, Illinois, weather conditions. Heating savings are based on air source heat pumps, and cooling savings are excluded under Illinois TRM 9.	Illinois TRM 11[32]	Verified savings are based on Illinois TRM 11, effective January 2023, which assigns cooling savings to prescriptive air sealing measures. The evaluation team calculated heating savings according to the distribution of electric furnaces and heat pumps, and then adjusted savings based on Atlanta weather conditions, ISR, and the percentage of electric heat.

Net-to-Gross

The evaluation team developed NTGRs based on self-reported surveys with program participants. The team also integrated into the NTG analysis results from the general population survey which captured the recycling behaviors for customers that recycled their refrigerators and freezers but did not participate in the program.

Refrigerator and freezer recycling resulted in a NTGR of 42% and 49%, respectively. These values are slightly lower than what was reported in the 2021 program evaluation. Conversely, the evaluation found relatively high NTG values for kit measures, with few customers saying they would have purchased the equipment they received through the kit without the program.

The evaluation team retained the planned NTG values for recycled dehumidifiers and room A/Cs. Few customers recycled these small appliances, and therefore response to the survey was limited (n=11). Therefore, the evaluation team could not draw meaningful conclusions about net savings for these appliances and retained the assumed NTG (100%). Future research will be needed to determine a more accurate NTG assumption of these small appliances.

Table 92 shows the NTGRs by measure. Comprehensive inputs and calculations for each of these values are available in Appendix 8A. Detailed Study Methodology for RR+ Program Evaluation.

Table 92. 2023 RR+ NTGRs by Measure

MEASURE	NTGR
Refrigerators	42%
Freezers	49%
Dehumidifiers	100%
Room A/Cs	100%

[31] Illinois Statewide Technical Reference Manual, Version 9.0

[32] https://www.ilsag.info/wp-content/uploads/IL-TRM_Effective_010123_v11.0_Vol_3_Res_09222022_FINAL.pdf

MEASURE	NTGR
Electric Energy Kit	89%
Dual Fuel Energy Kit	87%
Program-level NTGR (RR+)	**51%**

Table 93 highlights the yearly differences in the program free-ridership and NTG values of RR+. Continuing a trend identified in the 2021 evaluation, the relatively higher percentage of participants who indicated they would have been likely to dispose of their appliance in absence of the program contributed to the lower NTG values found in this year's evaluation.

Table 93. RR+ Refrigerator and Freezer NTG Benchmarks

YEAR	% LIKELY TO HAVE BEEN DISPOSED ABSENT OF PROGRAM		NTGR	
	REFRIGERATOR	FREEZER	REFRIGERATOR	FREEZER
2023	83%	75%	42%	49%
2021	65%	66%	50%	48%
2017	51%	48%	65%	57%
2014	62%	67%	56%	57%

Process Evaluation Results

Key findings include:

- The Georgia Power website was the primary driver of RR+ program awareness in 2023, and significantly more so than in 2021.
- Most respondents were satisfied with the program overall (4.4 out of 5), as well as with Georgia Power (8.2 out of 10), and were likely to recommend the program to others (8.6 out of 10).
- While getting rid of an old appliance and receiving the incentive remain the two highest drivers of participation, significantly more 2023 respondents were driven to participate to help the environment or be green than in prior years.
- While the incentive was noted as a driver by some, the amount of the incentive may not be as important. Over half of respondents would have participated if the rebate had only been $20, another half said they would have participated if there had been no rebate at all. This dichotomy emphasizes

the value of the incentive for certain customers, but it also highlights for many customers, the free pick-up and disposal of the appliance is most important.

- There is interest in small appliance recycling through both participation pathways – free pick-ups and drop-off events, although there was much more interest in having the appliance picked up than recycling through a drop-off center.

Participant Feedback

The evaluation team surveyed 246 customers who participated in the program: 150 who recycled 1-2 refrigerators, 71 who recycled 1-2 freezers, and 14 who recycled one of each.[33] Survey respondents also recycled 29 dehumidifiers and 45 room A/Cs. The evaluation team administered the survey as a mixed-mode survey (phone and online) in December 2023. We analyzed responses by measure type and by comparing to the previous evaluation cycle and found few statistically significant differences.[34] We note these differences below, otherwise, all responses are representative of the survey population. Of the 246 respondents, 154 verified in the survey they received a kit.

The following sections describe the results related to source of awareness, reasons for participation, satisfaction with the program, and program impacts on customers. Table 94 showcases the combination of the types of appliances they recycled as many participants did not recycle just one type of appliance but a combination of refrigerators, freezers, dehumidifiers, and room A/Cs.

Table 94. 2023 Participant Survey Respondent Distribution, All Recycled Measure Combinations and Kits

MEASURES RECYCLED	NUMBER OF RESPONDENTS	SMALL APPLIANCES			SAVINGS KITS
		ONE DEHUMIDIFIER	ONE ROOM A/C	ONE DEHUMIDIFIER + ONE ROOM A/C	
One refrigerator	135	12	20	0	-
Two refrigerators	15	2	1	1	-
One freezer	68	2	5	0	-
Two freezers	3	0	0	0	-
One refrigerator and one freezer	14	0	0	0	-
Small appliances only	11	5	5	1	-
Kits	-	-	-	-	154
Total Sample	246	21	31	2	154

[33] Participants who recycled one of each appliance type were placed in the "freezer" sample group, and asked questions primarily focused on the disposal of their freezer.

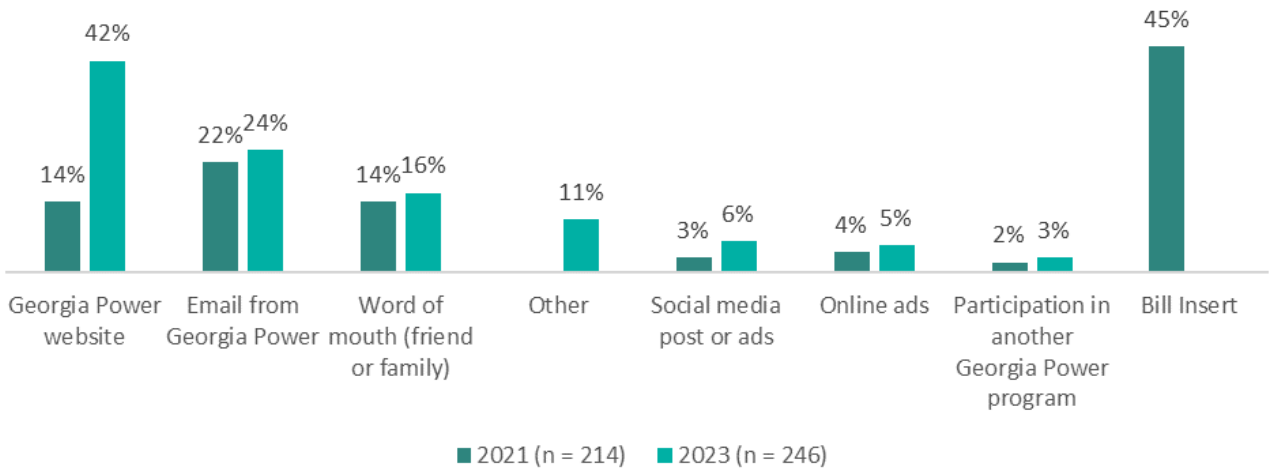
[34] Differences are statistically significant with 95% confidence (p-value ≥ 0.05).

Program Awareness

The Georgia Power website was the primary driver of RR+ program awareness (42%, see Figure 44). Other top sources of awareness included emails from Georgia Power (24%) and word of mouth (16%). Other mediums (e.g., social media posts, online advertisements, advertisements of participation through another Georgia Power program, flyer at a local business) each accounted for 2-6% of program awareness. Some of the other responses included bill insert, previous participation in the recycling program, online search, and a retailer's website.

More respondents heard about RR+ through the Georgia Power website compared to 2021 evaluation survey responses (14% in 2021, 42% in 2023). Though bill inserts were the primary driver of awareness in 2021, Georgia Power did not pursue bill insert marketing in 2023.[35] Other top sources of awareness were similar across evaluation cycles.

Figure 44. 2021 and 2023 Sources of Program Awareness



Source: Participant Survey. B1. How did you learn about Georgia Power's Refrigerator Recycling Program? Allowed for multiple responses.

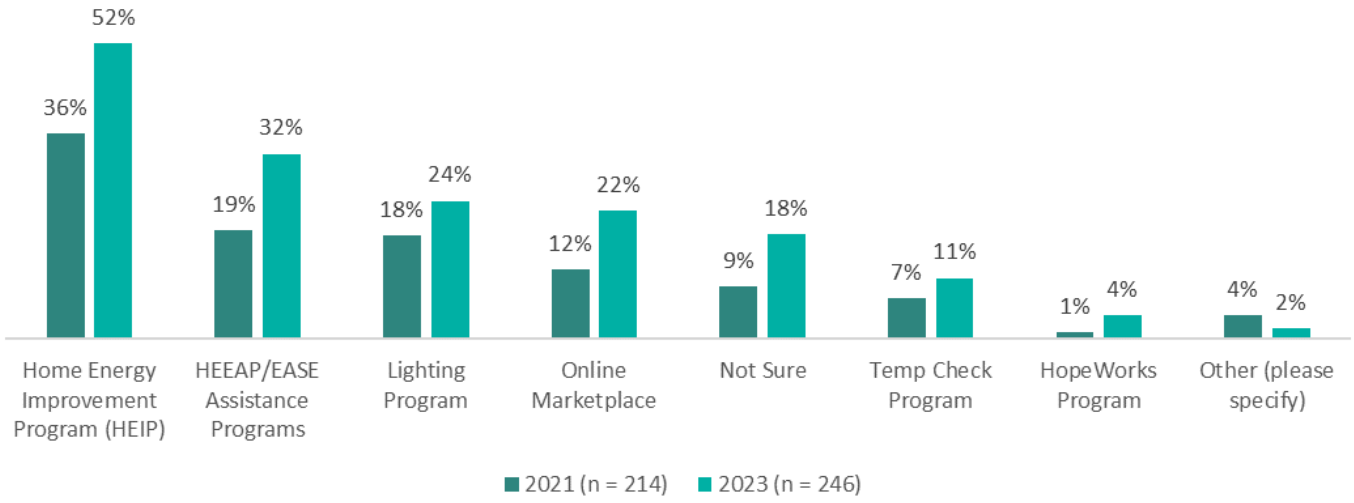
Most 2023 respondents (69%, n=170) were aware of other Georgia Power Energy Efficiency programs. The Home Energy Improvement Program (HEIP) was the most cited (52%, Figure 45), followed by Energy Assistance for Savings & Efficiency Program (EASE, 32%), Lighting Program (24%), and Online Marketplace (22%).[36] Eighteen percent of respondents indicated they were aware Georgia Power offered other programs but were not sure what the names of these programs were.

[35] Georgia Power found a low return on investment for bill inserts as more customers switched to paperless billing.

[36] Awareness of the EASE program (formerly HEEAP) includes respondents who cited awareness of "the low-income program", as many survey respondents were better able to describe the general nature of the program rather than the specific name. It is possible they are also confusing this offering with other income-qualified services offered by Georgia Power (e.g., HopeWorks).

Awareness of the -HEIP (36% in 2021, 52% in 2023) and Online Marketplace (12% in 2021, 22% in 2023) increased significantly between the 2021 and 2023 evaluation cycles. Rates of awareness of other programs were about the same between cycles.

Figure 45. 2021 and 2023 Awareness of Other Georgia Power Programs



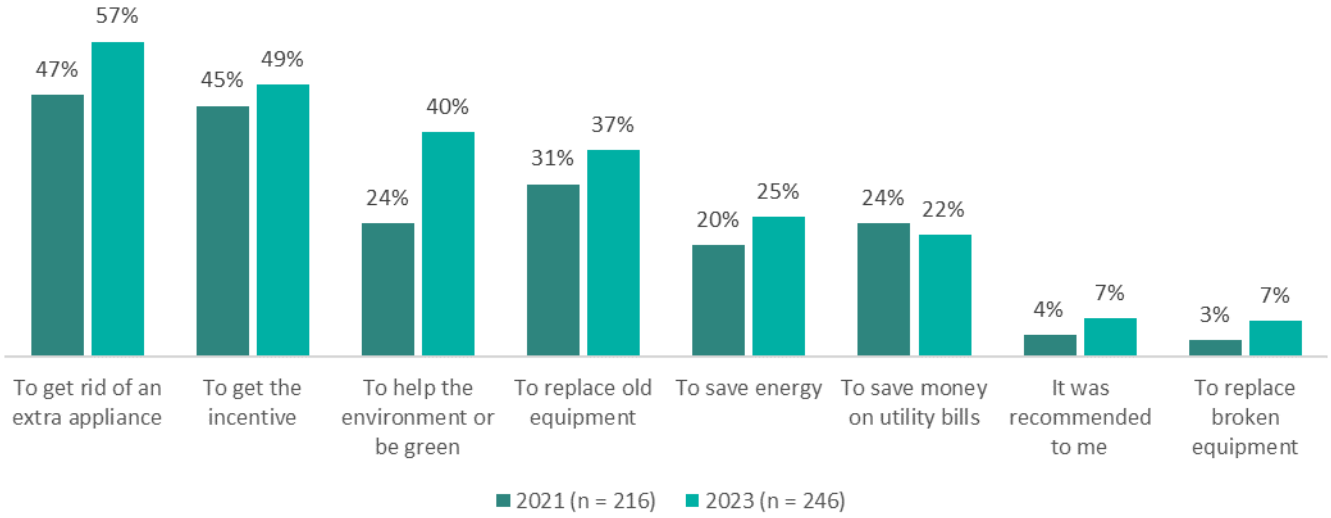
Source: Participant Survey. B3. What other energy efficiency programs are you aware of? Allowed for multiple responses.
Note: The 2023 survey referenced EASE while the 2021 survey referenced HEEAP.
HEEAP=Home Energy Efficiency Assistance Program; EASE=Energy Assistance for Savings & Efficiency.

Participation Drivers

Respondents were motivated to participate in RR+ primarily to remove an extra appliance (57%, Figure 46) or to obtain the incentive (49%). Conservation-based motivations such as helping the environment and being green (40%), replacing old equipment (37%), saving energy (25%), and saving money on utility bills (22%) substantially influenced program participation as well. Fewer respondents indicated they participated to replace broken (7%) equipment or because the program was recommended to them (7%).

In 2023, significantly more respondents participated to get rid of an appliance (47% in 2021, 57% in 2023) or to help the environment or be green (24% in 2021, 40% in 2023). Rates of other participation drivers were similar between evaluation cycles.

Figure 46. 2021 and 2023 Participation Motivation



Source: Participant Survey. N1. Why did you decide to participate in Georgia Power's Refrigerator Recycling Program?

The specific aspects of RR+ that influenced why respondents participated largely aligned with respondents' primary motivations to participate in the program – that is the free pick-up service (4.8 out of 5), environmentally safe disposal (4.4 out of 5), incentive payment (3.8 out of 5), and Georgia Power's marketing of the program (3.8 out of 5, Figure 47). Notably, respondents' ratings show that Georgia Power's program marketing efforts to raise customer awareness were as important as the incentive itself in respondents' decision to participate. This alignment between participants' motivations (e.g., a desire to get rid of an extra appliance), and specific program aspects (e.g., free pick-up service) is a strong indicator that RR+ is successfully meeting the needs of participating customers by providing an avenue by which they can get rid of unnecessary appliances easily via pick-up, for free, and receive an incentive. All statement ratings were similar between evaluation cycles.

Figure 47. 2023 Participation Influences



Source: Participant Survey. D9. Rate how important each one was to your decision to recycle your appliance through Georgia Power's program. Rate each statement any number from 1 to 5, with 1 meaning "not at all important" and 5 meaning "very important."

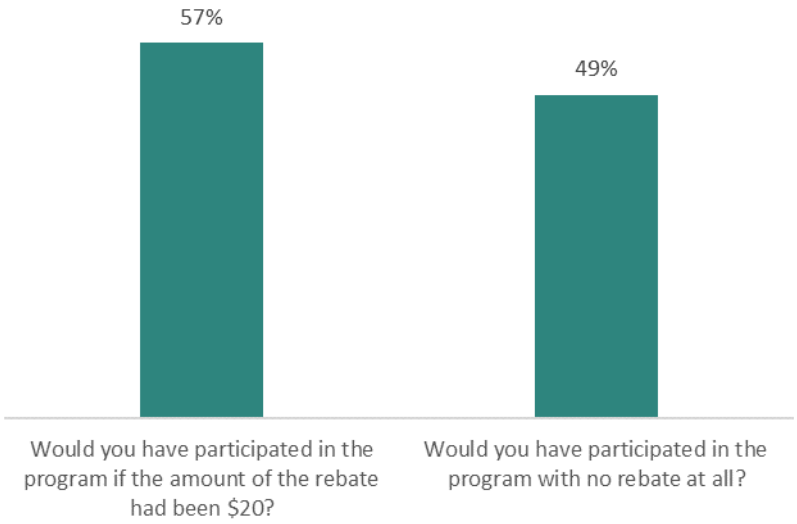
The evaluation team also asked respondents if there were any other reasons that were important in their decision to recycle their appliance through Georgia Power's program. The top four reasons respondents provided were:

- This option is environmentally friendly (n = 24).
- The program picked up the appliance (n = 23).
- This option was convenient and easy (n = 21).
- I no longer needed the appliance (n = 18).

These open-ended responses reinforce previously discussed motivations including that the program was an environmentally friendly option and provided a pick-up service to recycle appliances. The idea that this program provided a convenient and easy option to recycle, and they no longer needed the appliance is an important consideration that respondents added to their decision to recycle their appliance via the Georgia Power program.

Survey respondents were somewhat split in the value they place on the program incentive. Although almost half of respondents (49%) indicated that the incentive was a primary motivation of their participation as noted previously, most respondents (57%) indicated they would have participated if the rebate had only been $20, and 49% indicated they would have participated if there had been no rebate at all (Figure 48). Conversely, recall that 49% of respondents indicated the incentive was a primary motivation of their participation. This dichotomy emphasizes the value of the incentive for certain customers, but it also highlights that for many customers, the free pick-up and disposal of the appliance is most important. The 2023 responses were like the responses from the 2021 evaluation cycle.

Figure 48. 2023 Incentive Motivation Levels

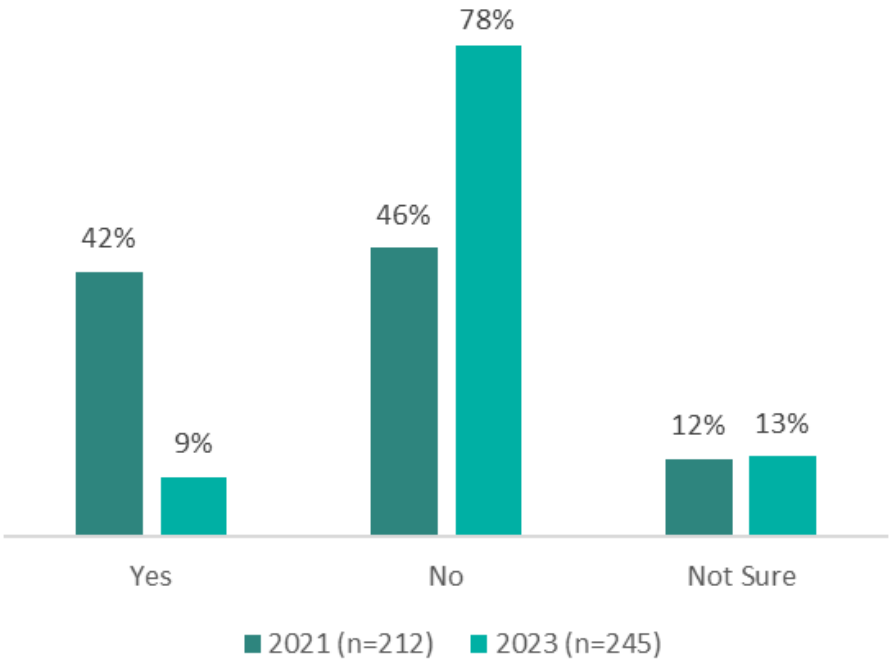


Source: Participant Survey. D11. Would you have participated in the program if the amount of the rebate had been $20? Source: Participant Survey. D12. Would you have participated in the program with no rebate at all? (n = 246)

Participant Experience

Only 9% percent of survey respondents in 2023 indicated they were on a waitlist prior to their appliance being recycled, which was a large drop from 42% in the 2021 evaluation (Figure 49).[37] The differences is likely due to the effects of COVID-19 restrictions on the implementation period of the prior evaluation cycle.[38] Of those who indicated they had been placed on a waitlist for this cycle (n=23), the majority (80%) indicated the wait was less than three months, and only 5% indicated they were required to wait longer than six months (Figure 50).

Figure 49. 2021 and 2023 Waitlist Prior to Recycling

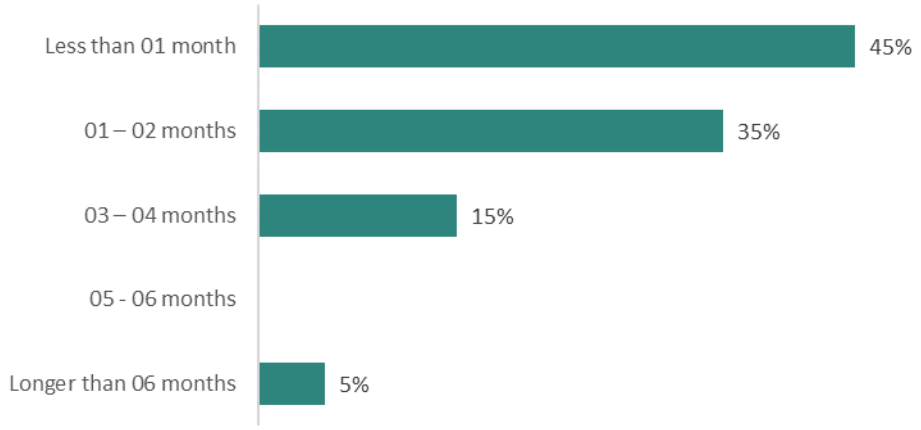


Source: Participant Survey. N2. Before you participated, were you on a waitlist for the Georgia Power Refrigerator Recycling+ Program?

[37] Program implementers used a waitlist in the latter half of 2023 after the implementing partner ceased business operations including appliance pick-ups. The evaluation team surveyed only program participants who participated before this occurred to avoid bias in the results.

[38] Due to the COVID-19 pandemic, the program was paused from mid-March 2020 through early-November 2020. When the program resumed operations, a requirement was appliances needed to be plugged in outside of a participants' home prior to the appliance being picked up.

Figure 50. 2023 Amount of Time Spent on Waitlist



Source: Participant Survey. N3. Roughly how long were you on the waitlist before you were able to participate? (n = 20)

New Measure Experiences: Dehumidifiers and Room A/Cs

As described above, Georgia Power introduced a new option to recycle dehumidifiers and room A/Cs through RR+ in 2023. The evaluation team asked survey respondents who had *not* recycled one of these small appliances about their awareness of and interest in the offering. Most respondents (72%) were unaware of the offer. About a third (38%) were very or somewhat interested in it (Figure 51 and Figure 52).

Figure 51. 2023 Awareness of Dehumidifier and Room A/C Recycling Option



Source: Participant Survey. B4. Georgia Power's Refrigerator Recycling+ Program now includes dehumidifiers and room A/Cs. Before today, were you aware that you could recycle these small appliances through the program? (n = 170)

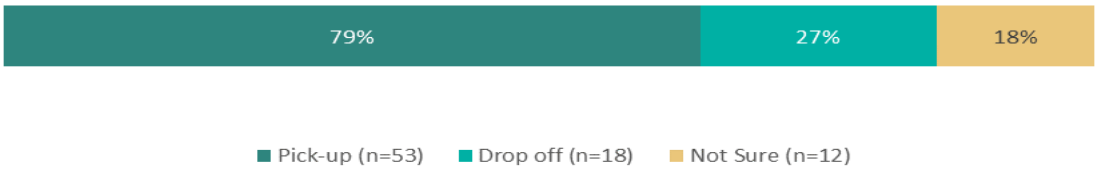
Figure 52. 2023 Interest in Recycling Dehumidifiers and Room A/Cs



Source: Participant Survey. B5. How interested would you be in recycling a working dehumidifier or room A/C through Georgia Power's Refrigerator Recycling+ program? (n =170)

Of the 67 participants who were very or somewhat interested, 79% were interested in scheduling a pick-up, 27% were interested in dropping off at a drop-off event, and 18% were not sure which program pathway they would choose (Figure 53).[39]

Figure 53. 2023 Program Pathway Interest for Dehumidifiers and Room A/Cs

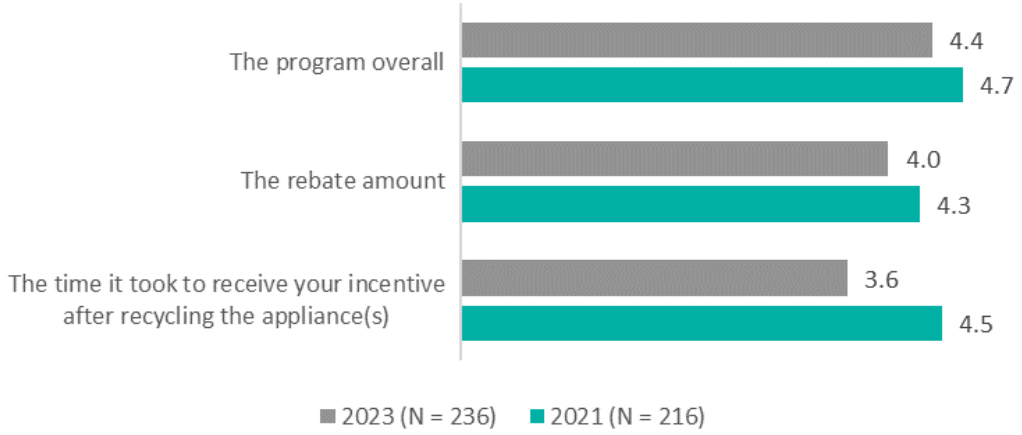


Source: Participant Survey. B6. Would you be interested in scheduling a pick-up or dropping them off at an in- person drop-off event? (n=67)

Satisfaction with the Program

Survey respondents reported high levels of satisfaction with the program overall (4.4) and with the program's various components (Figure 54) with both aspects achieving a minimum of 4.0 except for one component (using a scale from 1 to 5 where 1 meant not at all satisfied, and 5 meant very satisfied). The only component that received a rating below 4.0 was the time it took to receive your incentive after recycling the appliance(s) (3.6), which was lower than the average rating from the 2021 evaluation cycle.

Figure 54. 2021 and 2023 Overall Program Satisfaction



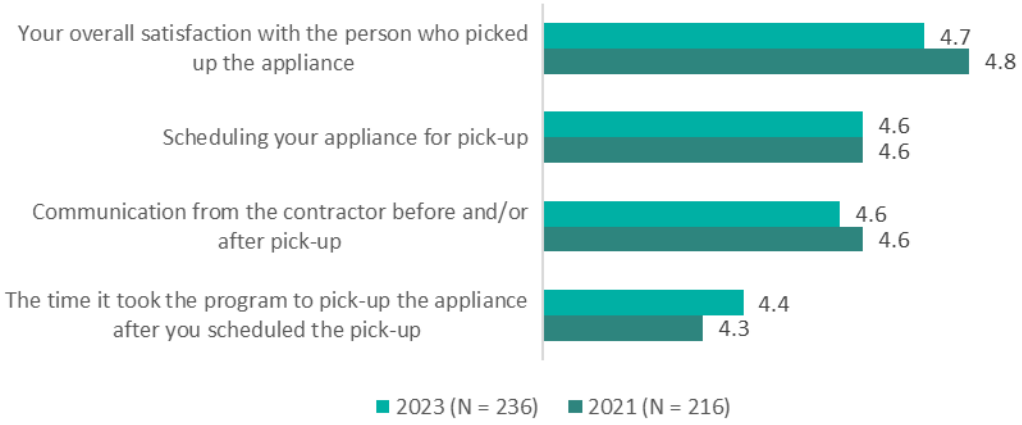
Source: Participant Survey. N8. How satisfied are you with the following components of Georgia Power's Refrigerator Recycling Program?

[39] Sixteen of these 67 respondents selected "Both" to indicate they would participate either by scheduling a pick-up or dropping off at an event. For the purposes of this analysis, we counted those 16 in both the pick-up and drop-off categories. Therefore, the percentages will sum to greater than 100%.

Satisfaction by Program Pathway

Respondents who participated in scheduled pick-ups were highly satisfied overall (4.7). They were also very satisfied with the time the program took to pick-up the appliance after scheduling (4.4). All satisfaction ratings for scheduled pick-ups were consistent with the 2021 evaluation (Figure 55).

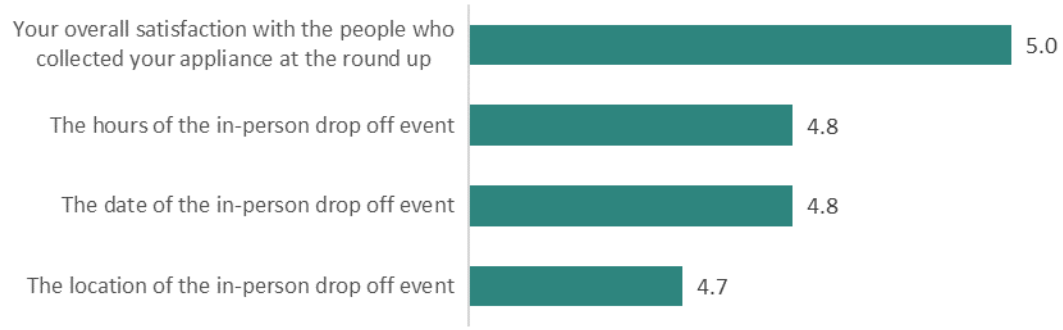
Figure 55. 2021 and 2023 Satisfaction with Scheduled Pick-ups



Source: Participant Survey. N8. How satisfied are you with the following components of Georgia Power's Refrigerator Recycling Program?

The 11 respondents who participated in the new drop-off event program for small appliances expressed high satisfaction ratings for the people who collected their appliance at the event (5.0). Respondents were also highly satisfied with the hours, date, and location of the drop-off event (Figure 56).

Figure 56. 2023 Satisfaction with Drop-off Events



Source: Participant Survey. N8. How satisfied are you with the following components of Georgia Power's Refrigerator Recycling Program? n=11

Coinciding with the overall high levels of program satisfaction, respondents similarly indicated they were highly likely to recommend the program to a friend or colleague, providing an average score of 8.6 (on a scale of 1 to 10 with one being not at all likely and 10 being extremely likely) (Figure 57). Respondents also indicated high levels of satisfaction with Georgia Power as their utility provider overall, providing an overall score of 8.2 (on a scale of 1 to 10 with 1 being not at all satisfied, and 10 being extremely satisfied).

Figure 57. 2023 Likelihood to Recommend and Satisfaction with Georgia Power



Source: Participant Survey. N12. How likely is it that you would recommend the Refrigerator Recycling Program to a friend or colleague? Please select the rating scale point that best describes how you feel on a 1 to 10 scale with 1 being not at all likely and 10 being extremely likely. N13. Taking into consideration all aspects of your utility service experience, please rate your current satisfaction with Georgia Power overall on a 1 to 10 scale with 1 being not at all satisfied and 10 being extremely satisfied? (n = 246)

Among those who expressed low satisfaction with the program overall (providing a rating of less than 4 out of 10, n=81), seven respondents provided reasoning for their relatively low satisfaction. Primarily, the biggest problems which contributed to low satisfaction are likely due to the program implementor ceasing operations, and the role of rebates being mixed for this program. Drivers of dissatisfaction included:

- Check bounced for insufficient funds (n = 27).
- I never received a rebate (n = 17).
- Program is not easy nor streamlined (n = 8).
- It took too long to receive a rebate (n = 6).
- Rebate amount is too small (n = 6).

Respondents were asked to consider what, if anything, the person picking up the appliance could have done to improve their experience. Primarily, the responses focused on professionalism and behavior of the program pick-up representative. Responses included for the appliance pick-up person to show up on time and not be late (n = 9), be more careful when picking up appliance (n = 3), protect driveway/floors when picking up appliance (n = 2), provide incentives at the time of pick-up (n = 2), call if running late to pick-up (n = 2), and provide a receipt (n=1).

Respondents were asked to consider what, if anything, Georgia Power could have done to improve their experience. Many of the improvements include fixing issues quickly if there is an issue with the program implementor, having better communication, making improvements to streamline the rebate process, and providing sufficient and valid payments to participants.

There seems to be mixed feelings about the rebate being too low and increasing the incentives. However as getting an incentive is a primary motivation for participation for almost half of the participants, over half (57%) would have participated if the rebate had only been $20, and approximately 49% indicated they would have participated if there had been no rebate at all. This dichotomy emphasizes the value of the incentive for certain customers, but it also highlights for many customers, the free pick-up and disposal of the appliance is most important, so increasing the incentive may not be a huge driver for more participation. The following were suggestions respondents provided, including:

- Do not have the check bounce for insufficient funds (n = 18).
- Increase the incentive (n = 18).
- Fix delays and issues with program (n = 16).
- Provide more communication about rebate status/kit (n = 8).[40]
- Provide more communication about the issues with rebate/check (n = 7).
- Provide incentive (never received) (n = 6).
- Provide better marketing/program information (n = 5).
- Provide reimbursement for insufficient funds charge from bank for bounced check (n = 4).
- Consider providing a rebate on bill (n = 2).
- Use a better subcontractor (n = 2).

[40] Georgia Power provided an update that the program will begin sending out emails to notify customers that their rebates will be mailed soon and after their project information is fully processed in VisionDSM.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion 1: RR+ reported savings were 41% of 2023 energy savings goals, in large part due to implementation disruptions. The program was paused after the implementer's main vendor ceased operations and was unable to complete scheduled pick-ups. Once relaunched, the program needed time to become fully operational. As such, Georgia Power was unable to run the new program design for a full program year. Given disruptions to the new program design, no recommendations for adapting existing participant engagement strategies are recommended at this time.

Conclusion 2: Market changes significantly affected the per-unit savings for large, recycled appliances as well as lighting equipment provided through the kits. Refrigerators and freezers recycled through the program have become increasingly newer over the years, as evidenced by the tracking analysis and on-site metering study results. Due to federal standards, primarily standards instituted in 2000, these appliances have lower energy consumption, reducing energy savings potential for large appliance recycling (assuming there is no appliance age requirement for participation). Additionally, the EISA backstop affected savings for lighting measures distributed in kits.

RECOMMENDATIONS:

- **Revise deemed savings for recycled refrigerators and freezers.** Significant decreases in refrigerator and freezer UEC estimates derived from the 2023 in-situ metering study as part of this evaluation and advancing federal appliance standards described in this report resulted in significantly more efficient refrigerators and freezers being recycled through the program.
- **Do not claim savings for lighting measures in the next program cycle.** If Georgia Power opts to retain lighting measures in kits in the future, the savings from these lighting measures should be excluded from the per-kit deemed savings.

Conclusion 3: ISRs for kit measures were low, affecting savings. ISRs were low for all the measures except for the LEDs. Customers did not request (or opt-in) to receive the kit; therefore, it is unknown whether the kit contents were useful or relevant to them. Additionally, it is possible that customers may have needed additional information or education on the kit products, such as how to install them, and the benefits of replacing their old products with new products. This is important as participants in a recycling program may not realize the connection to receiving an energy efficiency kit in the mail without requesting one.

RECOMMENDATIONS:

- **Identify program delivery opportunities to increase kit ISRs.** Example strategies include coordinating with the kit distribution vendor to review kit contents and ask customers to opt-in to receiving the kit. Providing more information to customers may increase use and decrease free-ridership of each of these kit measures.

Conclusion 4: Small appliance recycling had limited uptake in 2023, although there may be an opportunity for increased participation. The option of recycling smaller appliances was new to this program cycle. Between this offering being new, and the mid-year implementation challenges, the program likely did not have sufficient time to gain traction for these specific measures. Further, the participant survey did find there is some customer interest in recycling small appliances (based on responses from customers who only recycled large appliances). Finally, while many customers preferred to have small appliances picked up, a portion (about a third) preferred or was open to the drop-off option.

RECOMMENDATIONS:

- **Continue to offer and monitor small appliance recycling.** More time is needed to determine the potential for small appliance recycling. As part of this offering, continue to monitor the uptake and value of offering small appliance recycling through drop-off events.
- **Consider conducting targeted small appliance recycling research studies to inform the offering for the next program cycle.** Limited participation affected the evaluation's ability to assess customer experiences and decision-making related to these measures (including developing measure-specific NTG estimates). Follow-up research with the general population and participating customers could focus on energy saving potential (based on small equipment age, capacity, and propensity to recycle) and net savings. The research should also investigate the extent to which customers are opting to recycle small appliances in tandem with large appliance recycling versus removing those small appliances independently, as well as opportunities to expand drop-off event participation (if a goal for Georgia Power).

Conclusion 5: The program is moderately influential in customers' decisions on how to dispose large appliances, and the influence continues to decrease year-over-year (albeit slightly between 2021 and 2023). NTG results were 42% for refrigerators and 49% for freezers. The NTGR for refrigerators decreased from the last evaluation, indicating higher likelihood that customers would have removed the equipment in a way that would have not been placed back on the grid in the absence of the program (50% in 2021 compared with 42% refrigerator NTGR in 2023). Freezer NTGR also decreased slightly, but the difference is not statistically significant.

Conclusion 6: Participants were satisfied with their program experiences and with Georgia Power, and those that were dissatisfied likely experienced issues due to disruptions from an implementation vendor ceasing operations. Most participants were highly satisfied with Georgia Power (8.2 of 10), the overall program (4.4 of 5), and were likely to recommend the program to others (8.6 of 10). Of program components, respondents were most satisfied with the person who picked up their appliance (4.8 of 5), and least satisfied with the time it took to receive their incentive after recycling (3.6 of 5). Among respondents with lower satisfaction ratings (n=81), 27 experienced issues with insufficient funds when depositing the incentive check and 17 others did not receive their incentive at all.

Respondents described a lack of response and communication from the program, which is connected to the slowing and ceasing of operations from one of the implementation vendors. As the RR+ program grows and smooths out vendor implementation challenges, satisfaction with the program will likely increase.

Conclusion 7. While some customers indicated the incentive value was not important in their decision to participate, the incentive is influential for others, as indicated in the NTG results. Survey respondents indicated that the free pick-up was very important in their decision to participate overall, and the incentive appeared to be more important for those customers who said they would have kept their appliance in the absence of the program (i.e., low free-ridership). This group was much less likely to say they still would have participated in the program if there was no incentive or a lower incentive.

7. RESIDENTIAL COST-EFFECTIVENESS

This section reports program and portfolio cost-effectiveness in terms of the Total Resource Cost test (TRC), the Ratepayer Impact Test (RIM), the Program Administrator Cost test (PAC), and levelized program delivery costs.

Methodology

The evaluation team completed a benefit-cost analysis to compare the value of the gross verified savings impacts resulting from the Demand Side Management (DSM) programs to the costs incurred by the programs. The evaluation team used net verified energy and demand savings for the calculation of avoided cost benefits, consistent with the values from Q42023 PSC Report. The calculation of cost-effectiveness components including: additional resource savings, incremental equipment and installation costs, program administrative costs, incentive payments, and bill savings, were generated by Georgia Power with review by the evaluation team.

Table 95 summarizes the allocation of cost-effectiveness components as a cost or benefit to each cost-effectiveness test consistent with the California Standard Practice Manual (SPM).[41]

Table 95. 2023 Cost-Effectiveness Component Inputs

COMPONENT	PROGRAM ADMINISTRATOR COST TEST (PACT)	RATEPAYER IMPACT MEASURE (RIM)	TOTAL RESOURCE COST (TRC)
Energy & Capacity Related Avoided Costs	Benefit	Benefit	Benefit
Additional Resource Savings			Benefit
Incremental Equipment & Installation Costs			Cost
Program Admin Costs	Cost	Cost	Cost
Incentive Payments	Cost	Cost	
Bill Savings/Lost Revenues		Cost	

Benefits and costs are stated in present value terms, using the appropriate discount and inflation rates.

[41] https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/e/6442465683-eepolicymanualrevised-march-20-2020-b.pdf

Total Resource Cost

The TRC test measures the net costs of a program as a resource option based on the total costs of the program, including both the participants' and the utility's costs. In general, it is the ratio of the discounted total benefits of the program to the discounted total costs over a specified time period. A benefit-cost ratio greater than one indicates that the program is beneficial to the utility and its ratepayers on a total resource cost basis.

The benefits calculated in the TRC test are the avoided supply costs, the reduction in transmission, distribution, generation, and energy costs valued at marginal cost for the periods when there is a load reduction. The costs associated with this test are the net programs costs paid by both the utility and the participants; this includes administration costs, non-free-rider equipment costs, and free-rider incentives.

In algebraic form:

$$Benefits = \sum_{t=1}^{n} \frac{UAC_t}{(1+d)^{t-1}} \; Costs = \sum_{t=1}^{n} \frac{PRC_t + PCN_t}{(1+d)^{t-1}} \; TRC\ Ratio = \frac{Benefits}{Costs}$$

Where:

UACt = *Utility (electric and gas) net avoided supply costs in year t*

PRCt = *Program administrator program costs in year t*

PCNt = *Net participant costs (equipment costs) in year t*

d = *Nominal discount rate*

Program Administrator Costs (PAC)

The PAC test, also known as the utility cost test, measures the net costs of a program as a resource option based on the costs incurred by the program administrator and excluding any net costs incurred by the participant. A benefit to cost ratio above one indicates that the program would benefit the administrator's cost environment.

Similar to the TRC test, the benefits calculated in the PAC test are the avoided supply costs of energy and demand. However, the net avoided supply costs for the PAC test include only the avoided costs of supplying electricity, not the avoided societal costs of natural gas, propane, or water. The costs associated with this test are the program costs incurred by the administrator and the incentives paid to the customers.

In algebraic form:

$$Benefits = \sum_{t=1}^{n} \frac{UAC_t}{(1+d)^{t-1}} \; Costs = \sum_{t=1}^{n} \frac{PRC_t + INC_t}{(1+d)^{t-1}} \; PAC\ Ratio = \frac{Benefits}{Costs}$$

Where:

UACt = *Utility net avoided supply costs in year t*

PRCt = *Program administrator program costs in year t*

INCt = *Incentives paid to participants in year t*

d = *Nominal discount rate*

Ratepayer Impact Measure Test (RIM)

The RIM test measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program. This test adopts the perspective of all ratepayers, including program participants and nonparticipants. In general, the test is the ratio of the discounted total benefits of the program to the discounted total costs over a specified time period. A benefit-cost ratio above one indicates that the program is beneficial to the customers.

The benefits calculated in the RIM test are the avoided supply costs, the reduction in transmission, distribution, generation, and energy costs valued at marginal cost for the periods when there is a load reduction. The costs associated with this test are the gross incentive costs of the program, the net bill reductions experienced by participants (which can be thought of as the lost revenue to the utility from implementing the conservation program), and the program administration costs.

In algebraic form:

$$Benefits = \sum_{t=1}^{n} \frac{UAC_t}{(1+d)^{t-1}} \; Costs = \sum_{t=1}^{n} \frac{RL_t + PRC_t + INC_t}{(1+d)^{t-1}} \; RIM\ Ratio = \frac{Benefits}{Costs}$$

Where:

UACt = *Utility avoided supply costs in year t*

RLt = *Revenue loss from reduced sales in year t*

PRCt = *Program administrator program costs in year t*

INCt = *Incentives paid to participants in year t*

d = *Nominal discount rate*

Levelized Delivery Cost

Leveling the delivery costs of each initiative is a useful way to express the program delivery costs per unit of energy or capacity savings. Levelized delivery costs are useful when comparing programs within a demand-side management portfolio.

Initiative delivery costs are the sum of program administrator costs and incentives paid to the participants. To level these costs for energy and demand savings, the following formula is used:

$$Levelized\ Delivery\ Costs = \frac{Delivery\ Costs}{\sum_{t=1}^{n} \frac{Q_t}{(1+d)^{t-1}}}$$

Where:

Qt = Energy or capacity savings in year t

d = Nominal discount rate

Energy Efficiency Program Cost-Effectiveness

The following sections summarize the results of the residential energy efficiency program cost-effectiveness analysis. This analysis only focuses on energy efficiency (kWh) savings; the Temp✓ (Thermostat Demand Response) program's cost-effectiveness is not assessed as part of this analysis.

Home Energy Improvement Program

Table 96 summarizes the results of the cost-effectiveness assessment for the Home Energy Improvement Program.

Table 96: 2023 HEIP Cost-Effectiveness

METRIC	VALUE
Program Administrator Cost (PAC)	
PAC Costs	($7,185,639)
PAC Benefits	$5,512,698
PAC Net Benefits ($)	($1,672,940)
PAC Net Benefit (Ratio)	0.8
Ratepayer Impact Measure (RIM)	
RIM Costs	($19,210,967)
RIM Benefits	$5,512,698
RIM Net Benefits ($)	($13,698,268)
RIM Net Benefit (Ratio)	0.3
Total Resource Cost (TRC)	
TRC Costs	($10,138,741)
TRC Benefits	$8,413,088
TRC Net Benefits ($)	($1,725,653)
TRC Net Benefit (Ratio)	0.8
Levelized Delivery Cost	
$/MWh	$180.39

Energy Assistance for Savings and Efficiency Program

Table 97 summarizes the results of the cost-effectiveness assessment for the Energy Assistance for Savings and Efficiency Program.

Table 97: 2023 EASE Cost-Effectiveness

METRIC	VALUE
Program Administrator Cost (PAC)	
PAC Costs	($10,368,188)
PAC Benefits	$4,529,896
PAC Net Benefits ($)	($5,838,292)
PAC Net Benefit (Ratio)	0.4
Ratepayer Impact Measure (RIM)	
RIM Costs	($24,938,016)
RIM Benefits	$4,529,896
RIM Net Benefits ($)	($20,408,120)
RIM Net Benefit (Ratio)	0.2
Total Resource Cost (TRC)	
TRC Costs	($6,788,404)
TRC Benefits	$7,456,158
TRC Net Benefits ($)	$667,755
TRC Net Benefit (Ratio)	1.1
Levelized Delivery Cost	
$/MWh	$278.04

Refrigerator Recycling Plus Program

Table 98 summarizes the results of the cost-effectiveness assessment for RR+.

Table 98: 2023 RR+ Cost-Effectiveness

METRIC	VALUE
Program Administrator Cost (PAC)	
PAC Costs	($2,898,939)
PAC Benefits	$350,503
PAC Net Benefits ($)	($2,548,437)
PAC Net Benefit (Ratio)	0.1
Ratepayer Impact Measure (RIM)	
RIM Costs	($4,098,610)
RIM Benefits	$350,503
RIM Net Benefits ($)	($3,748,107)
RIM Net Benefit (Ratio)	0.1
Total Resource Cost (TRC)	
TRC Costs	($2,637,029)
TRC Benefits	$798,013
TRC Net Benefits ($)	($1,839,015)
TRC Net Benefit (Ratio)	0.3
Levelized Delivery Cost	
$/MWh	$547.21

Residential Specialty Lighting Program

Table 99 summarizes the results of the cost-effectiveness assessment for the Residential Specialty Lighting Program.

Table 99: 2023 Residential Specialty Lighting Program Cost-Effectiveness

METRIC	VALUE
Program Administrator Cost (PAC)	
PAC Costs	($4,228,519)
PAC Benefits	$1,245,323
PAC Net Benefits ($)	($2,983,196)
PAC Net Benefit (Ratio)	0.3
Ratepayer Impact Measure (RIM)	
RIM Costs	($8,371,745)
RIM Benefits	$1,245,323
RIM Net Benefits ($)	($7,126,422)
RIM Net Benefit (Ratio)	0.1
Total Resource Cost (TRC)	
TRC Costs	($4,085,745)
TRC Benefits	$1,245,323
TRC Net Benefits ($)	($2,840,422)
TRC Net Benefit (Ratio)	0.3
Levelized Delivery Cost	
$/MWh	$244.82

Residential Behavioral Program

Table 100 summarizes the results of the cost -effectiveness assessment for the Residential Behavioral Program.

Table 100: 2023 Residential Behavioral Program Cost-Effectiveness

METRIC	VALUE
Program Administrator Cost (PAC)	
PAC Costs	($1,610,327)
PAC Benefits	$2,328,364
PAC Net Benefits ($)	$718,037
PAC Net Benefit (Ratio)	1.4
Ratepayer Impact Measure (RIM)	
RIM Costs	($7,794,513)
RIM Benefits	$2,328,364
RIM Net Benefits ($)	($5,466,149)
RIM Net Benefit (Ratio)	0.3
Total Resource Cost (TRC)	
TRC Costs	($1,614,129)
TRC Benefits	$2,328,364
TRC Net Benefits ($)	$714,235
TRC Net Benefit (Ratio)	1.4
Levelized Delivery Cost	
$/MWh	$13.19

Residential Portfolio

Table 101 summarizes the results of the cost-effectiveness assessment for the Residential Portfolio.

Table 101: 2023 Residential Portfolio Cost-Effectiveness

METRIC	VALUE
Program Administrator Cost (PAC)	
PAC Costs	($26,291,612)
PAC Benefits	$13,966,785
PAC Net Benefits ($)	($12,324,828)
PAC Net Benefit (Ratio)	0.5
Ratepayer Impact Measure (RIM)	
RIM Costs	($64,413,850)
RIM Benefits	$13,966,785
RIM Net Benefits ($)	($50,447,065)
RIM Net Benefit (Ratio)	0.2
Total Resource Cost (TRC)	
TRC Costs	($25,264,047)
TRC Benefits	$20,240,946
TRC Net Benefits ($)	($5,023,100)
TRC Net Benefit (Ratio)	0.8
Levelized Delivery Cost	
$/MWh	$146.33

1. APPENDIX - GENERAL POPULATION SURVEY

Below we detail findings from the cross-cutting general population survey with Georgia Power's residential customers. The primary goal of this survey was to provide input into the NTG analysis for the RR+ program; however, the evaluation team was able to gather additional information on customer attitudes, perspectives, and awareness of energy efficiency and Georgia Power programs that may benefit the larger portfolio design and delivery.

Survey Overview

The general population survey characterized residential customers in terms of their:

- Awareness of Georgia Power's residential program offerings
- Attitudes toward energy efficiency
- Actions taken to save energy
- Likely future equipment replacements
- Intentions or recent actions to dispose of refrigerators and freezers
- Satisfaction with Georgia Power

The evaluation team explored differences in customer responses according to demographic characteristics and found that homeownership status had the strongest relationship to certain customer attitudes and behaviors. Below, results are segmented by homeownership status (homeowner or renter).

Georgia Power provided a list of 7,817,491 general population accounts. The evaluation team filtered this list to 1,438,108 residential accounts who had phone and email information and who had not opted-in to the do-not-contact or do-not-survey lists. To identify residential customers, the evaluation team selected seven domestic residential rate codes[42] including:

- FlatBill Residential
- Residential
- RST, Residential Service – TOU
- Time of Use – Plug-In Electric Vehicle
- Pre-Pay
- Pay-by-Day
- Smart-Usage

To conduct this survey, the evaluation team randomly sampled 3,500 residential customers from a list of 1,438,108 provided by Georgia Power and completed 350 total surveys (189 phone, 61 web) with Georgia

[42] The evaluation team identified and selected rate codes by comparing codes in the data set and codes described on the Georgia Power Residential Rate Plan Options page, September 2023. https://www.georgiapower.com/residential/billing-and-rate-plans/pricing-and-rate-plans.html

Power customers, representing a 7% response rate. The evaluation team sent email invitations to sampled customers with a link to complete the survey online. The evaluation team sent up to two reminder emails and, to customers who had not responded to the email request, a follow-up phone call. The evaluation team distributed five $100 VISA® gift cards based on a sweepstakes drawing for all customers who completed the survey.

The evaluation team compared demographic results to key demographics of the overall state of Georgia, because we did not have access to exact demographics of Georgia Power customers. Most statistics were relatively closely aligned (such as race/ethnicity and median income) except for homeownership. Specifically, the survey gathered data from considerably more renters than owners in Georgia. Results are weighted by homeownership.

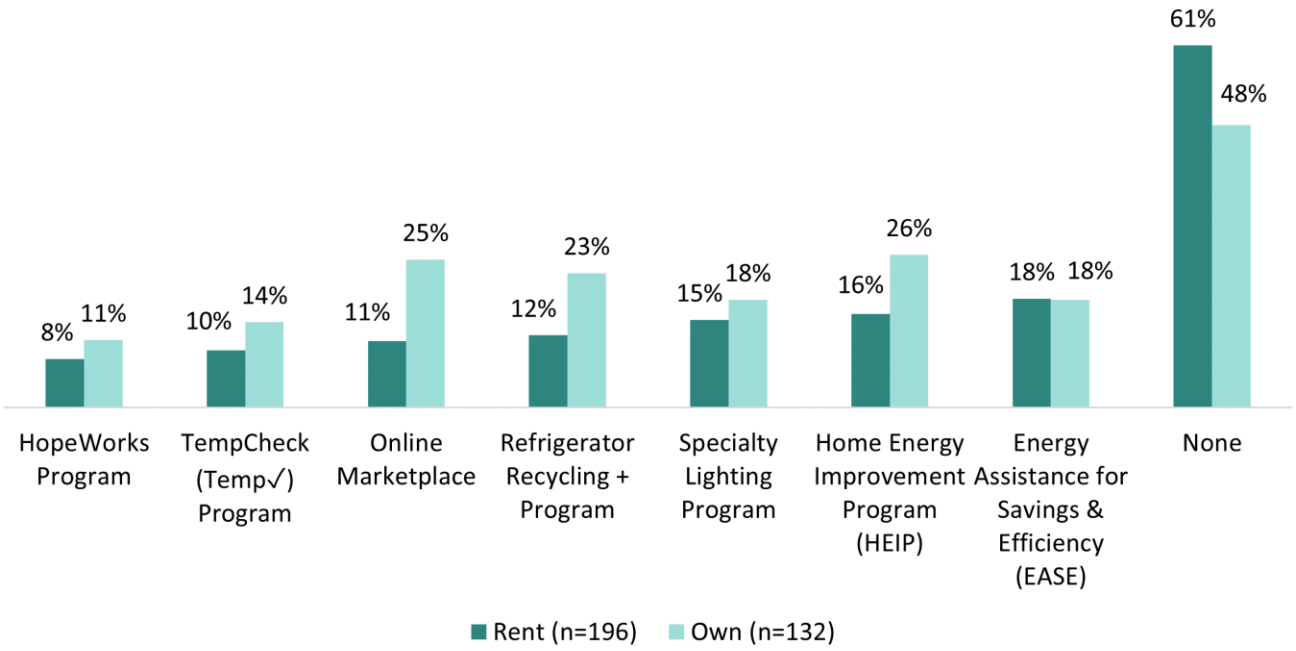
Below provides general population results within the following sections:

- Energy efficiency program awareness and participation
- Bill affordability
- Energy efficiency behaviors
- Satisfaction
- Home systems and equipment
- Demographics
- Conclusions and recommendations

Energy Efficiency Program Awareness and Participation

There is moderate awareness in Georgia Power's programs. Renters are significantly less likely to be aware than homeowners, which is unsurprising given many programs are directed to (or more relevant for) homeowners (Figure 58). Of those aware of programs, respondents (particularly homeowners) most recognized the HEIP, RR+, and Online Marketplace. Renters and owners were similarly aware of EASE, which was also the program renters were most aware of in general (although not statistically significantly).

Figure 58. 2023 Program Awareness by Home Occupancy Type

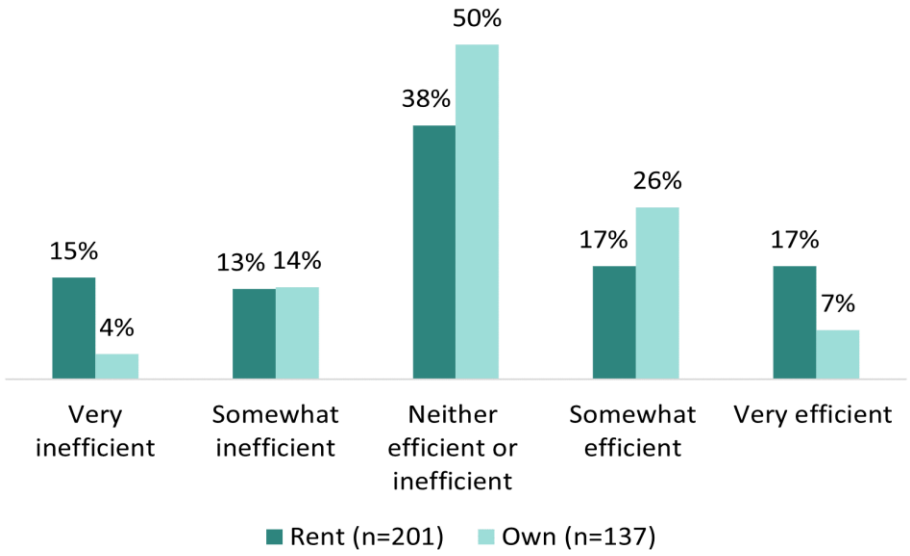


Source: General Population Survey. B1. Which energy-saving rebates or programs offered by Georgia Power have you heard of? Note the percentages may not sum to 100% because multiple response options were allowed.

Energy Efficiency Attitudes

Survey respondents provided neutral responses to the efficiency of their home, with half of owners and nearly 40% of renters saying their home is neither efficient nor inefficient (Figure 59). However, only about a third of respondents would qualify their home as efficient. Interestingly, renters were more likely to say their home was both very efficient and very inefficient compared to homeowners.

Figure 59. 2023 Perception of Home Efficiency

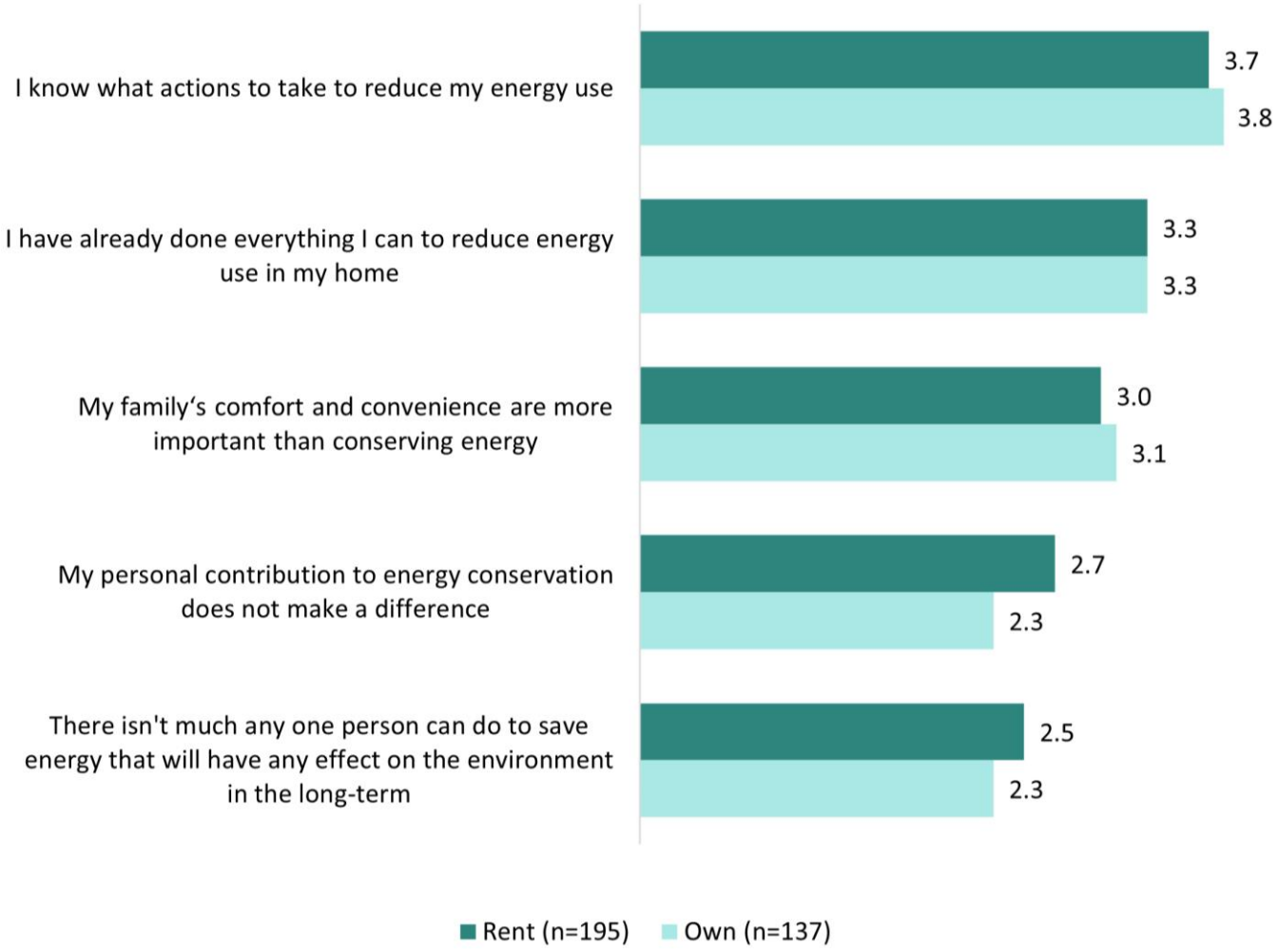


Source: General Population Survey. C2. In your opinion, how energy-efficient or energy inefficient is your home?

Attitudes, knowledge, and preferences can affect customers' decision-making, including whether to adopt high efficiency equipment and/or participate in programs to do so. Understanding customers' perception on their locus of control—and what they can control—can also be valuable.

This research indicates there are opportunities for Georgia Power to further educate and engage customers in efficiency and demand response programs. The survey asked customers to rate their agreement for various factors on a scale of 1 to 5 with 5 being strongly agree. Of all factors, respondents most strongly agreed that they knew what actions to take to reduce energy use, but with an average rating of under 4. Many also indicated that there is more they can do in their home to reduce energy. Further, respondents indicate they have some level of empowerment to affect their energy use and the environment through their actions. There was no difference in results from the prior study.

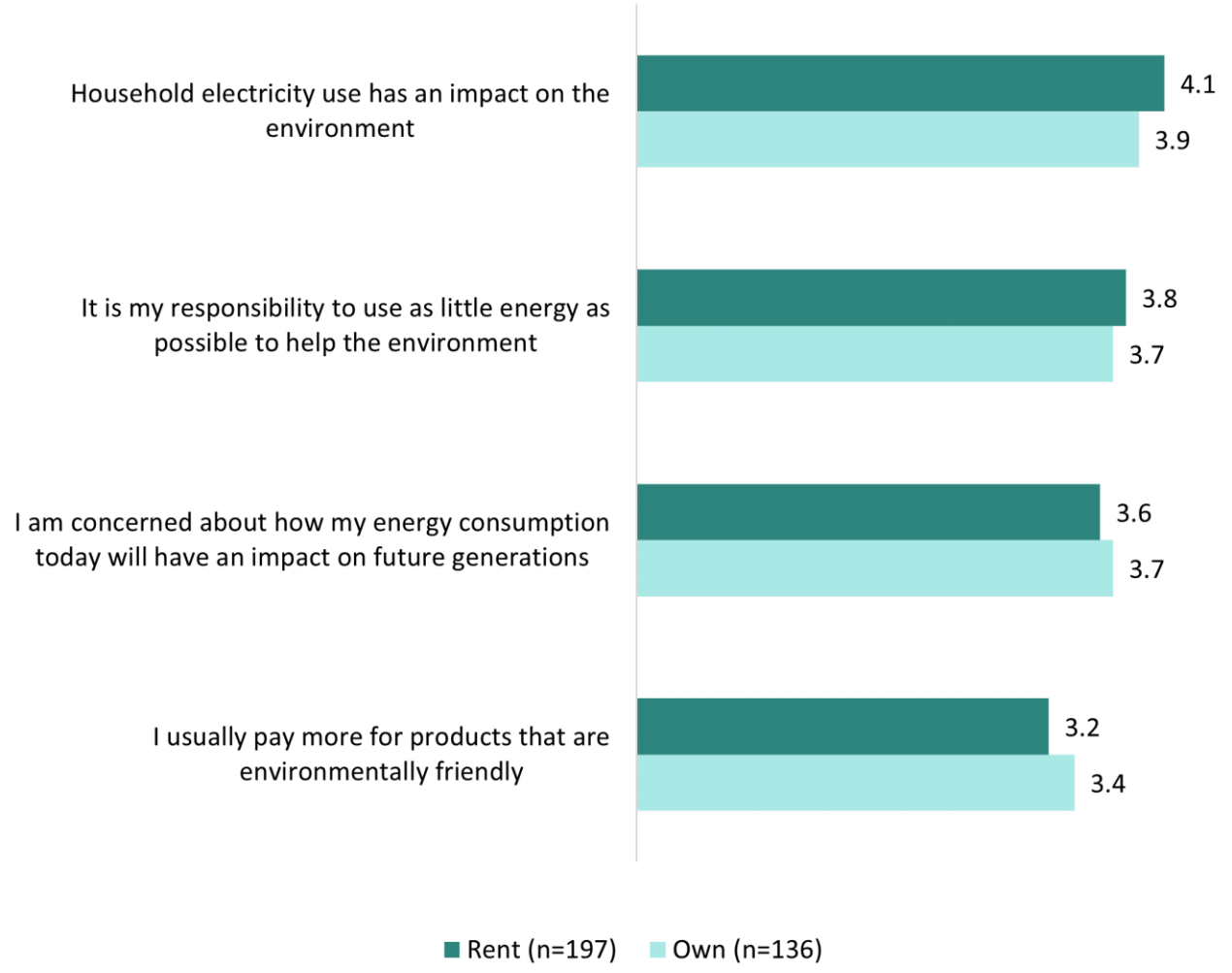
Figure 60. 2023 General Energy Efficiency Attitudes



Source: General Population Survey. C1. For each of the next statements, please tell me if you [1] strongly disagree, [2] some what disagree; [3] neither agree or disagree; [4] somewhat agree; or [5] strongly agree.

Regarding the belief that behaviors related to energy consumption have environmental impacts, most respondents understand that their household electricity use has an impact on the environment (Figure 61). Renters and owners both also showed some support for the idea that it is their responsibility to use as little energy as possible to help the environment, and that they are concerned with how energy consumption today will have an impact on future generations. Renters and owners both indicated that they usually pay more for products that are environmentally friendly. These results were consistent with the prior 2021 survey.

Figure 61. 2023 Environmental Stewardship and Energy Efficiency Attitudes

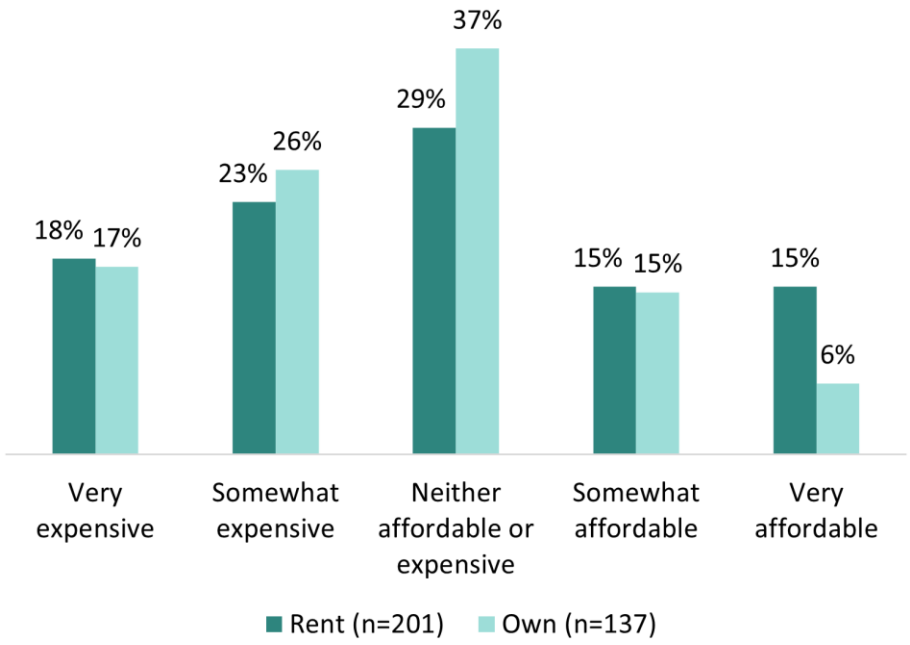


Source: General Population Survey. C1. Using the following scale of [1] strongly disagree, [2] somewhat disagree; [3] neither agree or disagree; [4] somewhat agree; or [5] strongly agree, please rate how much you agree with the following statements.

Bill Affordability

Customers are becoming increasingly more concerned about energy costs and paying their bills. The survey asked several questions to assess customers' perception and experience with their energy bills. Considerably more respondents said their energy bills were expensive compared with those that reported they are affordable. Homeowners are somewhat, although not statistically significantly, less likely to say their energy bills are affordable. (Figure 62). *It is worth noting that due to the timing of this survey, respondents may not have yet experienced rate increases which could affect their perception of bill affordability in future studies*.

Figure 62. 2023 Perception of Energy Bill Affordability

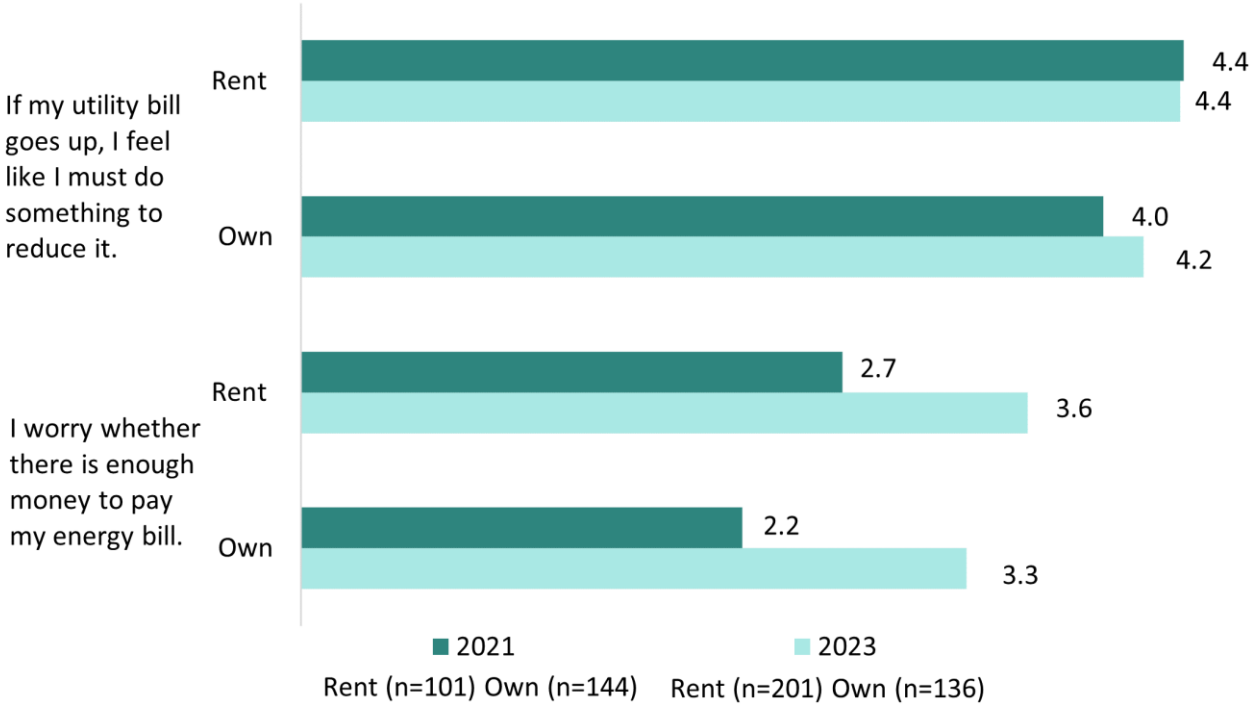


Source: General Population Survey. C3. In your opinion, how affordable or expensive are your energy bills from Georgia Power?

The 2023 results compared with 2021 show that customers are finding they are less affordable compared to prior years. In the 2021 evaluation, 6% of respondents indicated that their bill is very expensive compared with approximately 18% in 2023, and over half (53%) of respondents reported that their bill was somewhat or very affordable, compared with 30% of renters and 21% of homeowners in 2023.

In further support of customers' increasing financial concerns, significantly more respondents worry that there is enough money to pay for their utility bill than in 2021 (Figure 63). The change was somewhat more substantial for homeowners than renters, although renters remain more concerned about paying their bills than homeowners overall.

Figure 63. 2023 Financial Concerns

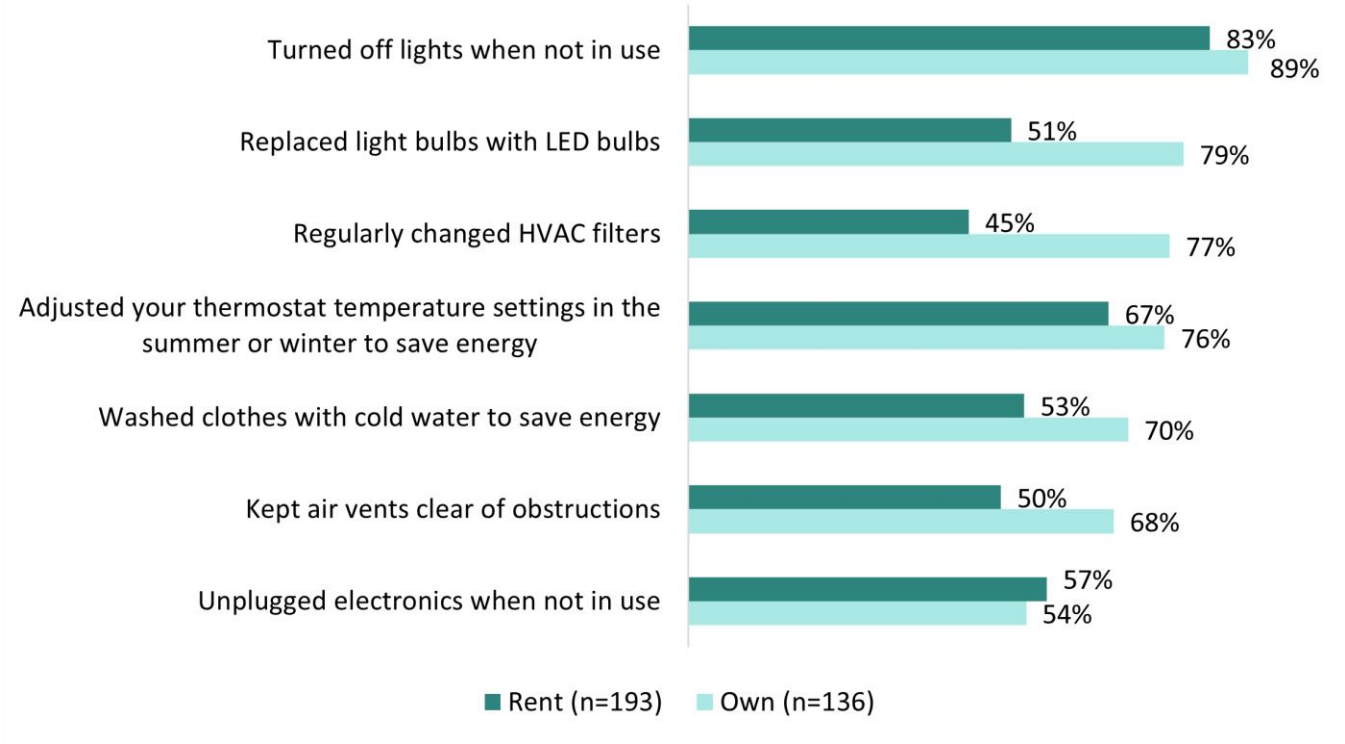


Source: General Population Survey. C1. Using the following scale of [1] strongly disagree, [2] somewhat disagree; [3] neither agree or disagree; [4] somewhat agree; or [5] strongly agree, please rate how much you agree with the following statements.

Energy Efficiency Behaviors

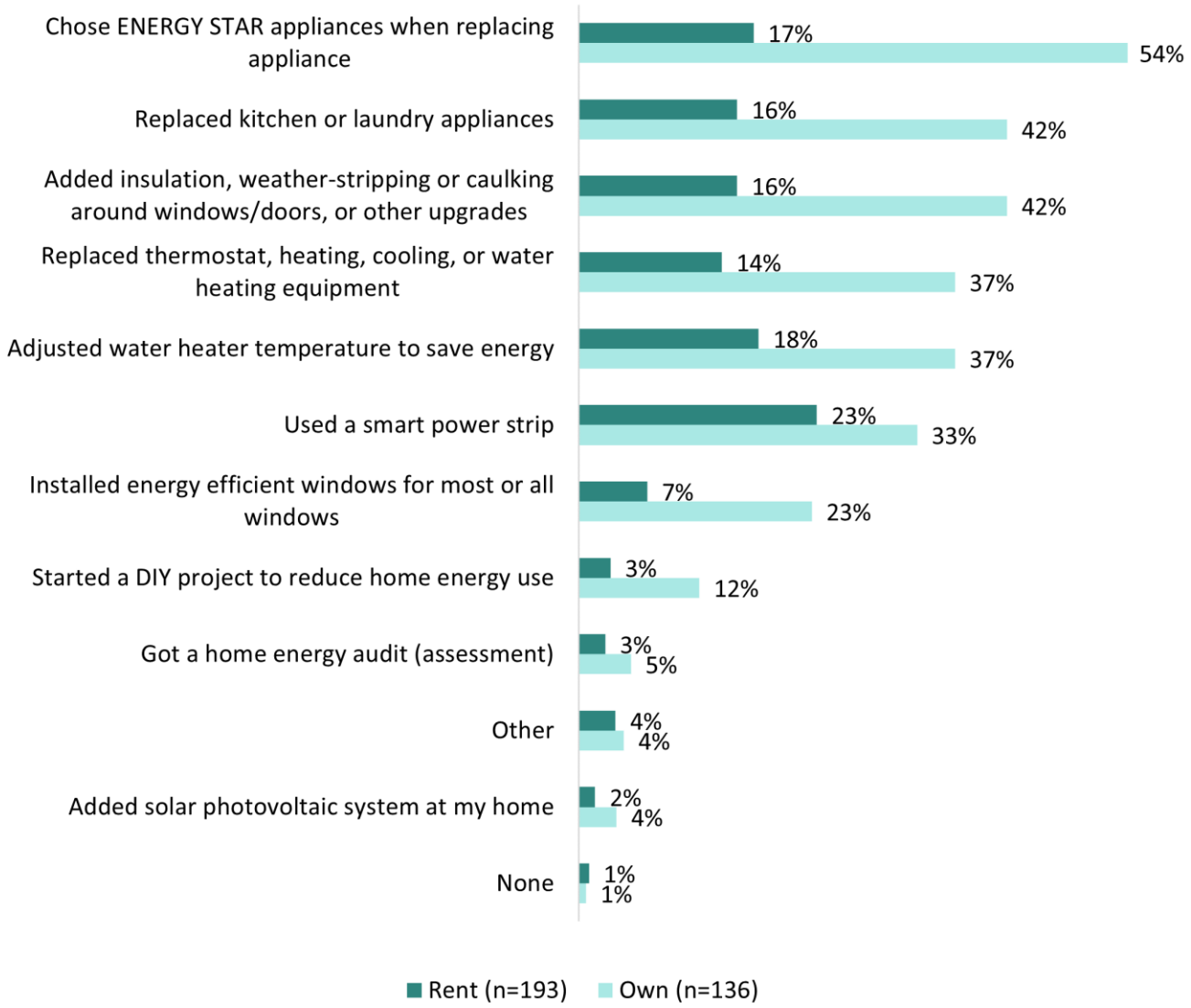
Overall, most survey respondents, regardless of homeownership, indicated engaging in some type of energy saving action over the past two years, however, homeowners were generally more likely to engage in energy saving actions compared to renters (Figure 64). Both homeowners and renters indicated that the most common energy saving action they engage in is turning off the lights when not in use (83% and 89% respectively). Homeowners' more common energy saving actions included replacing light bulbs with LEDS (79%), regularly changing HVAC filters (77%), adjusting their thermostat (76%), and washing their clothes with cold water (70%). Renters' more common energy savings actions include adjusting their thermostat (67%), unplugging electronics when not in use (57%), washing clothes with cold water to save energy (53%), and replacing lightbulbs with LEDs (51%). Compared to renters, homeowners were more likely to report they had conducted deeper energy saving actions such as installing measures like windows or insulation, changing HVAC filters, starting DIY projects to reduce home energy use, replacing larger appliances, or installing measures such as windows or insulation (Figure 65).

Figure 64. 2023 Common Energy-Saving Actions



Source: General Population Survey. C4. Below we list a few ways to use less energy in your home. Which, if any, of these energy-saving actions did you or someone in your household do in the last 2 years?

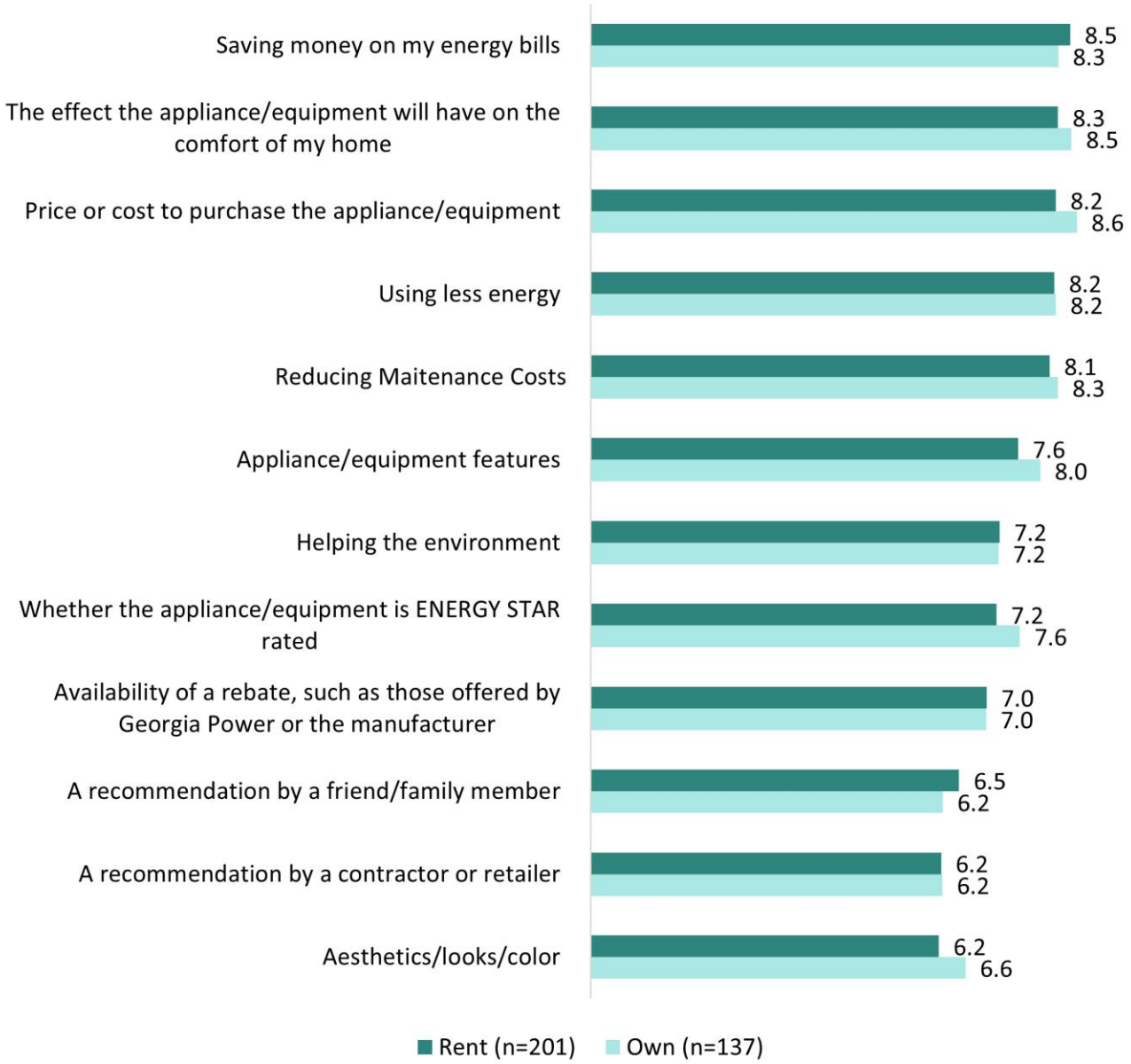
Figure 65. 2023 Less Frequent Energy-Saving Actions



Source: General Population Survey. C4. Below we list a few ways to use less energy in your home. Which, if any, of these energy-saving actions did you or someone in your household do in the last 2 years?

Homeowners and renters prioritized similar factors when making appliance purchases including features, cost, comfort, using less energy and saving money. Homeowners indicated a slight preference around aesthetics/looks/color, whether the appliance is ENERGY STAR rated, appliance equipment and features, and price or cost to purchase the appliance with price or cost to purchase the appliance as the most important Figure 66). Renters rated a recommendation from a friend or family member (6.5) and saving money on energy bills (8.5) slightly higher than did homeowners.

Figure 66. 2023 Factors Influencing Appliance Purchases

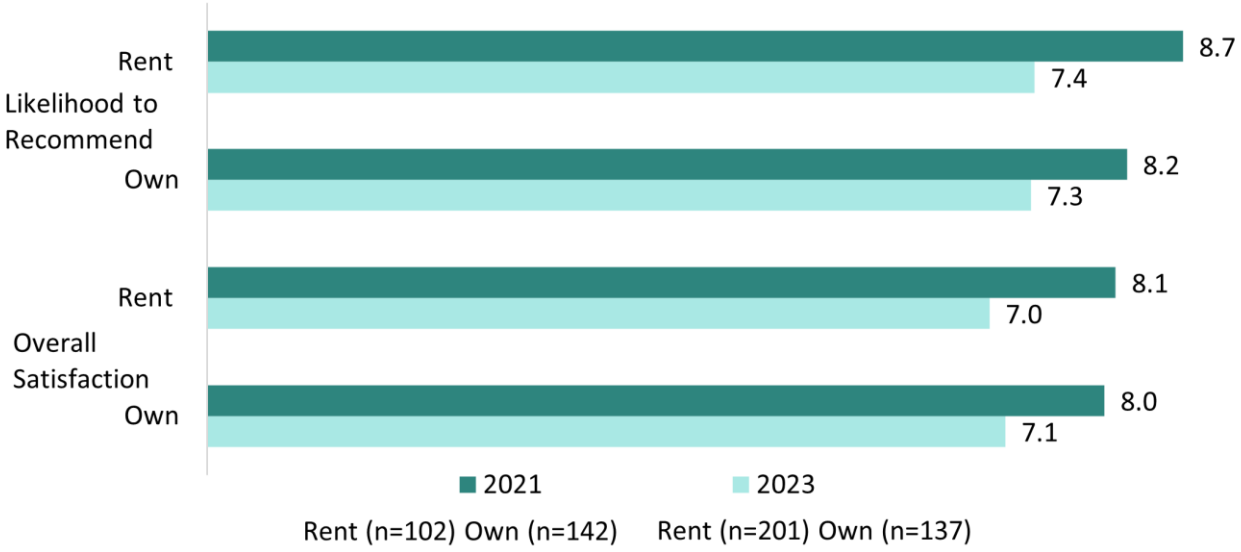


Source: General Population Survey. C6. When considering an appliance or equipment purchase for your home, how important are each of the following factors in your decision? Please use a 1 to 10 scale, with 1 being "Not at all important" and 10 being "Extremely important".

Satisfaction

Although both renters and homeowners indicated high levels of satisfaction with Georgia Power as a utility and are likely to recommend the utility to a friend or colleague, the satisfaction ratings decreased compared with the previous evaluation in 2021 (Figure 67).

Figure 67. 2023 Satisfaction with Georgia Power and Likelihood to Recommend



Source: General Population Survey. E1. Taking into consideration all aspects of your utility service experience, how would yo u rate Georgia Power overall? Please use a 1 to 10 scale, where 1 is "extremely dissatisfied" and 10 is "extremely satisfied." E3. If you could recommend them as an electricity provider, how likely is it that you would recommend Georgia Power to a friend or colleague? Please select the rating scale point that best describes how you feel.

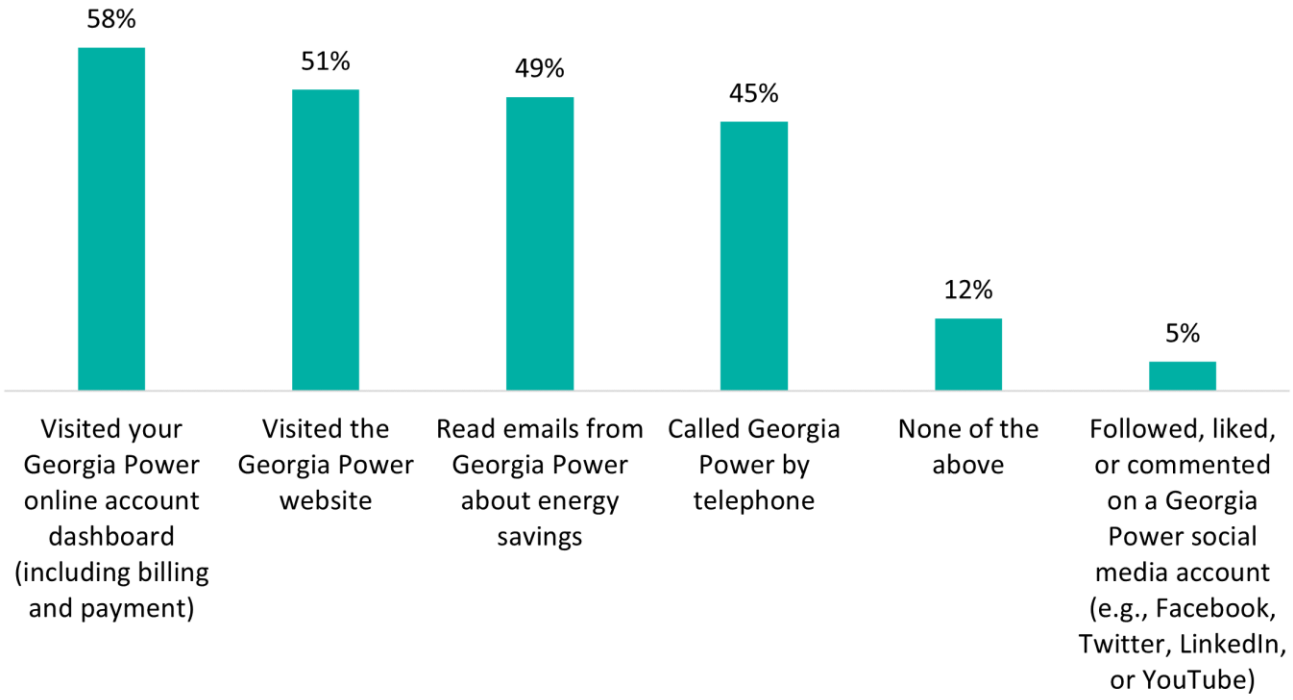
The decrease in satisfaction is in part related to customers' concerns with, and perceptions of, their energy costs. Overall, 93 respondents provided an overall satisfaction score of less than five. Through open-end responses, over half those respondents cited unaffordable or high energy bills (n=51).

Experiences with Georgia Power and staff contributed to respondents' satisfaction. Among those who were highly satisfied (9 or 10 out of 10, n=111), the most common drivers of high satisfaction included:

- Good experience with Georgia Power (n=59).
- Good communication and customer service (n=19).
- Easy or reliable (n=19).

Respondents indicated that most of their interaction with Georgia Power occurs online, with the most common types of contact coming from visiting the Georgia Power online account dashboard (58%), visiting the Georgia Power website (51%), or reading Georgia Power emails about energy savings (49%, Figure 68). Calling Georgia Power on the phone was slightly less common (45%), while social media interaction was reported as the least common type of contact (5%). Only 12% of respondents indicated having no contact with Georgia Power in the past year.

Figure 68. 2023 Types of Contact with Georgia Power (n=350)

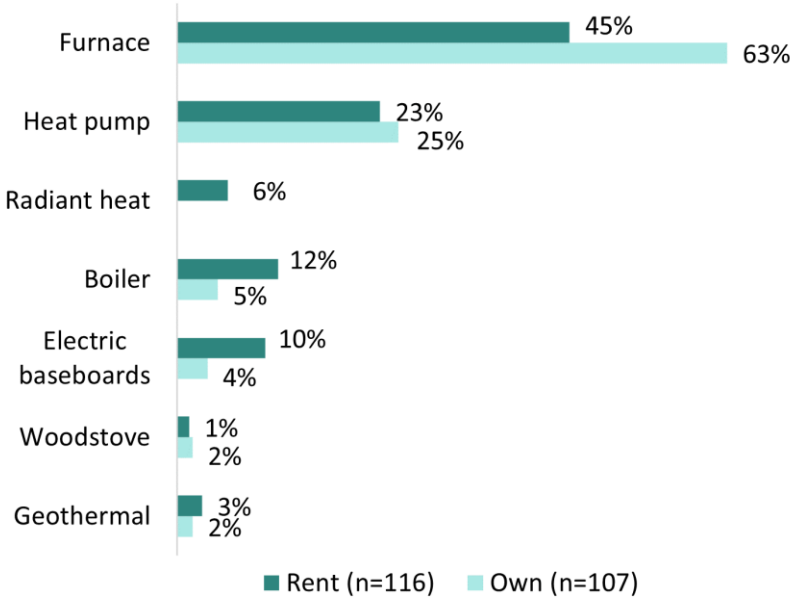


Source: General Population Survey. E4. Have you had any of the following types of contact with Georgia Power in the past year? Please select all that apply. Note: the percentages may not sum to 100% because multiple response options were allowed.

Home Systems and Equipment

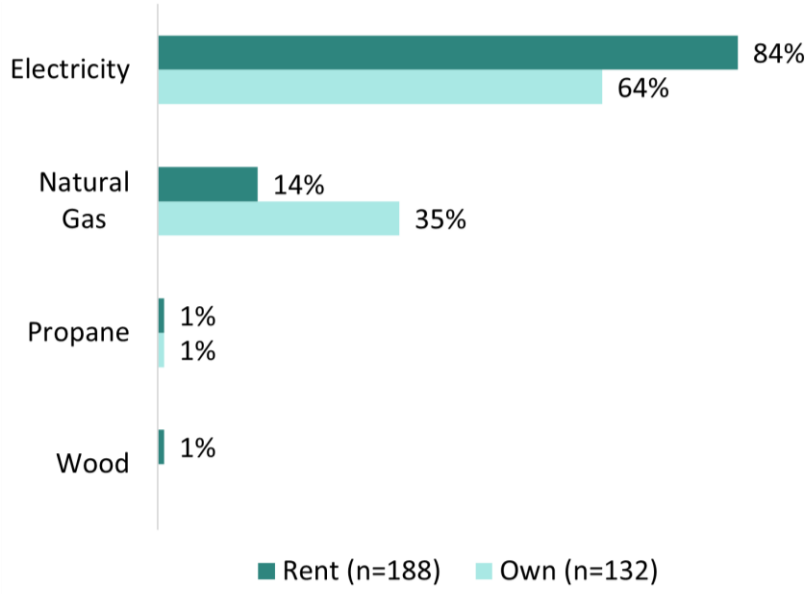
Homeowners and renters indicated using relatively similar heating systems (Figure 69). Furnaces were the most common system referenced by both groups followed by heat pumps. Renters reported using boilers and electric headboards more than homeowners, and several renters indicated using radiant heat (6%). Most renters and homeowners used electricity as their primary fuel source for space heating (84% and 64% respectively, Figure 70). Notably heat pumps as the identified heating system for renters climbed from 8% in 2021 to 23% in 2023 while there was little change for percent of heat pumps for homeowners.

Figure 69. 2023 Heating Systems



Source: General Population Survey. D1. Which of the following best describes the main heating system in your home?

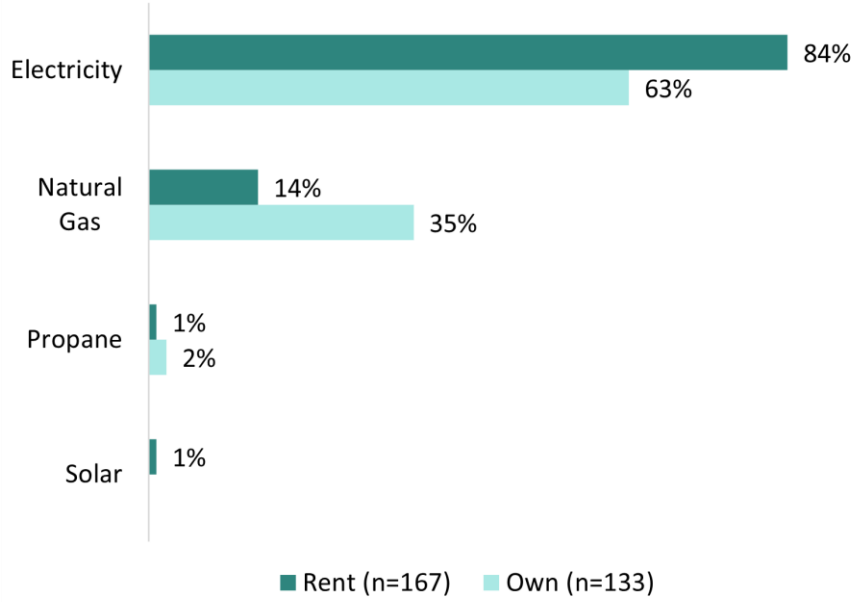
Figure 70. 2023 Fuel Source for Space Heating



Source: General Population Survey: D2. What is the main fuel used to heat rooms or spaces in your home?

The fuel source of water heaters followed a similar distribution as space heating equipment (Figure 71), with electricity as the dominant fuel source for both owners (63%) and renters (84%) followed by natural gas (35% and 14% respectively).

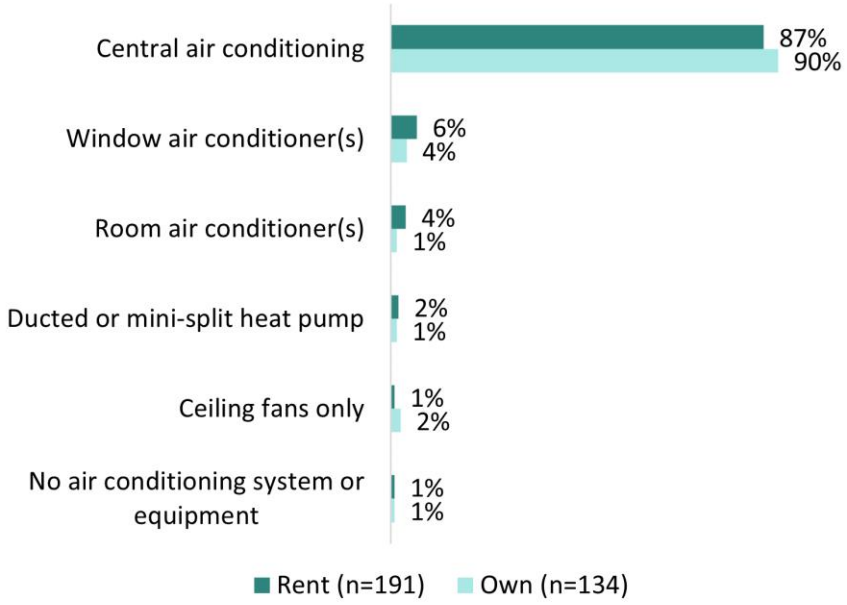
Figure 71. 2023 Fuel Source for Water Heating



Source: General Population Survey. D3. What is the main fuel your water heater uses?

Likewise, homeowners and renters use similar cooling systems (Figure 72), with central air conditioning as the dominant source for both owners (88%) and renters. Fewer respondents among both renters and owners reported using windows air conditioners, room air conditioners, heat pumps, or ceiling fans.

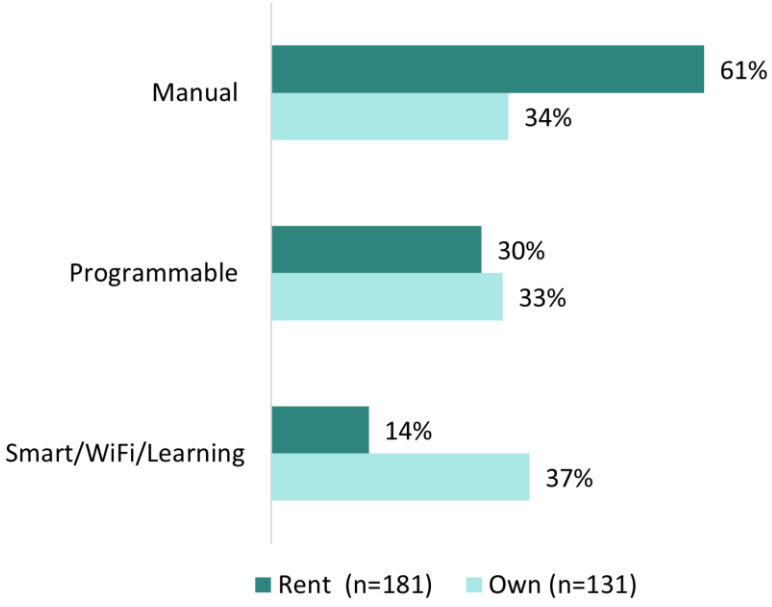
Figure 72. 2023 Cooling System



Source: General Population Survey. D13. Which of the following best describes the main cooling system in your home?

Regarding the type of thermostat utilized, homeowners and renters vary considerably (Figure 73), with most renters possessing manual thermostats (61%), whereas homeowners were more evenly split between using smart (37%), programmable (33%), or manual thermostats (34%).

Figure 73. 2023 Thermostat Type

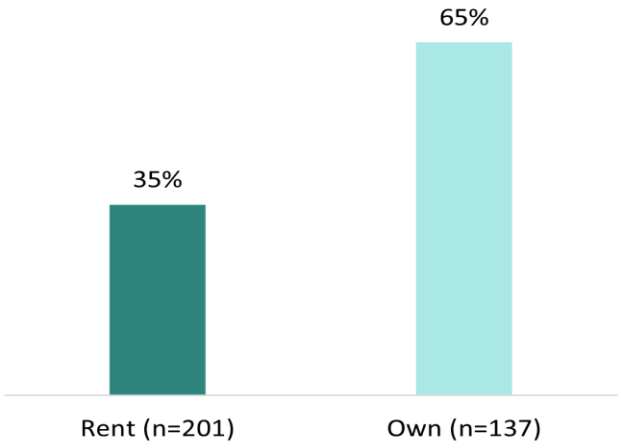


Source: General Population Survey.F1. What type of thermostat(s) do you have in your home? Please select all that apply. Note: the percentages may not sum to 100% because multiple response options were allowed.

Household Demographics

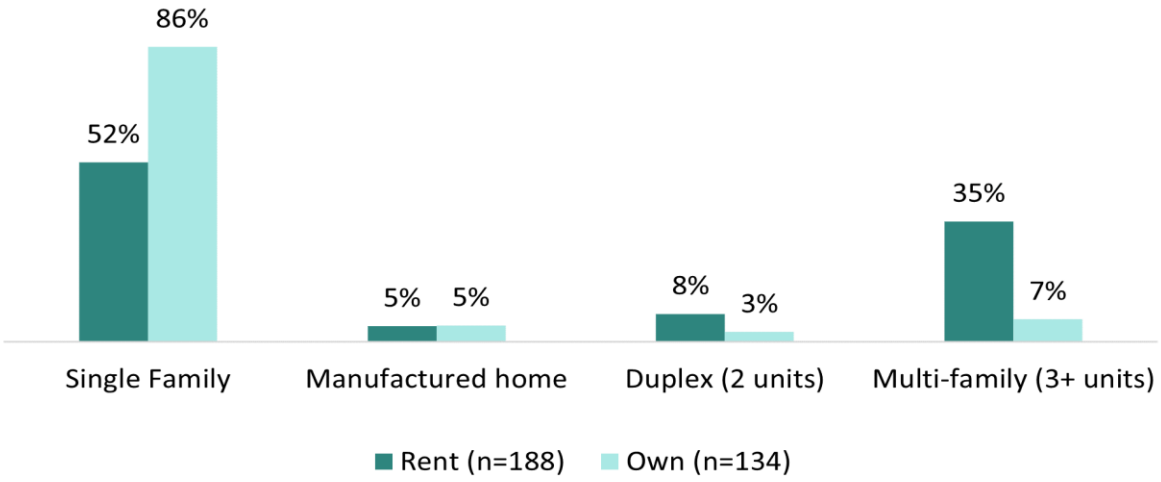
Most respondents (65%) own their home and 35% rent their home (Figure 74). Most homeowners live in a single-family home (86%, Figure 75). Slightly more than half of renters reported living in a single-family home (52%) while several live in multifamily homes (35%). *As a reminder, these results are weighted by homeownership to reflect the population. This analysis is weighted.*

Figure 74. 2023 Rent or Own Home



Source: General Population Survey. F1. Do you rent or own your home?

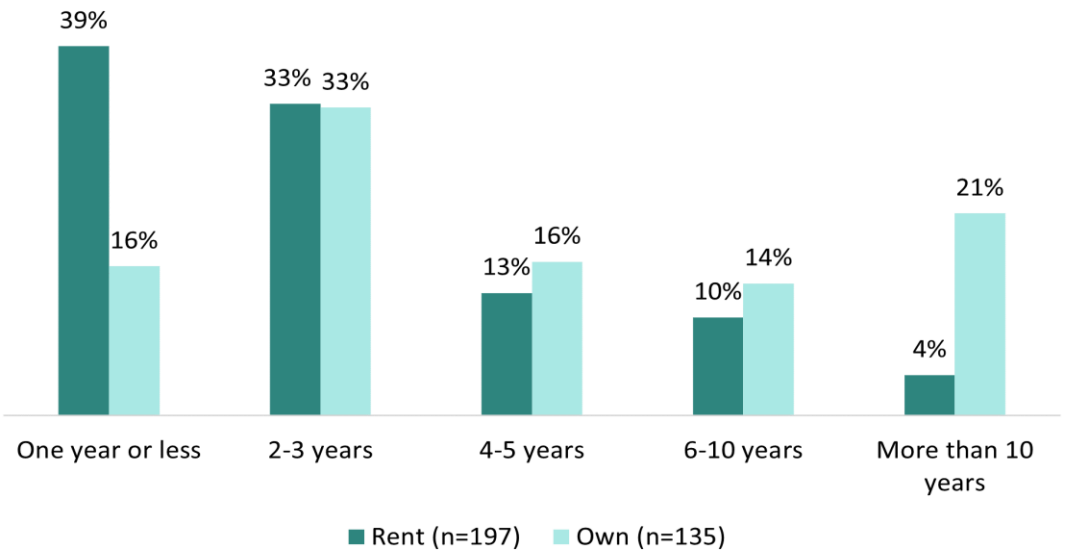
Figure 75. 2023 Single or Multifamily Home



Source: General Population Survey. F2. What type of home do you live in?

Renters are significantly more mobile than homeowners. Most renters lived in their home three or fewer years, with nearly 40% saying they lived in their home for one year or less. Homeowners are more likely to have been in their homes longer, although the analysis does show variability in homeowners' time in their home (Figure 76), with homeowners most commonly being in their home for 2-3 years (33%) and an additional 21% reporting living in their home for more than 10 years.

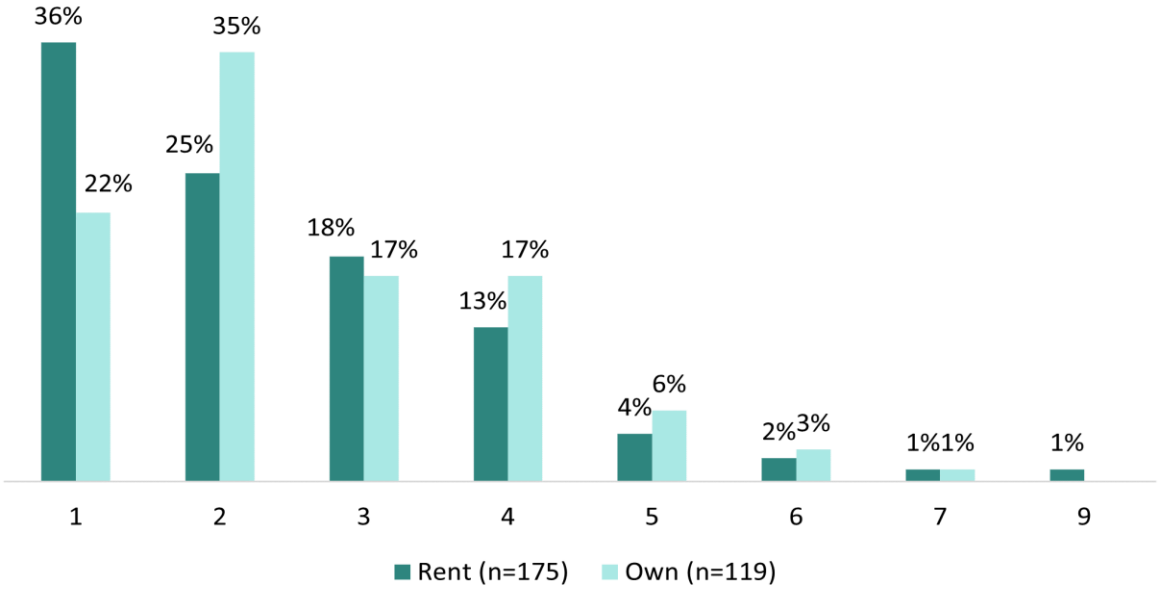
Figure 76. 2023 Years Lived in Current Home



Source: General Population Survey. F3. How many years have you lived in your current home?

Most renters live alone (36%) whereas most homeowners reported living with another person (35%, Figure 77). Several renters indicated they also live with another person (25%) and several homeowners indicated that they live alone (22%). Some renters and owners reported living with two or three people, but few respondents, regardless of homeownership, live with four or more people.

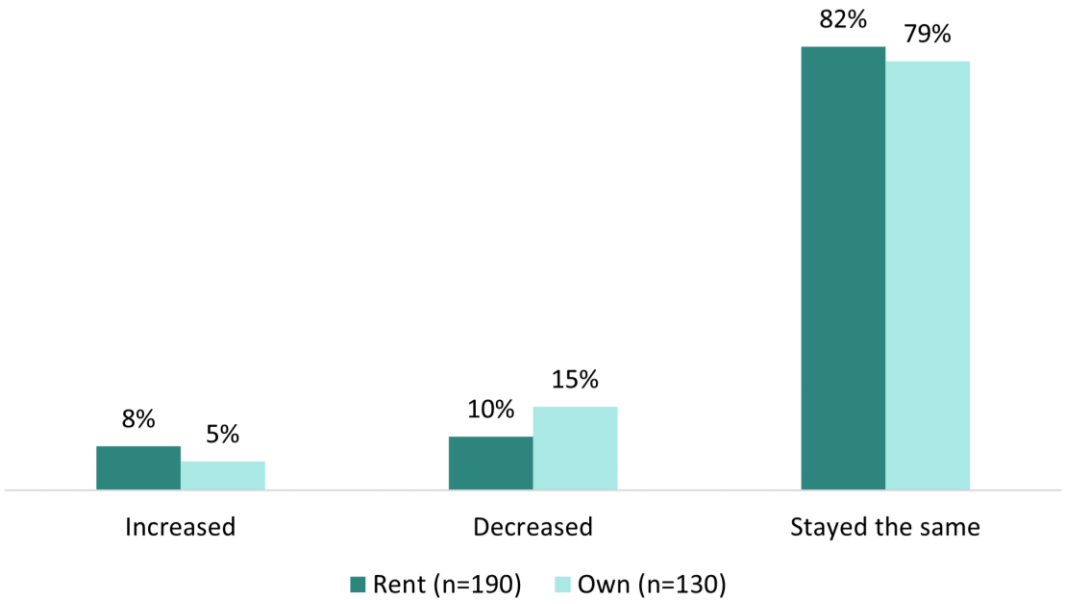
Figure 77. 2023 Household Size



Source: General Population Survey. F4. Including you, how many people are currently living in your home year-round? Include all members of your household whether they are related to you, but do not include anyone who is just visiting, or children who may be away at college or in the military.

Most renters and homeowners reported that since 2022, the number of people living in their home has stayed the same (82% and 79% respectively, Figure 78). Some indicated that the number of people living in their home had decreased and few reported it had increased.

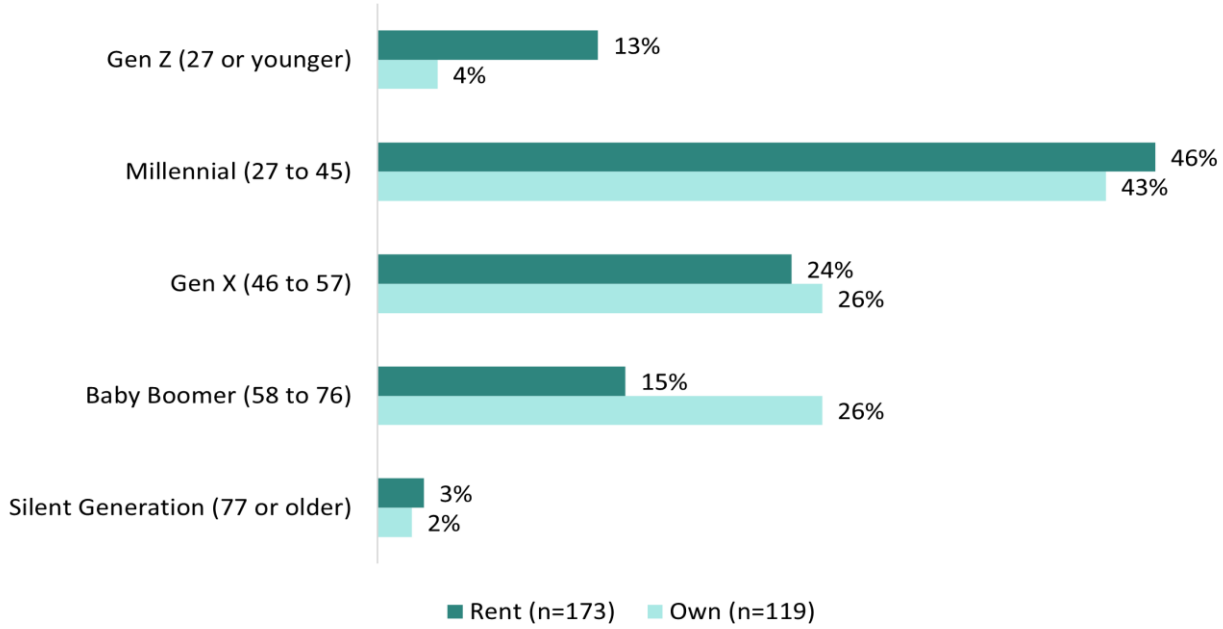
Figure 78. Household Size Compared to 2022



Source: General Population Survey. F5. Since 2022, has the number of people living in your home…

Most respondents, both renters and owners, reported that they were Millennials or between the ages of 27 to 45 (46% and 43% respectively, Figure 79). Just over half of homeowners belonged to Gen X and Baby Boomer categories between the ages of 46 to 76 whereas renters were more evenly split between Gen Z, Gen X and Baby Boomer.

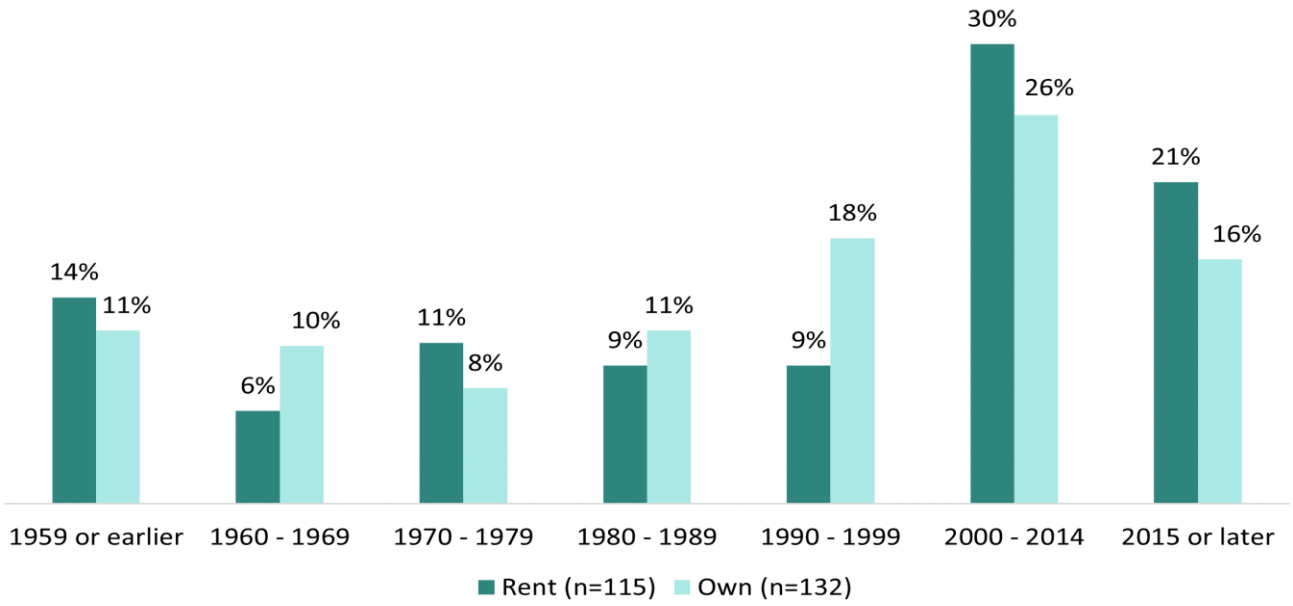
Figure 79. 2023 Survey Respondent Age



Source: General Population Survey. F6. In what year were you born?

Most renters and homeowners reported that their home was built between the years 2000 and 2014. More than a third of respondents reported that their home was built between 2000 – 2014 (36%, Figure 80). A quarter of homes were built prior to 1980 (25%).

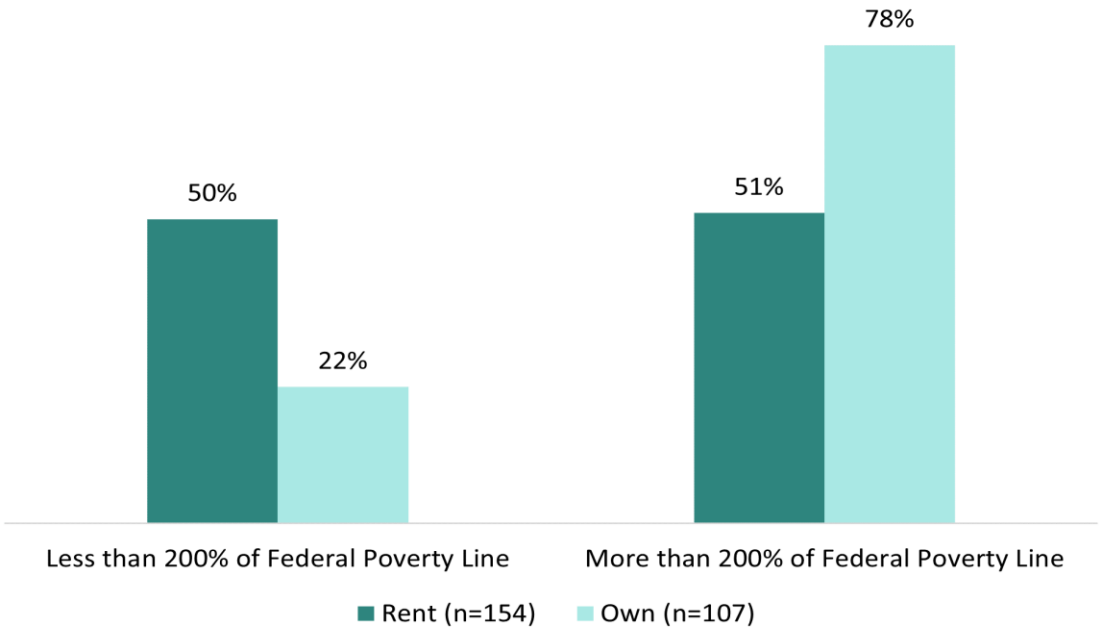
Figure 80. 2023 Year Home Built



Source: General Population Survey. F7. About when was your home built? Your best guess is fine.

Renters are significantly more likely to report lower incomes than homeowners. About half of renters report incomes at less than 200% of the FPL, compared with 22% of homeowners (Figure 81).

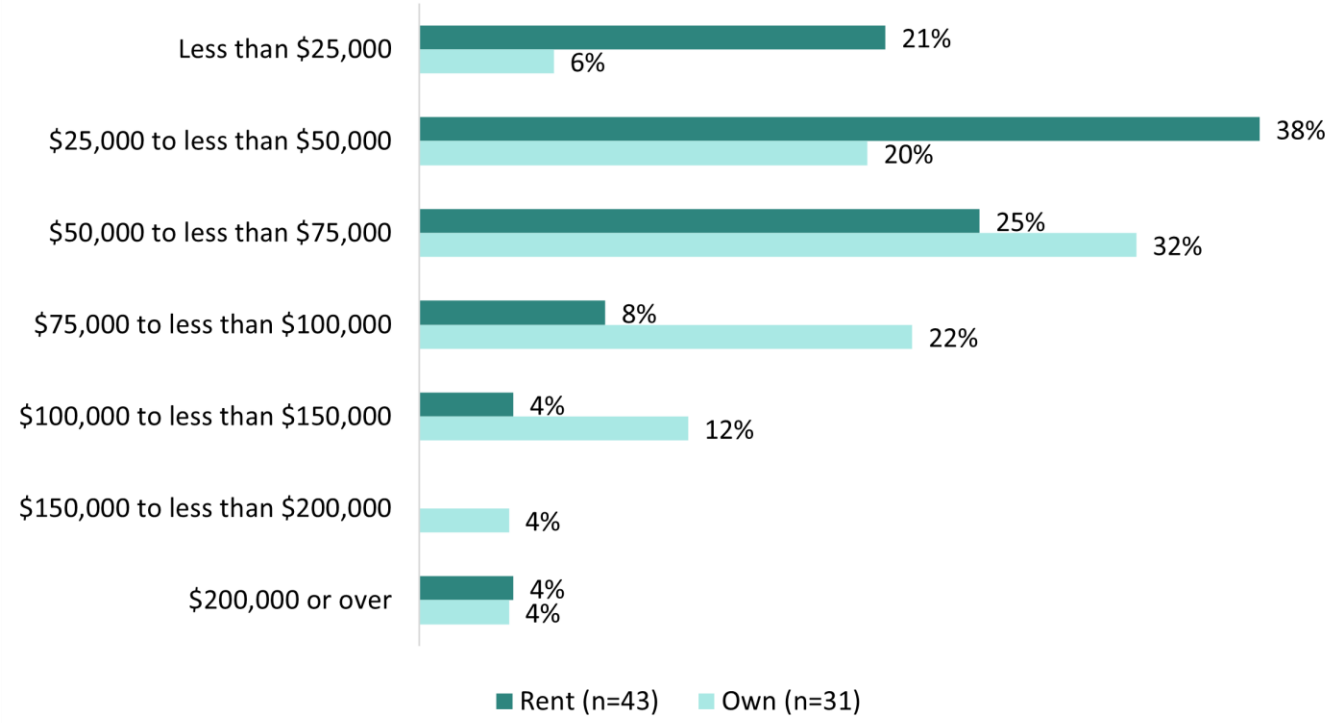
Figure 81. 2023 Income Related to 200% of Federal Poverty Line



Source: General Population Survey. F8. Is your annual household income more or less than [200% FEDERAL POVERTY LINE (FPL) BAS ED ON NUMBER OF HOUSEHOLD MEMBERS]?

Most renters indicated that their total household income before tax is between $25,000 to $50,000 (38%) whereas most homeowners indicated their income was between $50,000 to $75,000 (32%, Figure 82). Several renters indicated that their total household income was less than $25,000 (21%) or $50,00 to less than $70,000 (25%). Several homeowners indicated that their total household income was $25,000 to less than $50,00 (20%) and $70,000 to less than $100,000 (22%).

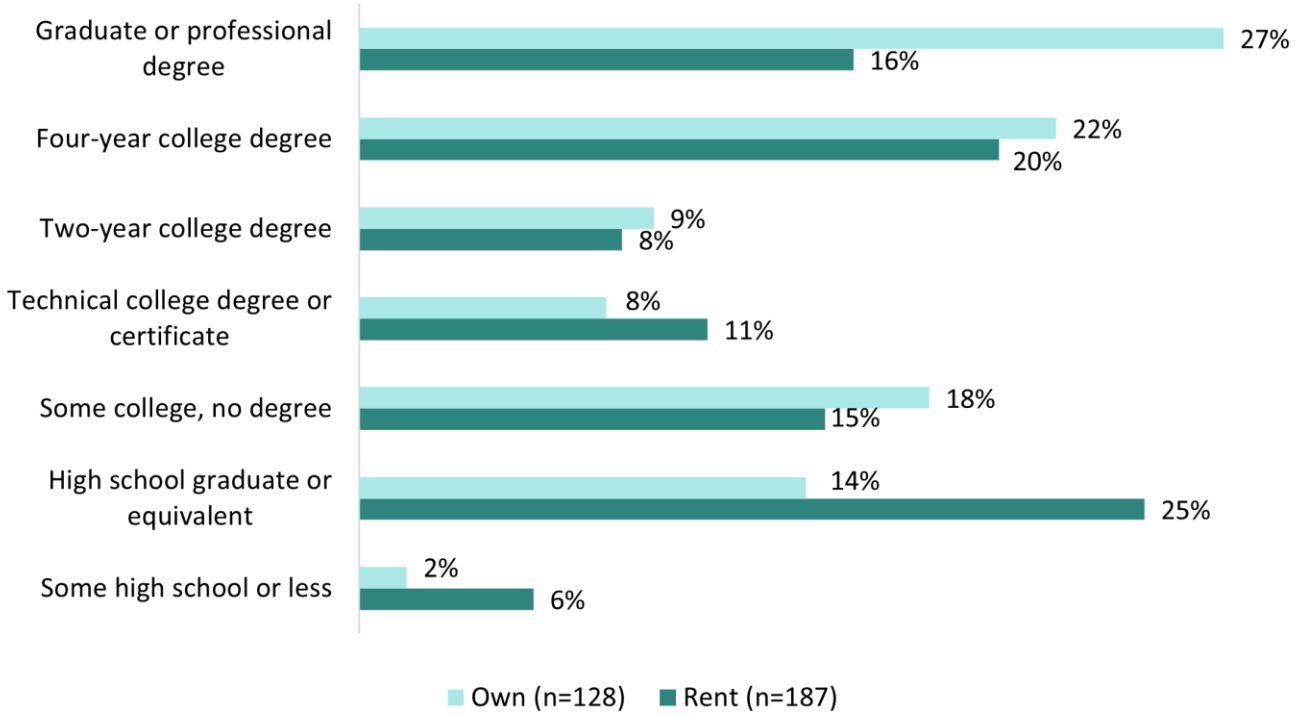
Figure 82. 2023 Household Income



Source: General Population Survey. F9. Which of the following categories best represents your total annual household income b efore taxes?

Homeowners tend to have gone through more formal education. Most renters reported that their highest level of education completed was high school graduate or equivalent (25%, Figure 83) whereas most homeowners reported their highest level of education was graduate or professional degree (27%) Figure 83. The next most reported level of education completed for both renters (20%) and homeowners (22%) was a four-year college degree followed by some college, but no degree (15% and 18% respectively).

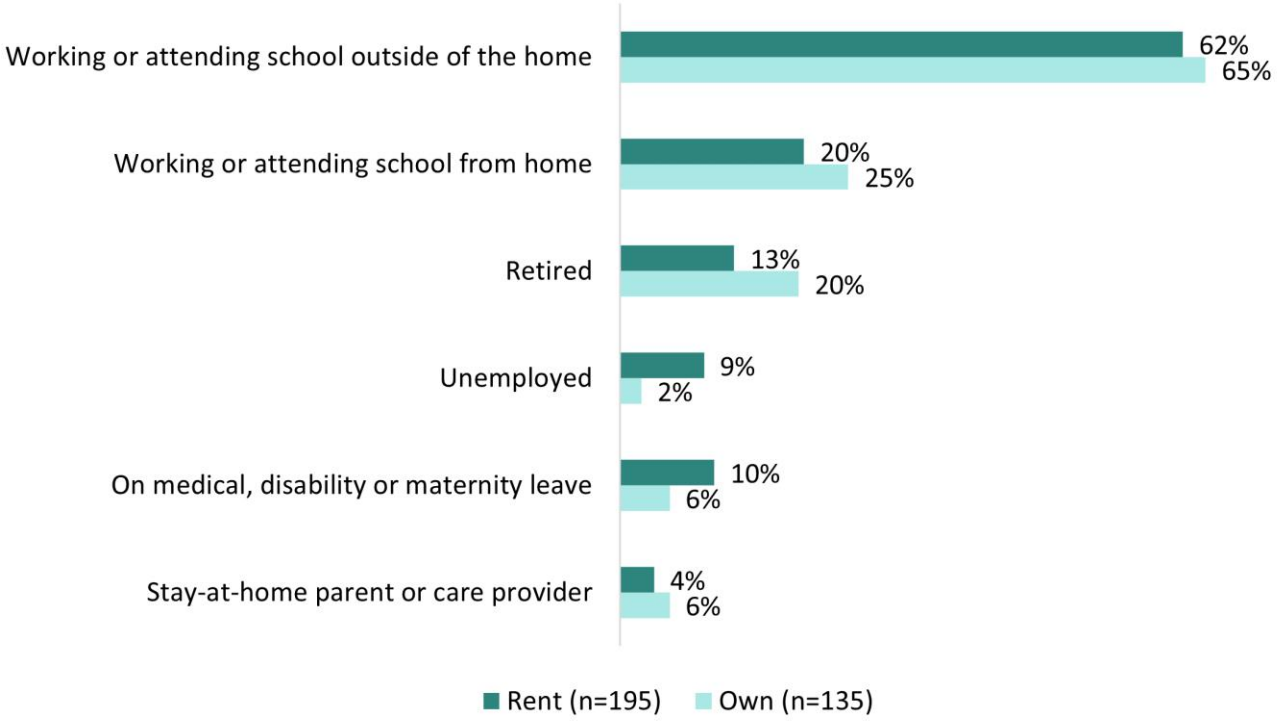
Figure 83. 2023 Highest Education Completed



Source: General Population Survey. F10. What is the highest level of education you have completed?

Renters and homeowners followed a similar trend in terms of their household employment (Figure 84). Most renters and homeowners reported that they are currently working or attending school outside of the home (62% and 65% respectively). Several renters and owners reported that they are currently working or attending school from home as well (20% and 25% respectively). The next most common response among both groups is that they are currently retired.

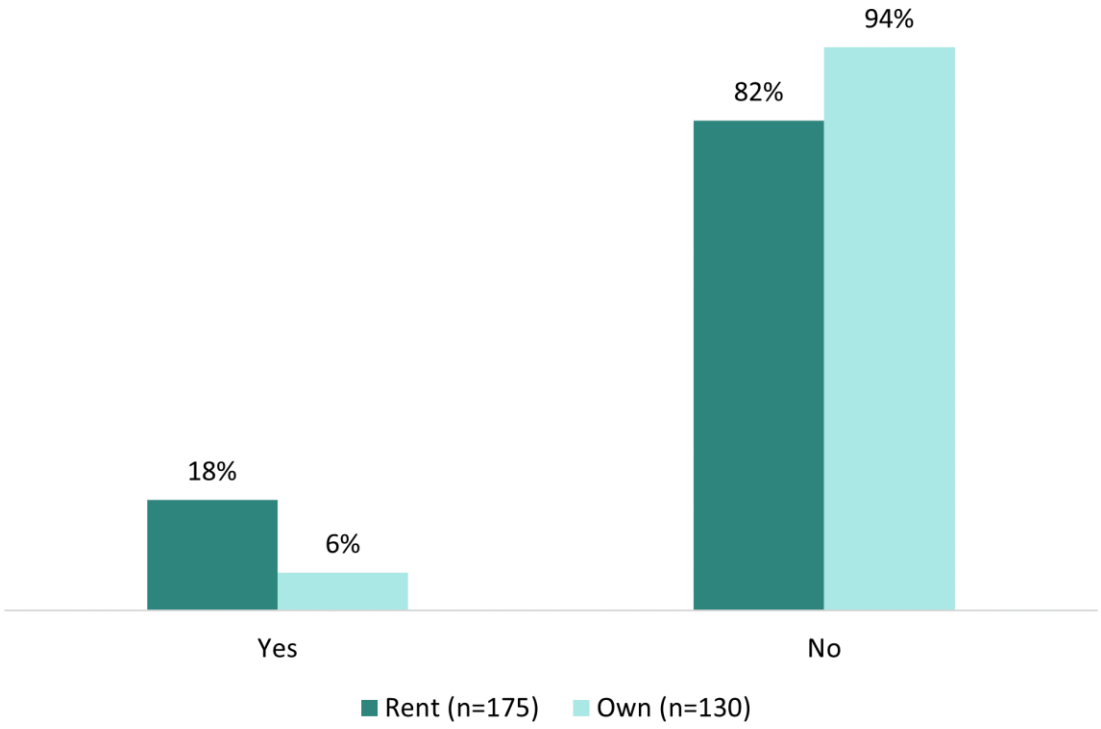
Figure 84. 2023 Household Employment



Source: General Population Survey.F11. Which of the following describes the employment situation of the adults in your household (including yourself)? Please select all that apply. Note: the percentages may not sum to 100% because multiple response options were allowed.

Employment has been relatively stable for respondents; most reported that their employment status had not changed from the prior year. Renters are significantly more likely to have reported a change in employment status (Figure 85).

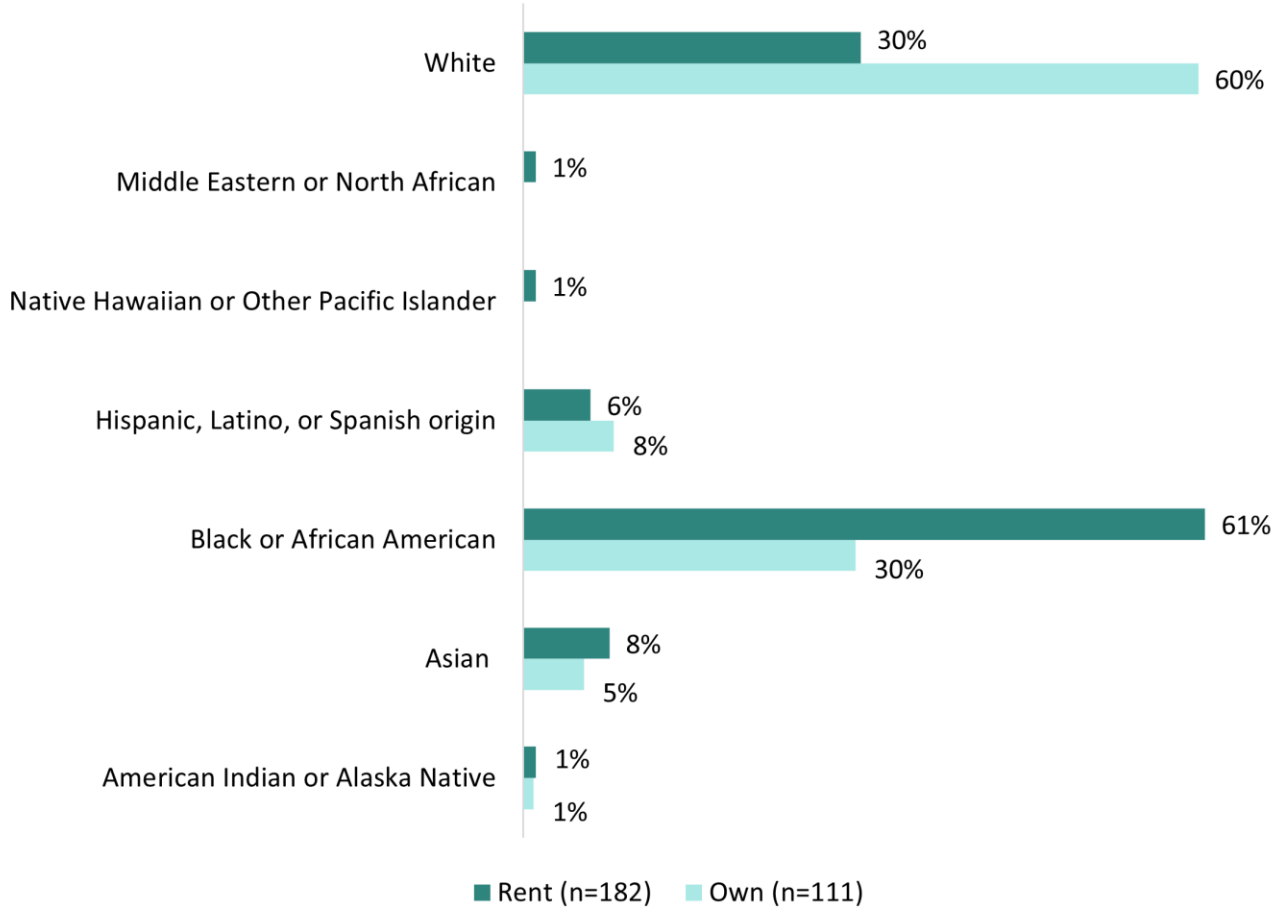
Figure 85. 2023 Change in Employment Compared to 2022



Source: General Population Survey. F12. Has your employment situation changed since 2022?

Renters and homeowners differed in race, ethnicity, or origin (Figure 86). Most renters identified as Black or African American (61%) whereas most homeowners identified as White (60%). Several renters identified as White (30%), and several homeowners identified as Black (30%). Some renters and owners identified as Asian and some as Hispanic, Latino, or Spanish origin.

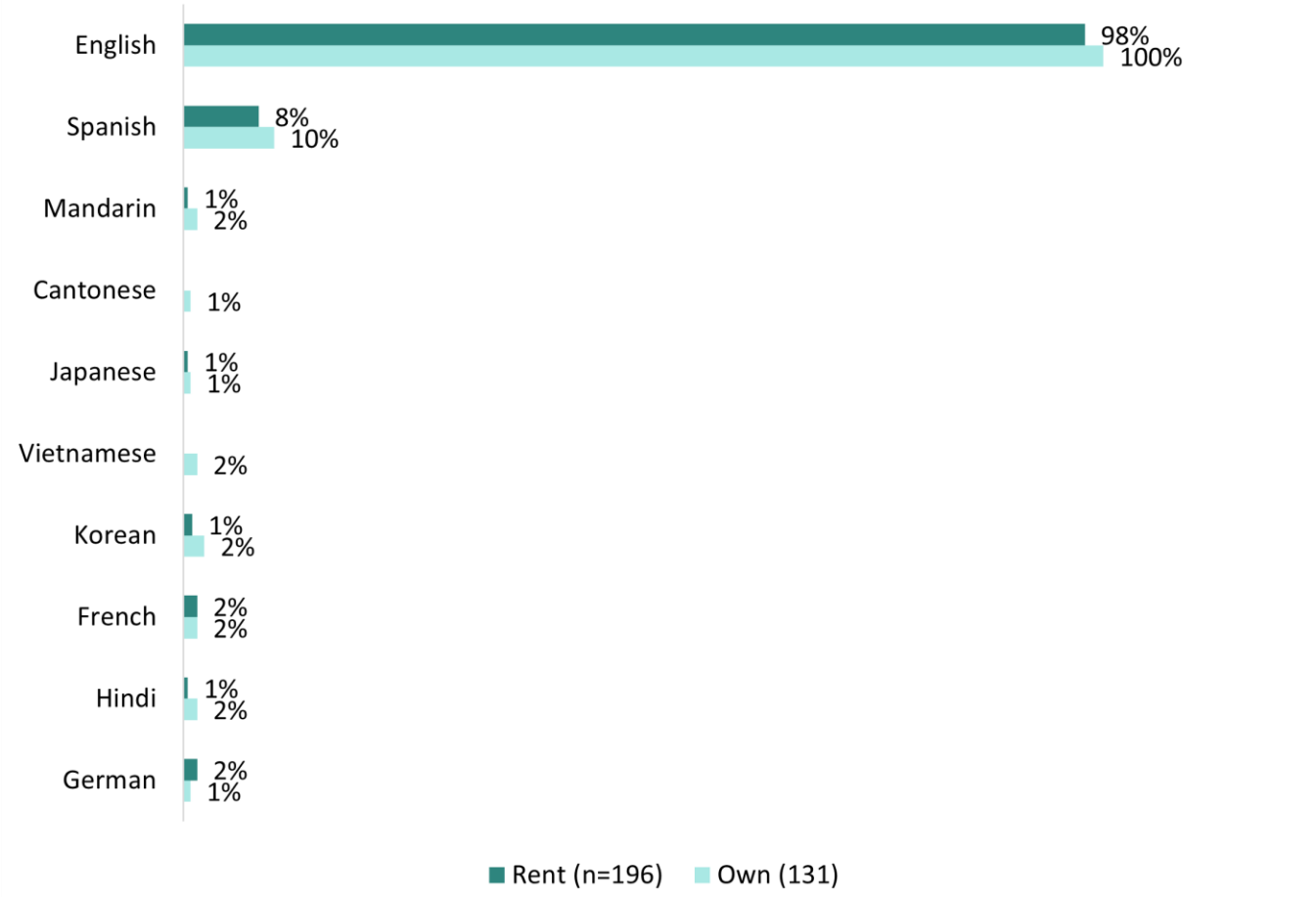
Figure 86. 2023 Race, Ethnicity, or Origin



Source: General Population Survey. F13. Which categories describe you? Please select all that apply. Note: the percentages may not sum to 100% because multiple response options were allowed.

Nearly all respondents, both renters and owners, reported that the primary language they speak at home is English (98% and 100% respectively, Figure 87). Several renters and owners indicated that they speak Spanish as well (8% and 10% respectively) and few speak other languages such as Mandarin, Vietnamese, Korean, French, Hindi, and German.

Figure 87. 2023 Primary Language Spoken at Home



Source: General Population Survey. F14. What language(s) do you primarily speak at home? Note the percentages may not sum to 100% because multiple response options were allowed.

General Population Conclusions and Recommendations

Conclusion 1: Renters are more concerned about bills being unaffordable and are less aware of Georgia Power programs than are homeowners. Renters are less aware of programs, less likely to undertake upgrades, and less likely to engage with Georgia Power than homeowners. Most renters have been living in their same home for two years or more, are interested in managing their energy costs, making energy efficiency improvements, and are concerned about their ability to pay energy bills. Renters lack awareness in the Online Marketplace which sells many products that renters would be able to install and use in their homes. These findings suggest that there continues to be ample opportunity to expand outreach in the rental market and to expand the promotion of the Online Marketplace to renters.

Conclusion 2: In general, more people are finding bills to be more unaffordable than just two years ago. The percentage of renters who are worried about paying their utility bills has increased significantly suggesting increased efforts to reach renters may be of benefit.

Conclusion 3: The number of renters reporting heat pumps in their homes has increased dramatically since 2021, however homeowners reporting heat pumps has remained stable since 2021 suggesting:

- There is interest and willingness in installing heat pumps in rental properties.
- That heat pumps installation by homeowner may be stalled and that further program support from Georgia Power may be needed to make significant traction with heat pumps in owned homes.

Conclusion 4: While overall satisfaction for Georgia Power remains positive, it has declined since our last survey in 2021. Renters and homeowners both ranked Georgia Power at a 7 or above on a scale of 1 to 10 on satisfaction and likelihood to recommend, a positive score, however this is nearly a one-point drop from 2021 suggesting that customers are slightly less satisfied with Georgia Power than in the past. Given there is also worry about ability to afford energy bills, Georgia Power's energy efficiency programs provide continued opportunity to alleviate this worry—which may be affecting satisfaction—by actively supporting customers in reducing their energy costs.

2. APPENDIX – RESIDENTIAL BEHAVIORAL

Appendix 2A. Residential Behavioral Program Design and Delivery Details

Changes from Previous Cycle

It is important to have up-to-date information for customers in HERs program, particularly their home information and their email address. To improve this information, the implementer refreshed the information in the Home Profile for customers and offered a sweepstakes to encourage customers to update their Home Profile and to provide their email address.

There are minor changes to the program during this cycle.

- In the last program cycle, Georgia Power had shifted from another implementer to Uplight. Since then, Georgia Power has continued with Uplight.
- As of early 2022, the cross promotional information provided in the HERs is more customized and specific to Georgia Power programs, such as including direct links to other Georgia Power programs.
- In 2023, the implementer took over customer service responsibilities.

Residential Behavioral Waves

Table 102 lists the name of each wave and how customers receive HERs in those waves. Customers in standard waves receive both paper and email reports, while customers in digital waves receive reports through email only. The two IQ waves receive both paper and email reports. Finally, the Transformation Wave began as a paper and email report wave, but as of 2021 is now an email only wave.

Table 102 also shows the number of reports that each wave was sent in 2023. Every wave was sent six email reports and some waves received between two and six paper reports as well. Reports were sent more often around the peak summer months (June, July, and August) as well as the peak winter months (December, January). All waves received reports during these months. Reports were sent less often in the spring and fall, with no waves receiving reports in March, April, or October.

Table 102. 2023 Residential Behavioral Wave Report Type and Frequency

WAVE NAME	TYPE OF HER	EMAIL REPORTS	PAPER REPORTS
2014 Legacy Wave	Email Only	6	0
2016 Legacy Income-qualified Wave	Paper and Email	6	2
2018 Legacy Wave	Paper and Email	6	2
2020 Standard Wave	Paper and Email	6	4
2020 Digital Transformation Wave	Email Only	6	0
2020 Digital Only Wave	Email Only	6	0
2021 Standard Wave	Paper and Email	6	4
2021 Digital Only Wave	Email Only	6	0
2022 Electric Income-qualified Wave	Paper and Email	6	5

Appendix 2B. Detailed Study Methodology for Residential Behavioral Program Evaluation

The Residential Behavioral program evaluation sought to address the following process and impact evaluation research questions:

Process Evaluation Questions

- Are treatment group customers aware of the HERs? Does this differ by delivery channel?
- To what extent are HER recipients aware of other energy efficiency programs?
- To what extent do treatment group customers read and interact with the HERs? Does this differ by delivery channel? To what extent do the HERs customers implement energy efficiency measures?
- Do customers recall receiving high bill alerts? What are customer experiences with these alerts?
- How satisfied are treatment group customers with the reports overall and with the different sections of the HERs?
- Does receiving HERs affect satisfaction with Georgia Power?

Impact Evaluation Questions

- How did the program perform against participation and savings goals?
- What is the impact of HERs on energy use?
- Does receiving HERs result in higher participation in other energy efficiency programs? If yes, what is the impact of double-counted savings?

Activities employed to address these questions are detailed below in two sections: data collection approach (which addresses process and impact evaluation activities) and impact evaluation approach.

Data Collection Approach

This section details the method of data collection for the evaluation. The evaluation team collected data through interviews with program staff, an interview with Uplight, and through participant surveys. We

conducted an interview with program staff to understand the program history, context, goals, and challenges. We also interviewed the program implementer (Uplight) to understand their experience and perspective of the program.

Participant surveys:

The evaluation team invited 2,700 HER participants to complete a web-based survey through an email invitation in September and August 2023. Customers received reminders to complete the survey. Those who completed the survey were entered into a drawing to win one of five $100 gift cards. The evaluation team received 220 completed surveys, 109 where the respondents were in HER waves that received paper and email reports and 111 where the respondents were in HER waves that received email reports only. The overall survey response rate was 8%, and it did not differ based on which mode a customer received their HER.

The evaluation team utilized a stratified random sample of program participants as part of the process evaluation. The sample was stratified by report type (paper and email versus email only) and targeted 75 survey completes per report type (Table 103). The initial survey deployment did not satisfy the quotas. A supplementary sample of 600 participants each was thus provided and recruited for surveys.

Table 103. 2023 Participant Survey Sampling and Response Rate

REPORT TYPE	POPULATION	TARGET	SAMPLE 1	SUPPLEMENTARY SAMPLE	COMPLETES	RESPONSE RATE
Paper and Email	132,565	75	750	600	109	8%
Email Only	233,047	75	750	600	111	8%

Impact Evaluation Approach

This section details each step of the impact evaluation and the evaluated savings for the Residential Behavioral program. The evaluation team conducted a billing analysis and cross program participation analysis for the time between August 2022 and July 2023.[43] To calculate the savings achieved during the 2023 program year, the evaluation team applied the RR calculated in the evaluation period to the implementer-reported savings in the program year.

[43] The 2022 Electric Income-qualified Wave was evaluated from November 2022 to July 2023 because the wave began in October 2022. Since this overlapped with the August 2022 to July 2023 evaluated program period, only these nine months were evaluated.

The implementer created randomized groups by randomly assigning customers to either the treatment or the control group. The evaluation team verified the groups were similar by comparing their energy use in the months prior to receiving the first HER. Because of the nature of RCT study design, we also assume it is likely the groups are equivalent on other unmeasured, behavioral characteristics such as their level of interest in saving energy; the RCT with opt-out program design limits the threat of selection bias.[44]

The control group acts as a baseline or counterfactual, providing an estimate of the treatment group's energy consumption in the absence of the program. The RCT design allows both the implementer and evaluators to estimate program impacts by comparing changes in whole home energy use between the treatment and control groups.

The evaluation team applied several steps for our Residential Behavioral program billing analysis.

- **Data cleaning:** The evaluation team identified treatment and control group billing data to exclude it from the analysis. We cleaned the data by removing any duplicate reads, negative reads, reads in the top 1% of energy usage, and reads after the account was inactive. See Appendix 2A. Residential Behavioral Program Design and Delivery Details for a detailed disposition of treatment and control customers in each wave.
- **Equivalency check:** The evaluation team verified that the distribution of average monthly energy usage prior to receiving the HERs was sufficiently similar between the treatment and control groups, consistent with the random assignment of customers to each group.
- **Regression analysis:** The evaluation team verified program impacts using a post-program regression (PPR) analysis with lagged participant controls. This model controls individual respondent differences by including an explanatory variable that is the monthly energy use for each customer from the year prior to treatment group customers receiving the first HER. As a check on these results, we also ran a linear fixed effects regression (LFER) model. We provide more details in Appendix 2C. Residential Behavioral Program Algorithms, and Assumptions.
- **Cross-program participation analysis:** The evaluation team estimated the cross-program participation in other energy efficiency programs due to actions suggested by HERs through a post-only differences approach applied to tracking data from other programs. Post-only differences are a direct comparison of program uptake in the post-period as a percentage of respondents from treatment and control groups. We provide more details in the *Cross-Program Participation Analysis* section.

[44] Selection bias may exist in opt-in program designs, in which customers who choose to participate in a program may differ systematically from customers who do not participate. However, this is not a concern with an RCT opt-out program design.

A key feature of the RCT design is that the analysis yields net savings, not gross savings. There is no option for customers to receive the HERs outside of the program. Thus, there is no free-ridership, and no NTG adjustment to the billing analysis results is necessary. We refer to the net savings from the billing analysis as "unadjusted net savings" to distinguish from final "adjusted net savings," which do not include double-counted savings from cross-program participation (uplift).

Appendix 2C. Residential Behavioral Program Algorithms, and Assumptions

This appendix contains additional information on the data cleaning steps as well as algorithms and assumptions used in calculating energy savings for the Residential Behavioral program.

Data Cleaning

Table 104 shows the data disposition by wave for treatment and control records and accounts after removing data outside of the pre and post periods and removing reads in the top 1%. We also cleaned the data by looking for duplicate reads and negative reads but found none.

Table 104. 2023 Data Cleaning Disposition by Wave

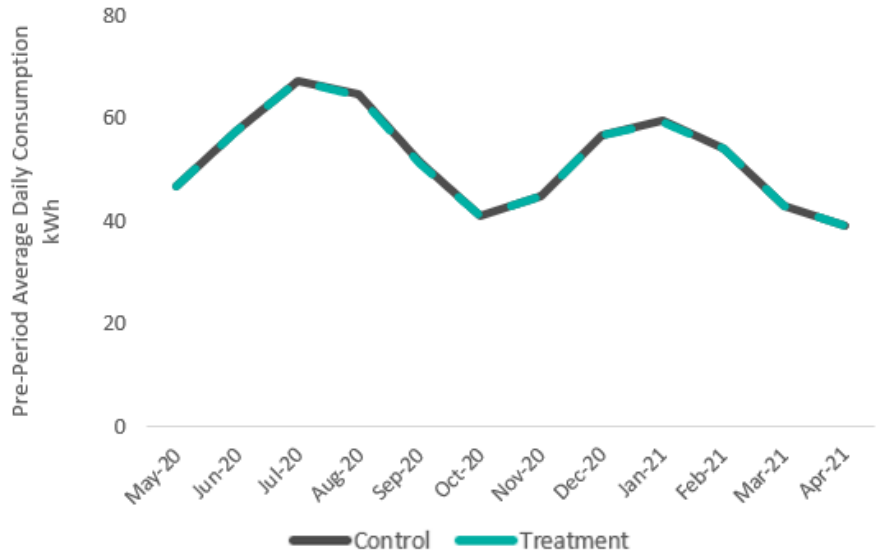
STEP	WAVE	CONT REC	TREAT RECS	CONT ACCTS	TREAT ACCTS	CONT PCT RECS REMOVED	TREAT PCT RECS REMOVED	CONT PCT ACCTS REMOVED	TREAT PCT ACTS REMOVED
Remove data outside of pre and post periods	2014 Legacy Wave	192006	241172	4037	5067	-	-	-	-
	2016 Legacy Income-qualified Wave	162814	595834	3428	12534	-	-	-	-
	2018 Legacy Wave	453372	2269273	9519	47670	-	-	-	-
	2020 Standard Wave	886038	1875170	18627	39428	-	-	-	-
	2020 Digital Transformation Wave	833772	2494439	17543	52501	-	-	-	-
	2020 Digital Only Wave	834673	833819	17558	17544	-	-	-	-
	2021 Standard Wave	990845	1974537	20840	41541	-	-	-	-
	2021 Digital Only Wave	984336	2955178	20731	62249	-	-	-	-
	2022 Electric Income-qualified Wave	1055918	4214537	23317	93270	-	-	-	-
Removing reads in the top 1% of energy usage	2014 Legacy Wave	190755	239778	4036	5066	0.65%	0.58%	0.02%	0.02%
	2016 Legacy Income-qualified Wave	161920	593320	3428	12533	0.55%	0.42%	0.00%	0.01%
	2018 Legacy Wave	440965	2208061	9515	47650	2.74%	2.70%	0.04%	0.04%
	2020 Standard Wave	877864	1859329	18612	39409	0.92%	0.84%	0.08%	0.05%
	2020 Digital Transformation Wave	824324	2468907	17530	52462	1.13%	1.02%	0.07%	0.07%
	2020 Digital Only Wave	826239	824989	17546	17534	1.01%	1.06%	0.07%	0.06%
	2021 Standard Wave	978776	1949659	20826	41519	1.22%	1.26%	0.07%	0.05%
	2021 Digital Only Wave	984274	2955027	20731	62249	0.01%	0.01%	0.00%	0.00%
	2022 Electric Income-qualified Wave	1046876	4178286	23301	93219	0.86%	0.86%	0.07%	0.05%

Equivalency Checks

The evaluation team employed two methods to assess the equivalency of treatment and control energy usage:

- Visual inspection of overlaid plots of monthly mean energy use for treatment and control groups. Figure 88 shows the pre-period usage for the 2021 Standard Wave. If the waves were not equivalent the usages lines would not be perfectly overlapped. We reviewed these graphics for each of the waves and only include the 2021 Standard Wave as an example.
- T-tests of the monthly differences in mean energy use between treatment and control groups in each month. A significant difference ($p < 0.05$) indicates that pre-period usage is dissimilar between groups. No waves had a significant difference between treatment and control groups overall. Three waves had one month which had a statistically significant difference in the pre-period, but the magnitude was small and since the remaining months of the pre-period did not have a significant difference, the evaluation team considered the wave overall to pass this equivalency check.

Figure 88. 2021 Standard Wave Treatment and Control Pre-Period Usage



Regression Analysis

The evaluation team conducted a regression analysis to determine energy savings for treatment and control respondents using two models: PPR and LFER. Both approaches produced unbiased estimates of program savings. The evaluation team reported the PPR results and used the LFER results as a robustness check. Although structurally different, assuming the RCT is well-balanced with respect to the drivers of energy use, the two models should produce similar program savings estimates.

Based on our experience analyzing the impacts of similar programs, the savings estimates produced by the PPR approach tend to be more precisely estimated (smaller standard errors) than those produced from the

LFER model. This increase in precision occurs because the PPR accounts for groupwide pre-post consumption differences with a continuous term (ADClag) instead of a categorical term (post). Detailed descriptions of both model types are provided below.

Post-Period Regression

The PPR model controls for anomalous differences in energy usage between treatment and control group respondents by using lagged energy use as an explanatory variable. In other words, the model frames energy use in each calendar month of the post-program period as a function of both the treatment variable and energy use in the same calendar month of the pre-program year. The underlying logic is that any small systematic differences between the control and treatment respondents that remain, despite the randomization, will be reflected in differences in their past energy use, which is highly correlated with their current energy use. Including lagged energy use in the model serves to control these differences more precisely. The version the evaluation team estimated includes monthly fixed effects interacting with the pre-program energy use variable. These interaction terms allow pre-program usage to have a different effect on post-program usage in each calendar month.

$$\mathrm{ADC_{kt}} = \beta_0 + \beta_1 \mathrm{ADClag_{kt}} + \beta_2 \mathrm{Treatment_k} + \sum_j \beta_{3j} \mathrm{Month_{jt}} + \sum_j \beta_{4j} \mathrm{Month_{jt}} * \mathrm{ADClag_{kt}} + \varepsilon_{kt}$$

Where:

$\mathrm{ADC_{kt}}$ = The average daily usage in kilowatt-hours or therms for respondent *k* during billing cycle *t*. This is the dependent variable in the model.

$\mathrm{ADClag_{kt}}$ = Respondent *k*'s energy use in the same calendar month of the pre-treatment year as calendar month *t.*

$\mathrm{Treatment_k}$ = A binary variable indicating whether respondent *k* is in the participant group (taking a value of 1) or the control group (taking a value of 0).

$\mathrm{Month_{jt}}$ = A binary variable taking a value of 1 when $j = t$ and 0 otherwise.[45]

$\mathrm{E_{kt}}$ = The cluster-robust error term for respondent *k* during billing cycle *t* that accounts for heteroscedasticity and autocorrelation at the respondent level.

In this model, β_2 is the estimate of average daily energy savings due to the program. Program savings are the product of the average daily savings estimate and the total number of participant-days in the analysis.

Linear Fixed Effects Regression

As with the PPR model, the LFER model combines cross-sectional and time series data. Unlike the PPR model, however, the LFER models the full set of pre- and post-program usage data. The regression essentially

[45] If there are post-program months, the model has monthly dummy variables, with the dummy variable "month" being the only one to take a value of 1 at time *t*. These are, in other words, monthly fixed effects.

compares the pre- and post-program energy usage of participants to those in the control group to identify the effect of the program. The purpose of the respondent-specific fixed effect is to capture all systematic cross-respondent variation in electric energy usage that the model does not capture. Like the lagged usage variable in the PPR model, the fixed effect represents an attempt to control for any small systematic differences between the treatment and control respondents that might occur in the data despite the randomization.

$$\mathrm{ADC_{kt}} = \beta_{0kt} + \beta_1 \mathrm{Post_t} + \beta_2 \mathrm{Treatment_k Post_t} + \varepsilon_{kt}$$

Where:

$\mathrm{ADC_{kt}}$ = The average daily usage in kilowatt-hours or therms for respondent *k* during billing cycle *t*. This is the dependent variable in the model.

β_{0kt} = The respondent-specific fixed effect at month-year *t*.

β_1 = The effect of being in the post-period on energy use to account for non-program effects that impact both the treatment and control groups.

$\mathrm{Post_t}$ = A binary variable indicating whether bill cycle *t* is in the post-program period (taking a value of 1) or in the pre-program period (taking a value of 0).

B_2 = The estimate of treatment effects: the average daily energy savings per household due to behavioral program treatment.

$\mathrm{Treatment_k}$ = A binary variable indicating whether respondent *k* is in the participant group (taking a value of 1) or in the control group (taking a value of 0).

ε_{kt} = The cluster-robust error term for respondent *k* during billing cycle *t*. Cluster-robust errors account for heteroscedasticity and autocorrelation at the respondent level.

Cross-Program Participation Analysis

The HERs sent to treatment respondents included energy saving tips and marketing modules, some of which encouraged respondents to participate in other Georgia Power Energy Efficiency programs. To assess the interactions between these programs, the evaluation team analyzed both the Residential Behavioral program and other Georgia Power Energy Efficiency program data for participation overlap to address two factors:

- **Participation lift.** Does the Residential Behavioral program treatment influence participation in other energy efficiency programs?
- **Savings lift and adjustment.** What portion of savings from the Residential Behavioral program was obtained through Georgia Power's other energy efficiency efforts?

As with the energy savings calculations, the control group acts as the counterfactual, for both participation and savings from other programs, to address the above questions and provide unbiased estimates through the RCT model.

First, the evaluation team assessed whether the Residential Behavioral program increased participation in Georgia Power's other energy efficiency programs by comparing participation rates between control and treatment groups. If participation rates in other residential energy efficiency programs were the same across HER treatment and control groups, the savings estimates for HERs from the regression analysis were already net of savings from the other programs and indicates that the Residential Behavioral program had no effect on participation in other energy efficiency programs.

However, if the Residential Behavioral program channeled participants into other energy efficiency programs, then savings detected in the HER billing analysis would include savings that are also counted by those other energy efficiency programs. For instance, if the Residential Behavioral program increased participation in the RR+ program, the increase in savings could be allocated to either the HER program or to RR+ provided through the Residential Behavioral program (or some portion to each), but it could not be fully allocated to both programs simultaneously.

The evaluation team then calculated participant lift and savings lift and adjustment:

- **Participation lift.** Using participation flags, the evaluation team calculated a participation rate based on the number of accounts (either by individual or by household) that initiated participation in other tracked energy efficiency programs after the first report date. The difference in treatment and control participation in the post-treatment period is participation lift.
- **Savings lift and adjustment.** The evaluation team estimated the energy savings associated with participation lift in other Georgia Power Energy Efficiency programs:
    - First the evaluation team calculated the annual savings for all measures installed in the post-period through the measure savings in the program tracking data.
    - Then we adjusted annual savings for each measure installation by the number of days per year in the post-period in which the measure was installed while the account was active; this step is necessary to most accurately estimate the savings that would be captured by the billing analysis.
    - Next, we determined the average savings per household for both the treatment and control group due to participation in other energy efficiency programs. This average is computed using the total population of the control and treatment group for a wave—not just the subgroup of cross program participants. Taking the difference between these two savings establishes the cross participation savings per household for the wave, as listed in Table 105. 2023 Participant Survey Sampling and Response Rate.
    - Finally, we multiply the per household savings by the total number of households in the treatment group to arrive at the total cross participation savings for the wave.

To remove the double-counted saving calculated in the Savings Lift Adjustment, we subtracted this value from the Residential Behavioral program savings for waves that have positive cross participation total savings (see Table 105). For example, when the report channels treatment customers into the HEIP program at a higher rate than the control group (who participate without the report), we subtract the net HEIP program savings from the total Residential Behavioral program savings. In this evaluation period, we find that the

control group of the 2014 Legacy and the 2016 Legacy Income-qualified waves have a higher per-household savings from other Georgia Power Energy Efficiency programs than the treatment groups. For these two waves, there are no double-counted savings to remove.

Appendix 2D. Additional Survey Findings

This section details additional findings from the participant survey analysis.

Participant Survey Sampling

The evaluation team utilized a stratified random sample of program participants as part of the process evaluation. The sample was stratified by report type (paper and email versus email only) and targeted 75 survey completes per report type (Table 105). The initial survey deployment did not satisfy the quotas. A supplementary sample of 600 participants each was thus provided and recruited for surveys.

Table 105. 2023 Participant Survey Sampling and Response Rate

REPORT TYPE	POPULATION	TARGET	SAMPLE 1	SUPPLEMENTARY SAMPLE	COMPLETES	RESPONSE RATE
Paper and Email	132,565	75	750	600	109	8%
Email Only	233,047	75	750	600	111	8%

Participant Survey Program Awareness

Most respondents (65%) are aware that Georgia Power offers programs, rebates, and incentives to help save money and energy in their home (n=212). Of those that had heard of offers from Georgia Power, the most common offerings that respondents were aware of included the HEIP, the RR+ Program, and the EASE Program. In the general population study, 6% of respondents reported that they heard about a Georgia Power Energy Efficiency program through a HER (n=150).

Participant Survey Program Interaction and Implementation

Respondents had the highest recall of the home comparison section of the HER (98%, n=120) followed by the graph of electric use over time (87%, n=111), and then the graph showing a breakdown of energy end-uses in their home (83%, n=112). Fewer respondents recalled the HER section that described actions to save more energy (63%, n=116) and the section that described Georgia Power programs and rebates (57%, n=115). There were no statistically significant differences in which sections respondents remembered between those that receive paper and email reports compared to those who receive it via email only.

Participant Survey Satisfaction

Respondents find all sections of the HERs to be informative. More than 80% of respondents found each section of the HER including the How am I doing? (n=116), How does my home use energy? (n=93), How can I save more? (n=73), Home Energy Education (n=65), and Electric use over time (n=97) to be at least somewhat informative.

Appendix 2E. Survey Demographics

This appendix includes survey respondent demographics. Table 106 provides the full demographic breakdown of survey respondents.

Table 106. 2023 Residential Behavioral Program Participant Survey Demographic Data

VARIABLE	PROPORTION
HOUSEHOLD INCOME	
Less than $25,000	12%
$25,000 to less than $35,000	8%
$35,000 to less than $50,000	12%
$50,000 to less than $75,000	17%
$75,000 to less than $100,000	18%
$100,000 to less than $150,000	18%
$150,000 or over	14%
AGE	
Less than 30	3%
30 - 39	8%
40 - 49	22%
50 - 59	18%
60 - 69	25%
70+	25%
EDUCATION	
Some high school or less	1%
High school graduate or equivalent	14%
Some college, no degree	16%
Technical college degree or certificate	14%
Two-year college degree	5%
Four-year college degree	29%
Graduate or professional degree	21%
RACE/ETHNICITY	
American Indian or Alaska Native	2%
Asian	3%
Black or African American	22%
Hispanic, Latino, or Spanish origin	8%
Middle Eastern or North African	1%

VARIABLE	PROPORTION
White	64%
Other	6%
OWNERSHIP STATUS	
Own	86%
Rent	14%
HOUSE TYPE	
Single-Family	88%
Multifamily	9%
Manufactured Home	2%
Duplex	1%
HOME TENURE	
3 years or less	7%
4 - 10 years	43%
More than 10 years	50%
HOUSING AGE	
Before 1980	33%
After 1980	67%
HOUSEHOLD SIZE	
1 person	11%
2 people	49%
3 people	13%
4 people	16%
5+ people	10%
SQUARE FOOTAGE OF HOME	
0 to 1,500	29%
1,500 to 3,000	52%
3,000 to 4,000	13%
4,000 or larger	7%

3. APPENDIX - TEMP✓

Appendix 3A. Reported Demand Savings

In the Q42023 PSC Report, the Temp✓ program reported 139,502 kW of demand savings for 2023. As shown in Table 107, this represents the total of all demand savings from the seven events of 2023. But the maximum capacity at any time of the year from the Temp✓ program was on the event day of August 24, 2023, saving 22,104 kW (as per the implementer's running event reports). The evaluation team recommends using an average approach for all planning and cost-effectiveness estimates, which more accurately represents the potential demand savings due to the Temp✓ program and to be consistent across planning goals, reported savings, and verified savings.

Table 107. 2023 Reported Savings

EVENT DAY	kW SHIFT[1]
1/27/2023	19,748
3/15/2023	16,855
6/29/2023	20,412
7/20/2023	21,386
7/31/2023	20,838
8/24/2023	22,104 (maximum)
12/20/2023	18,156
SUM TOTAL DEMAND SAVINGS (REPORTED)	**139,502**
AVERAGE DEMAND SAVINGS	**19,928**
VERIFIED DEMAND SAVINGS	**18,519**

[1] The event-day kW figures presented are from the implementer's event report, which Georgia Power used to sum the reported savings.

Appendix 3B. Detailed Study Methodology for Temp✓ Program Evaluation

The Temp✓ program evaluation sought to address the following process and impact evaluation research questions:

Process Evaluation Questions

- What influences customers' decisions to participate in the program, and to remain enrolled? How influential is the annual incentive?
- What are customers' behaviors during event periods?

- Are customers aware of and affected by DR events?
- How satisfied are customers with the process and their experiences in general with the program and individual events?
- What factors influence customer opt-outs?
- Do customers recall participating in emergency events? If so, what is their perspective and experience with these events?
- What successes and challenges are the program managers and implementation team experiencing?

Impact Evaluation Questions

- Are the average demand and energy savings assumptions accurate, especially at the time of the Georgia Power's system peak hours?
- How did the program perform against participation and savings goals?
- Is the thermostat demand response technology working as planned?
- What factors drive savings, and if necessary, how, and why should savings assumptions be adjusted?

Activities employed to address these questions are detailed below in two sections: Data Collection Approach and Impact Evaluation Approach.

Data Collection Approach

The evaluation team fielded web-based surveys on the Qualtrics platform to 2,100 summer event enrollees and 2,100 winter event enrollees. These surveys were fielded following a summer event in August 2023, and a winter event in December 2023. The summer survey was fielded after the fourth event of the year, and the winter survey was fielded after the first event of the 2023 – 2024 winter season, which was the last event of 2023. The surveys were 15 minutes in length. If respondents completed the survey within one week of the initial invitation from each survey, they were entered into a sweepstakes to win one of three $100 Visa gift cards (six total for the two surveys). To enroll and participate in Temp✓ customers need to have a valid email address, which allowed the evaluation team to field the survey using email invitations. Each customer in the sample received a total of two emails (an initial invitation and one reminder). The summer survey collected responses from August 25 to September 4, 2023, and the winter survey collected responses from December 21, 2023, through January 2, 2024. The time to complete the winter survey was longer to give respondents more time to complete it around the winter holidays.

The population of enrolled participants skewed heavily towards Nest thermostats, as shown in Table 108. The evaluation team pulled a stratified sample that included equal proportions of each thermostat brand to investigate whether there were differences in experience and satisfaction between those that had different thermostat brands.

Table 108: 2023 Winter and Summer Populations and Samples by Thermostat Brand

THERMOSTAT BRAND	SUMMER POPULATION	SUMMER SAMPLE	WINTER POPULATION	WINTER SAMPLE
Google Nest	12,704 (66%)	700 (33%)	10,804 (62%)	700 (33%)
ecobee	5,309 (28%)	700 (33%)	5,310 (31%)	700 (33%)
Emerson	1,198 (6%)	700 (33%)	1,199 (7%)	700 (33%)
TOTAL	**19,211**	**2,100**	**17,313**	**2,100**

After removing responses that were automated bot responses, a total of 514 survey responses were included in the analysis, yielding a 12-13% response rate across both surveys. Table 109 reports the detailed survey disposition of winter and summer events.

Table 109: 2023 Process Evaluation Survey Disposition

STATISTICS	SUMMER EVENT	WINTER EVENT
Event date	August 24, 2023	December 20, 2023
Survey field date	August 25, 2023	December 21, 2023
Sample size [a]	2,070	2,059
Respondents	274	240
Response rate [b]	13%	12%

[a] *The presented sample size is less than the 2,100 invitations sent due to emails that bounced back.*

[b] *The response rate is the ratio of valid responses to valid invites.*

Impact Evaluation Approach

This section details each step of the impact evaluation.

Verified Gross Savings Approach

The results in this section reflect an analysis of hourly interval usage data from Georgia Power, event-specific enrollment data, and weather data. The evaluation team used a multivariate regression model to estimate impacts. The evaluation team followed our typical process for hourly usage or consumption analysis evaluation, by implementing different models for each of the following:

- **Primary Evaluation Model:** A regression that best aligns with typical evaluation analysis.
- **Robustness Checks:** Multiple regressions with minor changes to the model specification to provide an indication as to the sensitivity of the results.
- **Exploratory Analysis:** Multiple regressions where impacts are separated by various characteristics (e.g., event-level results and results by thermostat brand).

These methods are described in greater detail in Appendix 3C. Temp✓ Impact Analysis Methodology. Below, we provide additional background and context to the overarching program design, and the structure and approach of our evaluation and analysis.

Customer and Device Definitions

For this type of program where customers enroll their device or devices in the program, participation may refer to customers or devices. To differentiate the two, the evaluation team specifies the unit throughout this report chapter. For example, we use phrases such as "participating customer," "participant device," "enrolled customer," and "enrolled device" to specify whether we are referring to customers or devices. The evaluation team also uses the term "participant" to refer to both participating customers and devices.

Enrolled and Participating Definitions

We differentiate between "enrolled" and "participating" to denote how demand response programs have multiple levels of participation. Customers enroll their device or devices in the program through the BYOD channel.[46] After customers enroll their device or devices in the program, the implementer identifies enrolled devices that are eligible to "participate" in an event. Some enrolled devices or customers may not be eligible to participate in an event for a variety of factors (e.g., issues with their HVAC mode). On an event day the implementer will send signals to eligible enrolled customers to participate by adjusting their thermostat settings while leaving enrolled yet ineligible customers' thermostats unadjusted. Finally, some eligible participating customers and their devices may not successfully complete the event; for example, they may opt out, experience connectivity issues, or have their thermostat set to an incompatible mode (e.g., set to off or cool mode in the winter). However, the evaluation team notes that savings may exist for customers who opt out of events in cases where they participated for at least a portion of the event. Savings for customers who opt out during an event are included in our evaluation results.

This is discussed further in the Participant Counts subsection of the Impact Evaluation Findings section.

Event Period Definition

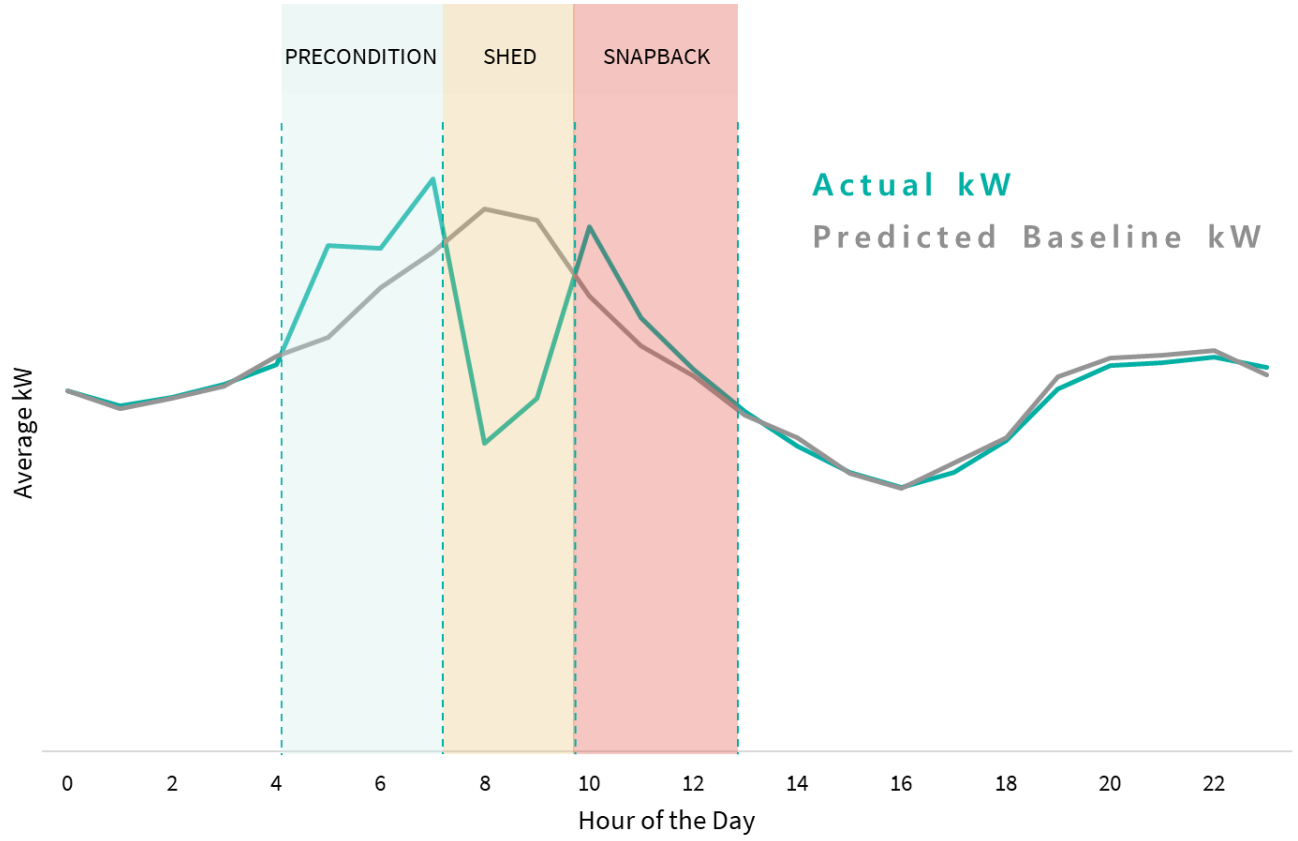
The evaluation team analyzed three periods during the DR event: 1) preconditioning, 2) shed, and 3) snapback. Preconditioning is the period just before demand is curtailed when the algorithm sets the thermostat to pre-cool or pre-heat. Shed is when the algorithm sets the thermostat to reduce usage. This is the period that is analyzed to evaluate the program level savings. Snapback occurs immediately after the shed period has ended, when the thermostat returns to its originally scheduled temperature setting.

In most cases, this results in HVAC systems cycling on to compensate for the event and creates an increase in load for participating customers. These three periods are visually clear in observed usage data patterns (Figure 89). Compared to the predicted baseline (or counterfactual), observed usage during preconditioning

[46] Georgia Power stopped offering incentives through the Online Marketplace channel in November 2020.

will typically show an increase in usage, during shed there are clear savings, and during snapback there is an increase in usage.

Figure 89. 2023 Event Period Definitions and Example Actual and Baseline Usage



Description of Data Received

The team collected three files with information on *ex-ante* savings and participation rates for this evaluation: a year-end report, event-day enrollment data, and event summaries. We used these files, in conjunction with the participating customers' AMI data, weather data, and survey responses, to evaluate the program. Table 110. 2023 Description of Information Received, describes the types of information we received, the provider, and a description of the information. We refer to these sources throughout this report.

Table 110. 2023 Description of Information Received

INFORMATION SOURCE	PROVIDER	DESCRIPTION
Georgia Power Q42023 PSC Report	Georgia Power	Year-end reported savings/impact
Enrollment Data	Georgia Power	Seven files provide customer characteristics for all enrollees and enrollment status on each event day
Event Summaries	Implementer	Event-level savings and participation counts provided by the implementer

Appendix 3C. Temp✓ Impact Analysis Methodology

The evaluation team estimated the demand reduction achieved during the DR events using hourly AMI data for participating homes. We conducted the impact analysis through data cleaning and preparation, identifying baseline or counterfactual days, and regression modeling. We describe each activity in detail below.

In addition to estimated peak demand reduction during the event period, the team also estimated the overall "event-related" impact on energy use, defined as the overall energy impact in the preconditioning, shed, and snapback periods together.

Data Cleaning and Preparation

The evaluation team collected and prepared data from Georgia Power, the implementer, and publicly available weather data. The evaluation team retrieved the AMI data from Georgia Power's EIX API as hourly, interval values. We compared regression results with minimum filtering to those with additional cleaning, which corroborated the findings presented in this report. Georgia Power provided event-day enrollment data, which included customer identifiers (e.g., premise number), thermostat brand, enrollment date, and removal date. The implementer provided data on the event details (e.g., event start and stop times), and summary data on connectivity and opt outs for each event. Lastly, we identified the nearest weather stations for each enrolled customer and downloaded historical weather from two weeks prior to two weeks following the evaluated events.

Baseline Days

The evaluation team used historical weather data to find three baseline days for each event. We identified baseline days as three weekdays within two weeks of the event with the least average absolute difference in hourly temperature to the event day, while excluding other event days and holidays. We used the baseline days to control differences in usage due to factors outside of the program in the regression model. The evaluation team assessed the reasonableness of the matches of the baseline days, reviewing weather and comparing the usage between these days (Figure 90 and Figure 91).

Figure 90. 2023 Usage on Winter Event and Comparison Days

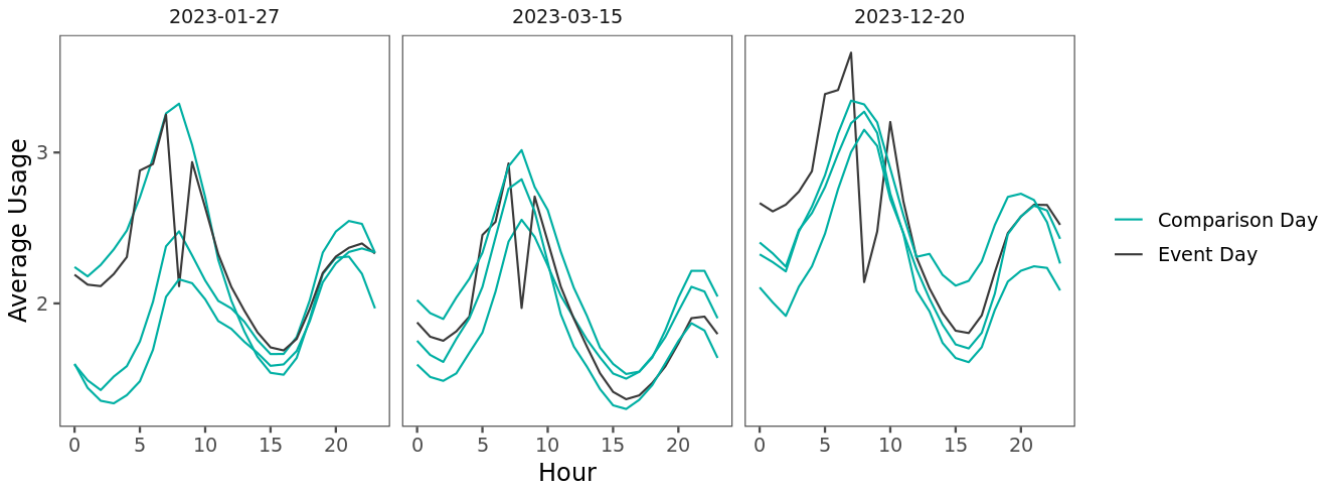
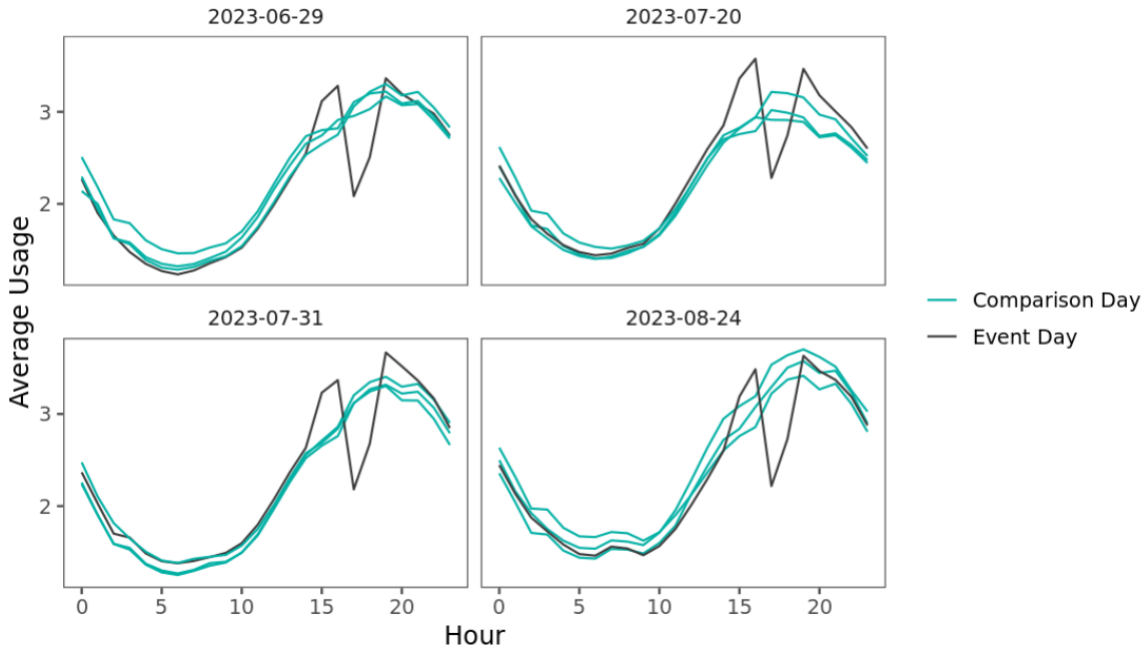


Figure 91. 2023 Usage on Summer Event and Comparison Days



Regression Specification

The evaluation team used data from the participants on the selected non-event days and event days in a linear fixed effects regression model to estimate a treatment effect for each event period. The final model specification included terms that account for weather (as heating degree hours with a base temperature of 65°F and cooling degree hours with a base of 70°F) and time of day. We estimated peak demand reduction and energy savings during an event day by including variables in the model to identify treatment (i.e., taking the value of one for days, hours, and sites where treatment occurred and zero otherwise).

The evaluation team followed our typical process for consumption analysis evaluation, by implementing different models for each of the following:

- **Primary Evaluation Model:** a regression that best aligns with typical evaluation analysis.
- **Robustness Checks:** multiple regressions with minor changes to the model specification to provide an indication as to the sensitivity of the results.
- **Exploratory Analysis:** multiple regressions where impacts are separated by various characteristics (e.g., event-level results and results by thermostat brand).

For this evaluation, we used the model specification in the equation below as the primary evaluation model. This model provides all hourly impacts. We chose this model as the primary evaluation model because it aligned with all other results, yielded statistical significance even at this granular-level, and provided additional flexibility for understanding preconditioning and snapback.

$$kW_{i,h,d} = \alpha_i + \beta_1 * Trt.Day_d + \beta_2 * HDH.65_{i,h,d} + \beta_3 * CDH.70_{i,h,d} +$$

$$\beta_{4,h} * Trt.Day_d * Event.Hour_i + \beta_{5,h} * Trt.Day_d * Pre.Hour_i + \beta_6 Trt.Day_d * Snap.Hour_i + \varepsilon$$

Where:

$kW_{i,h,d}$	= Hourly demand for site *i* at hour *h* during day *d*.
α_i	= Site fixed effect for site *i*. This field captures site specific conditions that do not vary over time.
Hr_h	= Hourly dummy variables for hours 1 – 24, where for example Hr_1 takes a value of 1 for observations where the hour is 1 and 0 otherwise.
$Trt.Day_d$	= Dummy variable for days where shed was delivered, where this field takes a value of 1 during days where the shed signal was sent and 0 otherwise.
$HDH.65$	= Heating degree hours at base 65°F for site *i* at hour *h* during day *d*.
$CDH.70$	= Cooling degree hours at base 70°F for site *i* at hour *h* during day *d*.
$Event.Hour_i$	= Event hour dummy variable, where this field takes a value of 1 for hours during an event and 0 for all other hours.
$Pre.Hour_i$	= Pre-conditioning hour dummy variable, where this field takes a value of 1 for hours during pre-conditioning and 0 for all other hours.
$Snap.Hour_i$	= Snapback hour dummy variable, where this field takes a value of 1 for the snapback hours after an event and 0 for all other hours.

Robustness Checks

To understand the robustness of these results, the evaluation team estimated program impacts for eight alternate and reasonable model specifications. We used similar model specifications to the primary

evaluation model as robustness checks. These models are used at both the event-specific level and when estimating savings across all events.

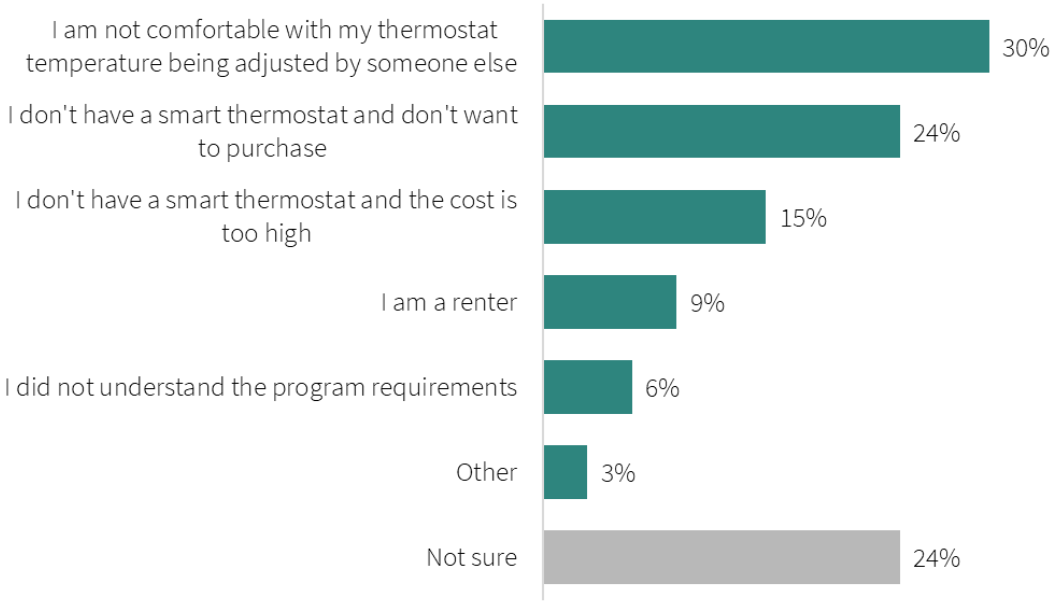
Appendix 3D. Additional Survey Findings

This section details additional findings from the participant survey analysis.

Program Awareness and Marketing

In the general population survey, 11% of respondents had heard of the Temp✓ program. Of those respondents that had heard of the Temp✓ program, they primarily heard about it from the Georgia Power Website (45%) or email (32%). Thirteen percent (n=5) of these respondents said they had enrolled. Of those that chose not to enroll (n=33), 30% (n=10) said they were not comfortable with someone controlling their thermostat, as seen below in Figure 92.

Figure 92: 2023 General Population Respondent Reasons for Not Enrolling in Temp✓ (n=33)



Source: General Population Survey. B4. Why did you not enroll?

Participation Drivers

When asked if the program works as respondents originally expected, 82% reported that the program worked as originally expected, and 19% reported that it did not work as they originally expected, or they were not sure. Of the 19% of respondents that reported the program did not work as they originally expected (or they were not sure), five respondents reported their bill was higher after enrolling in the program, and five reported their home was more uncomfortable than they thought it would be. While this is lower than the previous evaluation where 24% reported that the program did not work as they originally expected or were not sure, it is still likely that participants may need additional or clearer information on how the program works either in marketing materials or during the enrollment process.

Demand Response Event Experience

Before asking about event experience, the evaluation team wanted to know if respondents remembered recent events. Just 10% (n=55) of respondents did not remember an event occurring since June 1. Of respondents that recalled an event happening recently, the majority found out that an event was happening through an email (80%). Other ways that respondents found out about the most recent event was from a notification on their thermostat's phone app (24%) or a notification from their thermostat (21%). Respondents that had Nest thermostats were more likely to receive a notification through their thermostat ($p<0.01$) or on their thermostat ($p=0.01$) compared to Emerson and ecobee respondents. Those that had Emerson thermostats were more likely to have found out about an event through email ($p=0.01$).

About half of respondents (46%) were home for the whole event, and about one third (32%) were home for part of the event. Almost all (97%) of these respondents said their thermostat was on and working properly. While we asked about issues respondents had with their thermostat, since most respondents reported having working thermostats, we cannot speak to the experiences of those that did not have working thermostats. Two people that said their thermostat was not on for the event reported because they had no power.

We asked respondents what actions they took during the event that could affect energy usage. The top three actions respondents took during the event were avoiding running the dishwasher (28%), avoiding doing laundry (27%), and turning off lights (25%). During the summer event, 57% of respondents reported using a fan.

Perceived Effect on Home Comfort and Routines

Just 13% of respondents reported that someone in their home experienced negative effects because of the event, but about one quarter (25%) reported that their home was uncomfortable compared to the days before and after the event. Summer respondents who reported they were uncomfortable during the event primarily reported they were too hot (71%), followed by the humidity being high (23%). Winter respondents primarily reported they were too cold (49%), but also reported they were too hot (34%), indicating that some respondents may have been remembering the most recent summer event rather than the winter event after which the survey was fielded. Respondents may have also been uncomfortable with how much their home was pre-warmed. Despite these reports of discomfort, just 6% of respondents overall said that their daily routines were affected by the event.

Appendix 3E. Survey Demographics

This section outlines the demographics of survey respondents.

Survey respondents were mostly homeowners (90%) in single-family homes (84%). Most homes were heated by heat pumps (53%) or furnaces (32%) and were heated primarily using electricity (79%). Almost all (95%) had central air conditioning.

About half (48%) made more than $100,000 and about two thirds (64%) were college graduates or had a graduate degree, which is higher than the general population survey where 56% reported the same. A little over half were part of Generation X (1965-1980) or older (60%).

More than half of the survey respondents (57%) were younger than 50 years old. Slightly less than two-thirds of survey respondents (60%) were -White, 18% were Black, 6% were Hispanic, Latino or Spanish origin, and 5% were Asian. This aligned somewhat with the general population of Georgia: 59% White, 33% Black, 11% Hispanic, and 5% Asian. Table 111 displays the survey respondents' age, income, and ethnicity compared to the average or median resident of Georgia.[47] The average age of survey respondents was higher than the median age of Georgia residents.

Table 111. 2023 Respondent Demographics Compared to State of Georgia

CATEGORY	SURVEY	GEORGIA
Age	22% are 60 and older	15% are 65 and older
Income	63% make at least $75k	Median income is $71,355
Ethnicity	60% are White	59% of population is White

Table 112 provides the full demographic breakdown of the Temp✓ Program survey respondents.

Table 112. 2023 Temp✓ Survey Demographic Data

VARIABLE	PROPORTION
HOUSEHOLD INCOME	
Less than $25,000	4%
$25,000 to less than $50,000	9%
$50,000 to less than $75,000	14%
$75,000 to less than $100,000	18%
$100,000 to less than $150,000	25%
$150,000 to less than $200,000	16%

[47] United States Census Bureau. (2023). Quick Facts Georgia. Retrieved from United States Census Bureau Quick Facts: https://www.census.gov/quickfacts/GA

VARIABLE	PROPORTION
$200,000 or over	14%
AGE	
Silent Generation (1928-1945):	1%
Baby Boomers (1946-1964)	22%
Generation X (1965-1980)	37%
Millennial (1981-1996)	36%
Generation Z (1997-2010)	2%
EDUCATION	
Some high school or less	1%
High school graduate or equivalent	6%
Some college, no degree	12%
Technical college degree or certificate	6%
Two-year college degree	7%
Four-year college degree	35%
Graduate or professional degree	29%
RACE/ETHNICITY	
American Indian or Alaska Native	2%
Asian	5%
Black or African American	18%
Hispanic, Latino, or Spanish origin	6%
Native Hawaiian or Other Pacific Islander	0%
Middle Eastern or North African	1%
White	60%
Some other race, ethnicity, or origin	1%
OWNERSHIP STATUS	
Own	90%
Rent	9%
HOUSE TYPE	
Single-Family	84%
Multifamily	11%
Duplex (2 units)	2%
Manufactured home	2%
HOME TENURE	
3 years or less	36%

VARIABLE	PROPORTION
4 - 10 years	38%
More than 10 years	26%
HOUSING AGE	
Before 1980	21%
After 1980	76%
HOUSEHOLD SIZE	
1 person	18%
2 people	37%
3 people	17%
4 people	17%
5+ people	9%

4. APPENDIX – SPECIALTY LIGHTING

Appendix 4A. Detailed Study Methodology for Specialty Lighting Program Evaluation

The Specialty Lighting program evaluation sought to address the following process and impact evaluation research questions:

Process Evaluation Questions

- How does the program adjust to the EISA backstop effective mid-2023?
- How have program changes affected program delivery?
- Are there lessons-learned from the program's shift to income-qualified channels that could be applied to other programs or measures to better serve that market?
- Are customers who use the Online Marketplace satisfied with their experience? How did they learn about the program and what influenced their decisions to purchase lighting on the Online Marketplace?

Impact Evaluation Questions

- Are the per-unit gross savings assumptions accurate? If not, how, and why should they be adjusted?
- What impact is the EISA backstop having on inefficient lighting availability in the market?
- What are the evaluated savings for the program given the EISA backstop mid-2023?
- What EISA-exempt lighting measures can the program continue to offer? What is the magnitude of savings for EISA-exempt measures that can continue to be incentivized post-EISA backstop?
- How did the program perform against participation and savings goals?
- Was the program, as implemented, cost-effective according to the TRC test?
- Are there other high efficiency lighting products that should be added to this program to get deeper savings?

Activities employed to address these questions are detailed below in two sections: Data Collection Approach (which addresses process and impact evaluation activities) and Impact Evaluation Approach.

Data Collection Approach

This section presents the data collection the evaluation team completed to answer the process evaluation research questions listed above. The process evaluation primarily leveraged the survey completed for the Online Marketplace and General Population survey.

The evaluation team, in collaboration with MDC Research, fielded a survey in October 2023 to customers that purchased products through the Online Marketplace. This survey included only customers that had purchased lighting, EV chargers, APSs, or thermostats in 2023; findings related to EV chargers, APSs and thermostats can be found in Chapter 4. Home Energy Improvement Program – Online Marketplace. MDC Research fielded the survey as mixed mode web and phone survey and respondents were entered into a sweepstakes to win one of five $100 Visa gift cards. Respondents received an email invitation and could complete the survey on a phone, tablet, or computer. MDC Research followed up with non-respondents by phone to increase response rates.

The evaluation team received a total of 350 survey responses to the Online Marketplace survey, and 90 of those had purchased lighting products. The simple response rate for this survey was 10%.

The evaluation team also fielded a general population survey in October 2023 to address research questions across all residential programs. Additional details on the general population survey approach can be found in Appendix 4C. Additional Survey Findings.

Impact Evaluation Approach

This section details each step of the impact evaluation.

Verified Gross Savings Approach

The verified gross savings analysis for the Residential Specialty Lighting Program relied largely on a desk review of savings calculations and the underlying parameters that fed into the calculations. Savings algorithms and key impact factors are discussed below with additional detail located in .

Table 113.

The high-level energy savings calculation for calculating savings from efficient lighting is as follows:

$$Savings = (Baseline\ Wattage - Efficient\ Wattage) * Annual\ Hours\ of\ Use$$

For LED lightbulbs provided through Georgia Power's Specialty Lighting Program, the efficient wattages were known with certainty. However, due to the nature of the program, baseline wattages were not known, nor were annual hours of use. Thus, estimating savings required making assumptions about baseline wattages and hours of use. Additionally, the savings calculation accounts for:

- **Cross-sector sales.** Some program-supported bulbs are installed in commercial sockets rather than residential sockets. This is important because hours of use tend to be higher in commercial sockets.
- **ISRs.** Some program-supported bulbs end up in storage rather than in a light socket. Bulbs in storage do not produce any energy savings. In this context, an ISR represents the percentage of bulbs that end up in sockets within a given timeframe.
- **Interactive effects.** LEDs produce less waste heat than inefficient bulbs. This reduces air conditioning loads in the summer (less heat to reject) and increases heating loads in the winter.

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Table 113 shows the specific savings calculations used for energy and peak demand savings. Notably, there are separate formulas for residential sector sockets and commercial sector sockets. We assumed that all bulbs distributed through food banks and LEDs sold through the Online Marketplace were installed in residential sockets. For retail bulbs, we calculated savings under both residential and commercial operating parameters, and then took a weighted average of the resulting savings values using a cross-sector sales rate (6.2%) established in the prior evaluation. The cross-sector sales rate, as well as all other key impact factors, is discussed briefly in Table 114.

Table 113. 2023 Savings Algorithms

METRIC	SECTOR	ALGORITHM
Energy Savings	Residential	$kWh = Qty * \frac{Watts_{Baseline} - Watts_{Efficient}}{1{,}000} * HOU_R * 365.25 * ISR * HVAC_E$
	Commercial	$kWh = Qty * \frac{Watts_{Baseline} - Watts_{Efficient}}{1{,}000} * HOU_C * 365.25 * ISR * HVAC_E$
Summer Peak Demand Savings	Residential	$kW = kWh * ETDF_S * HVAC_{D_S}$
	Commercial	$kW = Qty * \frac{Watts_{Baseline} - Watts_{Efficient}}{1{,}000} * ISR * HVAC_{D_S} * CF_S$
Winter Peak Demand Savings	Residential	$kW = kWh * ETDF_W * HVAC_{D_W}$
	Commercial	$kW = Qty * \frac{Watts_{Baseline} - Watts_{Efficient}}{1{,}000} * ISR * HVAC_{D_W} * CF_W$

LED bulbs with built-in daylight sensors were new to the Specialty Lighting Program in 2023. We assumed that these bulbs would be installed in exterior sockets and used an exterior hours of use assumption from the Illinois TRM v11 to replace the residential and commercial values.[48] We also removed HVAC interactive effects and zeroed out peak demand savings since these bulbs will only be on during the night.

[48] https://www.ilsag.info/wp-content/uploads/IL-TRM_Effective_010123_v11.0_Vol_3_Res_09222022_FINAL.pdf

Table 114. 2023 Key Impact Factors

IMPACT FACTOR	EVALUATION APPROACH	VALUE
$Watts_{Baseline}$	Conducted a review of the census of program-supported LEDs on the ENERGY STAR® Qualified Products List. Mapped LED products to appropriate baseline wattage using style, application, base, and lumen output.	Variable
$Watts_{Efficient}$	Pulled efficient wattages from the ENERGY STAR® Qualified Products List for all program-supported LEDs.	Variable
Cross-Sector Sales	Conducted a literature review of national cross-sector sales research. Calculated the average cross-sector sales rate across the reviewed studies. Assumed LEDs purchased through the Online Marketplace or distributed through food banks stay in the Residential sector. Used the value from the prior evaluation; this evaluation did not include primary data collection to update the value.	6.2%
Daily Hours of Use (HOU)	Used research from 2013 Georgia Power Light Meter Study and 2017 DSM Program Evaluation. Illinois TRM v11 for exterior lamps (daylight sensors)	HOU_R: 2.62 HOU_C: 9.57 HOU_E: 6.78
Summer and Winter Energy to Demand Factors (ETDF) and Coincidence Factors (CF)	For residential, employed the ETDF values used in the 2017 evaluation, which were drawn from the load shape of a large southeastern state utility. For commercial, used coincidence factors from recommendations Nexant provided Georgia Power as part of the 2017 evaluation.	$ETDF_S$: 0.0114% $ETDF_W$: 0.0172% CF_S: 57.4% CF_W: 43.1%
Interactive Effects (HVAC)	Our team performed interactive effects modeling in the prior evaluation cycle. These efforts are discussed in detail in Appendix 4B. Detailed Impact Methodology. We estimate separate factors for energy ($HVAC_E$) and summer/winter peak demand ($HVAC_{D_S}$ and $HVAC_{D_W}$).	$HVAC_E$: 0.98 $HVAC_{D_S}$: 1.175 $HVAC_{D_W}$: 0.849
ISR[a]	Reported ISRs from 2020 evaluation, which surveyed participants who purchased LEDs through the Online Marketplace.	GSL: 85.2% Specialty: 86.3%

Where: R=Residential, C=Commercial, S=Summer, W=Winter, D=Demand, and E=Electric Energy

[a] Used previous evaluation due to low response rates in this evaluation.

Net Savings Approach

The 2023 evaluation used NTG adjustment factors determined through benchmarking. Given the prospective nature of NTG and the reduction in lighting in Georgia Power's portfolio due to EISA, the evaluation team opted to complete benchmarking, which is far less costly than primary data collection, which may not have yielded greater accuracy.

This benchmarking task reviewed publicly available evaluation results to identify recent NTG values estimated and applied by utilities across the United States. The team collected the most recent data available to capture current market conditions most accurately for LEDs, using evaluation results that were applied to residential upstream lighting between 2021 and 2022. The team also attempted to identify utilities within regions like Georgia Power.

Ultimately, the evaluation team identified five utilities to include in the NTG analysis. Using these utilities, the team calculated NTG averages that reflect broad market acceptance of LEDs among all bulb styles. Using simple averages across these studies, we estimated a NTGR of 14% to be applied to all bulb types.

For reference, below are the NTG values reported in previous years. As can be seen, NTG decreased steadily over the years, and 14% is considerably lower than reported in 2020, further reflecting the market shift.

- 2017: 81.3%
- 2018: 70.3%
- 2019: 30.6%
- 2020: 25.5%

As part of this benchmarking analysis, we also determined that most peer utilities have already, or will soon be, phasing out residential lighting programs in their entirety, with GSL screw-based lighting no longer appearing as a major, or even minor, measure in their portfolios. While some direct install programs remain operational, replacing inefficient lamps when discovered in participating homes, upstream and online sales of LEDs are generally being eliminated as a source of program kWh and kW savings.

All the included studies reference a retail model where customers are deciding what to purchase. Food banks are different, as customers are not actively visiting the food banks to purchase LEDs; rather, they are being provided lighting at no cost. Therefore, the evaluation team believes bulbs distributed through the food bank channel should have a separate, and higher, NTG value.

We recommend applying a higher NTG value of 65% to foodbank distributions. Foodbank distributions are provided to IQ customers that were not seeking to purchase lighting at the time they were provided, much like direct installation programs. Further, we assume that given customers' limited income they would be less likely to actively seek more efficient or additional lighting, thereby warranting a higher NTG.

The 65% NTG reflects the lighting NTG value from the Manufactured Homes channel of the HEIP. We recommend this value for a few reasons:

- The Manufactured Homes evaluations measured NTG at the measure-level and calculated lighting-specific point estimates.[49]
- While not technically an IQ program, Manufactured Home participants tend to be lower income than customers that participate in the Whole Home or Individual Improvements HEIP pathways and more likely to reflect the decision-making of IQ qualifying customers.
- Manufactured homes are direct install and, like foodbanks, customers are not purposefully visiting a store to purchase the equipment.

The energy and demand savings for the Residential Specialty Lighting program reflect this combined NTG value, weighted by distribution channel (retail at 14%, Online Marketplace at 14%, and food banks at 65%).

Data Sources

Table 115 shows NTG information for the five studies included in the benchmarking effort. Data were chosen based on their recency, their applicability to the residential lamps incented by Georgia Power, the robustness of the research approach, and similarity to Georgia's retail market.

Table 115. 2023 List of Studies Used in NTG Benchmarking

ORGANIZATION	STATE	EVALUATION/ PROGRAM NAME	STUDY TYPE	RESEARCH TIME PERIOD	NTGR
EmPOWER Maryland Residential Lighting	MD	Residential Upstream Lighting	Apex national sales data model	2021-2022	17%
Wisconsin Focus on Energy - Retail Lighting	WI	Residential Upstream Lighting	Apex national sales data model	2021-2022	12%
Pennsylvania Power & Light Efficient Lighting	PA	Residential Upstream Lighting	Market sales data analysis; retailer interviews	2021-2022	14%
NJ Clean Energy	NJ	Residential Upstream Lighting	Regression model	2020-2022	11%
CPUC	CA	Residential Upstream Lighting	(NTGR varies by bulb type) online survey and lamp-based elasticity model	2019-2021	7% 12% 25%

[49] This NTGR is calculated for LED lightbulbs distributed through the Home Energy Improvement Program (HEIP) Manufactured Homes channel. See Chapter 4. Home Energy Improvement Program (HEIP)for additional details on this NTG calculation.

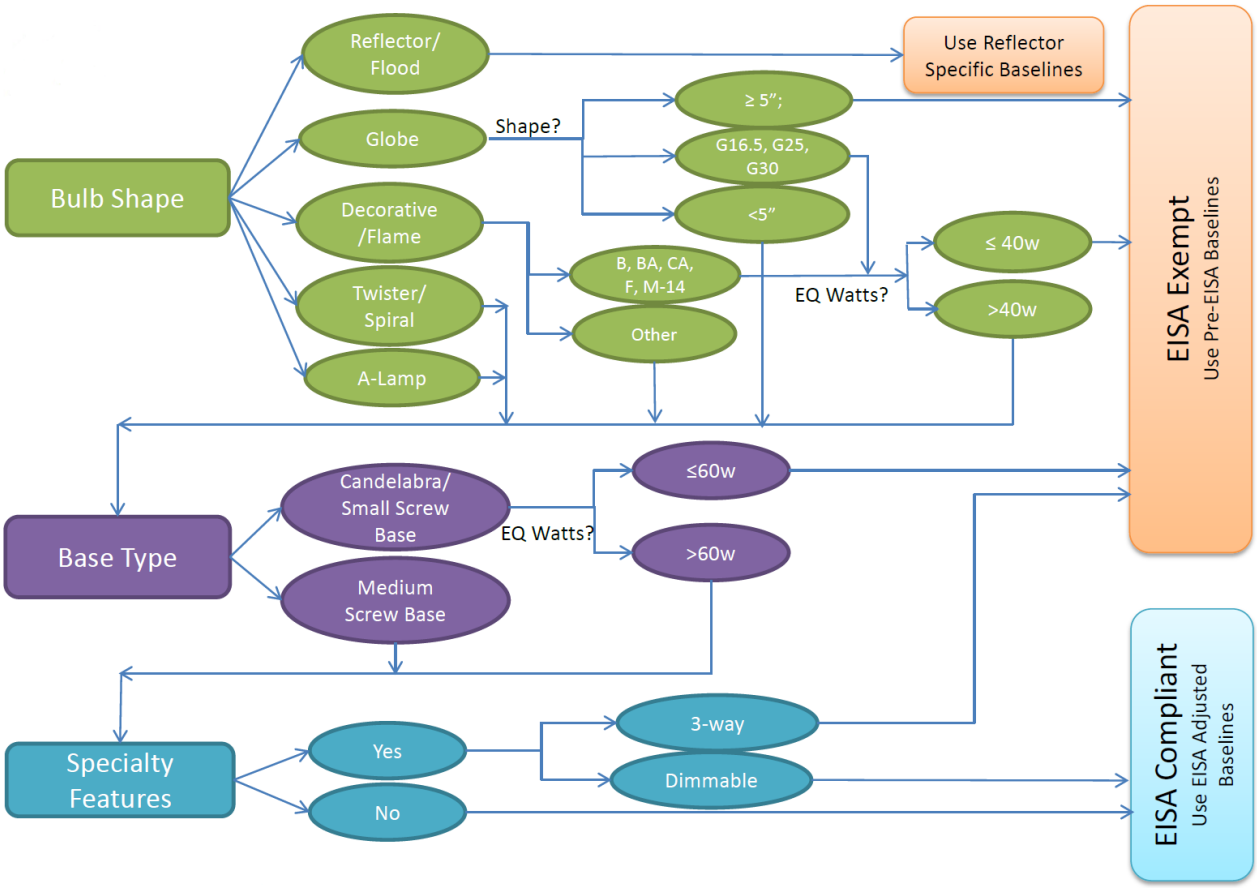
Appendix 4B. Detailed Impact Methodology

Verified Gross Savings

Baseline Wattage

A key component of the savings calculation is the delta between the wattage of the LED bulb and the federal standard baseline wattage of halogen/incandescent bulb (otherwise known as "delta Watts"). Figure 93 depicts how baseline wattages were assigned. Relevant factors in the mapping include bulb shape, equivalent wattage, and specialty features. For each bulb, we collected this information from the ENERGY STAR qualified products list.

Figure 93. Pre EISA Cutoff Baseline Wattage Map

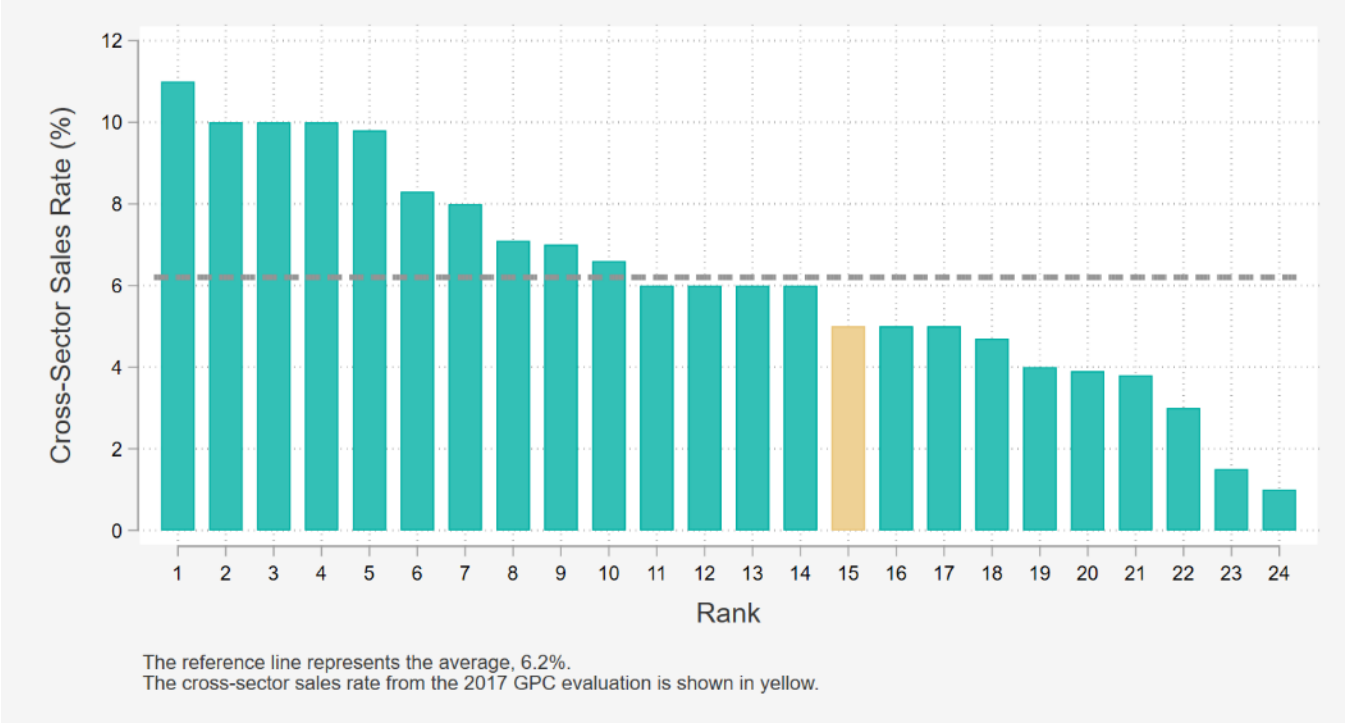


Cross-Sector Sales Rate

Our cross-sector sales assumption of 6.2% is the average cross-sector sales values published in twenty-four different studies, all of which relied on primary research to develop a cross-sector sales value. The studies cover multiple geographic regions in the research period of 2010 to 2019. The studies used several different measurement methods, including in-store intercept surveys and customer-facing surveys conducted after the lightbulbs were purchased via phone or internet. Several studies reported different values for different types of bulbs (e.g., specialty versus standard); for these studies, we use the weighted average of all bulbs sold. Finally, the values for three studies (covering the 2010 – 2013 period) were taken from a 2015 memo prepared by The Cadmus Group and NMR Group for the Massachusetts Program Administrators and Energy Efficiency Advisory Council.[50]

Figure 94 shows the distribution of cross-sector sales values across all 24 studies, with the 6.2% average value shown as a horizontal blue line. Table 116 shows the distribution of cross-sector sales values by study type. Finally, Table 117 provides the full list of studies used in our analysis.

Figure 94. Distribution of Cross-Sector Sales Values



[50] Available here: https://ma-eeac.org/wp-content/uploads/Residential-Lighting-Cross-Sector-Sales-Research-Memo.pdf.

Table 116. Distribution and Average Cross-Sector Sales Value by Study Type

SUB-SEGMENTS	AVERAGE	COUNT
Phone Survey	6.6%	5
Intercept Survey	6.0%	11
Multiple	7.1%	5
Mobile Device Survey	3.5%	2
Online Survey	7.1%	1
Average of All 24 Studies	**6.2%**	**24**

Table 117. List of Studies Used in Literature Review

ORGANIZATION	STATE	EVALUATION/ PROGRAM NAME	STUDY TYPE	RESEARCH TIME PERIOD	CROSS-SECTOR SALES RATE
PG&E	CA	Upstream and Residential Downstream Lighting Impact Evaluation Report	Multiple	2010-2012	7.0%
SCE	CA	Upstream and Residential Downstream Lighting Impact Evaluation Report	Multiple	2010-2012	6.0%
SDG&E	CA	Upstream and Residential Downstream Lighting Impact Evaluation Report	Multiple	2010-2012	6.0%
Efficiency Maine	ME	Residential Lighting Program	Phone Survey	2011	4.0%
PECO	PA	Residential Upstream Lighting Program	Intercept Survey	2016-2017	1.5%
PPL	PA	Residential Upstream Lighting Program	Phone Survey	2018-2019	6.0%
PPL	PA	Residential Upstream Lighting Program	Phone Survey	2016-2017	10.0%
Duquesne Light	PA	Residential Upstream Lighting Program	Intercept Survey	2017-2018	3.8%
FirstEnergy Companies	PA	Residential Upstream Lighting Program	Online Survey	2018-2019	7.1%
FirstEnergy Companies	PA	Residential Upstream Lighting Program	Phone Survey	2016-2017	8.3%
IL	IL	ENERGY STAR Compact Fluorescent Lamp	Intercept Survey	2014-2016	5.0%
Ameren	MO	Residential Upstream Lighting Program	Intercept Survey	2015	9.8%
PSE	WA	Residential Lighting Market Characterization Study	Intercept Survey	2015	8.0%

ORGANIZATION	STATE	EVALUATION/ PROGRAM NAME	STUDY TYPE	RESEARCH TIME PERIOD	CROSS-SECTOR SALES RATE
WI Focus on Energy	WI	Retail Lighting and Appliance Program	Multiple	2014-2015	6.6%
PacifiCorp (RMP)	UT	Utah Home Energy Savings Program Evaluation	Intercept Survey	2013-2014	3.9%
MA EEAC	MA	Lighting Decision Making	Mobile device survey	2016-2017	6.0%
MA EEAC	NY	Lighting Decision Making	Mobile device survey	2016-2018	1.0%
DC SEU	DC	District of Columbia FY2013 Annual Evaluation Report	Intercept Survey, Phone Survey Follow-Up	2013	10.0%
Duke	NC	Energy-Efficient Lighting Program	Intercept Survey	2011-2012	10.0%
Consumers Energy	MI	Residential Lighting Program	Phone Survey	2013	4.7%
Midwest Utility	MO	Upstream Lighting Program	Intercept Survey	2010	3.0%
EmPOWER	MD	Residential Lighting and Appliance Program	Intercept Survey	2011	5.0%
Midwest Utility	MO	Upstream Lighting Program	Intercept Survey	2013	11.0%
Georgia Power	GA	Residential Specialty Lighting Program	Intercept Survey	2017	5.0%

Interactive Effects

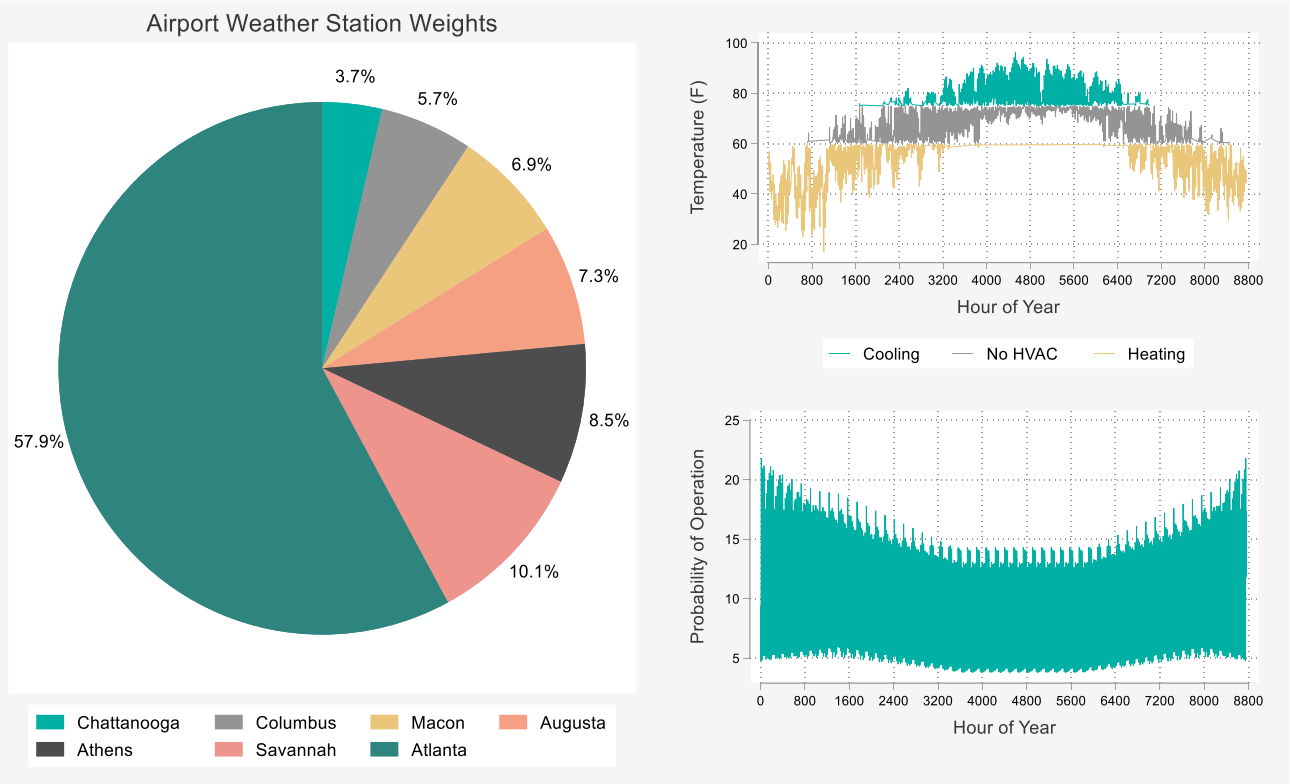
The premise behind interactive effects modeling is relatively straightforward. Lightbulbs emit heat as a byproduct. LEDs produce far less waste heat than halogen and incandescent lamps. When replacing an inefficient bulb with an efficient one, the change in waste heat affects HVAC loads for lamps in conditioned spaces. In the summer, air conditioning load is reduced because there is less waste heat to reject. In the winter, the heating system must make up for the heat not supplied by lightbulbs. "Interactive effects" account for the interaction between lighting waste heat and HVAC loads and are included as multipliers in savings algorithms.

To estimate the interactive effects multipliers, we relied on four key data sources:

- Population-weighted normalized weather. We downloaded TMY3 hourly weather data from seven different weather stations across Georgia. A weighted average weather file was calculated using the populations of the cities from which the weather data was pulled. Figure 95 shows the city weights and the annual weather profile.

- 8760 Residential Lighting Profile from GDS Associates Pennsylvania logger study (scaled to 2.62 hours/day). This 8760-load shape represents the expected diversified "on" time for each hour of the year.
- Georgia Power Residential Appliance Saturation Survey (2017). With this data, we estimated the percentage of residential premises with electric heat and the percentage of premises with air conditioning.
- Georgia Power Lighting Logger Report (2013). With this data, we estimated what percentage of residential lightbulbs in Georgia are in air-conditioned spaces.

Figure 95. City Weights and Hourly Temperature Profile



There are four key components to the interactive effects modeling framework. These components are:

- **Internal Gain Contribution:** What % of waste heat remains in the building envelope?
- **Concurrency:** Are the lights and HVAC systems operating at the same time?
- **Applicability:** Are lights installed in conditioned spaces?
- **Efficiency:** What is the change in kW associated with waste heat in conditioned spaces?

To estimate the interactive effects multipliers, we first calculated the waste heat associated with the efficient bulb change in each hour of the year. Next, we calculated the effect on the HVAC system, considering the fuel mix and efficiency of heating and cooling systems. Table 118 provides a full list of parameter assumptions. Finally, we applied the effects only in hours when heating or cooling systems were operating.

Table 118. Interactive Effects Parameter Assumptions

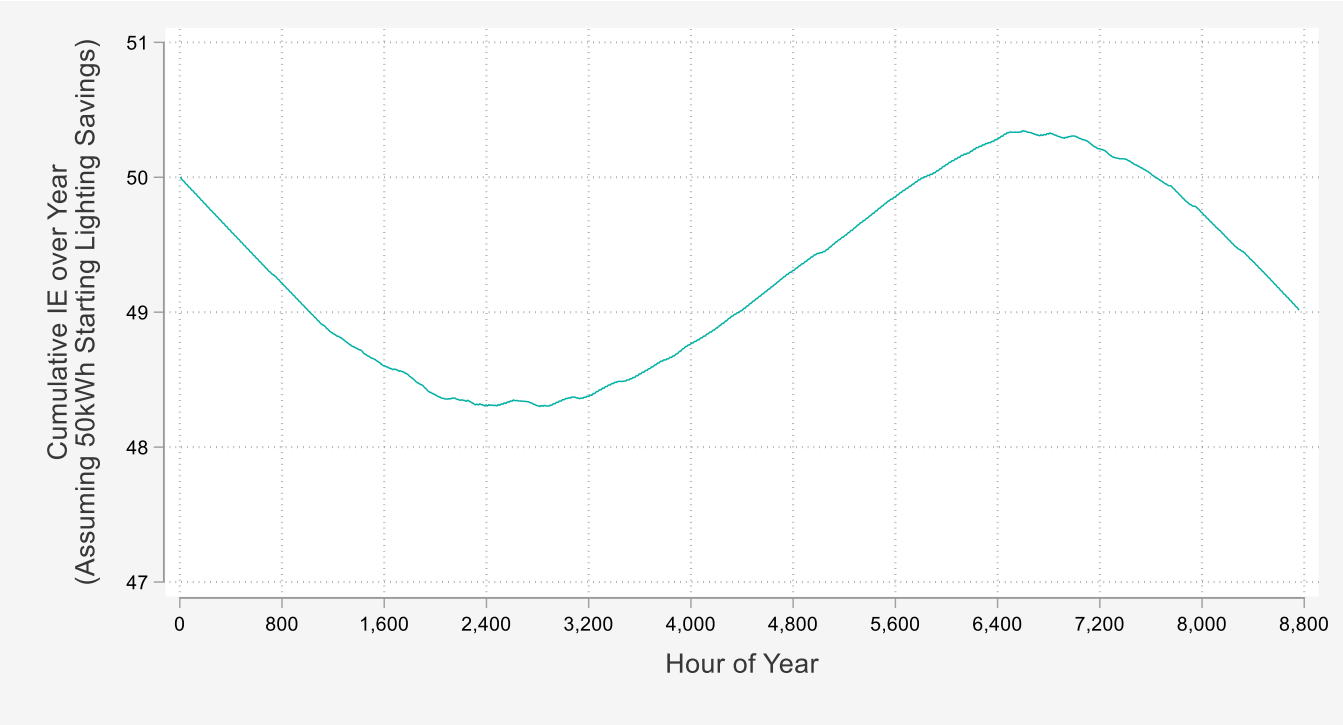
PARAMETER	VALUE	SOURCE	APPLIES TO
% of Heat Remaining in Envelope	60%	Assumption	Internal Gain Contribution
% Electric Heat	54% (23% Heat Pump, 31% Electric, 46% Gas)	Georgia Power RASS p62	Efficiency
% of Bulbs in Conditioned Spaces	86.4%	Lighting Logger Report (Table 3-4)	Applicability
% of Buildings with AC	99%	Georgia Power RASS p73	Applicability
Efficiency of Heating Systems	300% HP 100% Electric Furnace 80% Gas	Assumption	Efficiency
Efficiency of Cooling Systems	300% HP 293% Electric AC (SEER 10)	Assumption	Efficiency
Heating and Cooling Periods	Heating: Temp < 60F Cooling: Temp > 75F	Assumption	Concurrency
Peak Periods	Winter: HE9 January weekdays Summer: HE17, July weekdays	Georgia Power Peak Definition	Concurrency

The modeled multipliers are as follows:

- **Annual Energy Savings:** 0.980
- **Cooling Demand:** 1.175
- **Heating Demand:** 0.849

Figure 96 shows the cumulative interactive effect over the course of one year for a hypothetical bulb that saves 50 kWh. In the first portion of the year (winter), the HVAC system needs to do extra work to make up for the lost waste heat. As summer settles in, the HVAC system does less work, as there is less waste heat to reject. Upon the return of winter, the HVAC system again needs to do extra work. After one full year, we estimated this hypothetical bulb will save 49 kWh rather than 50 kWh due to HVAC interactions.

Figure 96. Cumulative Interactive Effects over the Year



In-Service Rate

The evaluation team leveraged primary data collection completed in 2020 to calculate ISR due to a low response rate in the 2023 survey.

To estimate ISR, we conducted a web survey of Georgia Power customers who purchased standard or specialty lighting from the Online Marketplace between January and September 2020. Globes, candelabras, and reflectors were grouped together under the "specialty lighting" bin. A total of 254 customers completed the survey (84 who purchased only standard lighting, 84 who purchased only specialty lighting, and 86 who purchased both types of lighting).

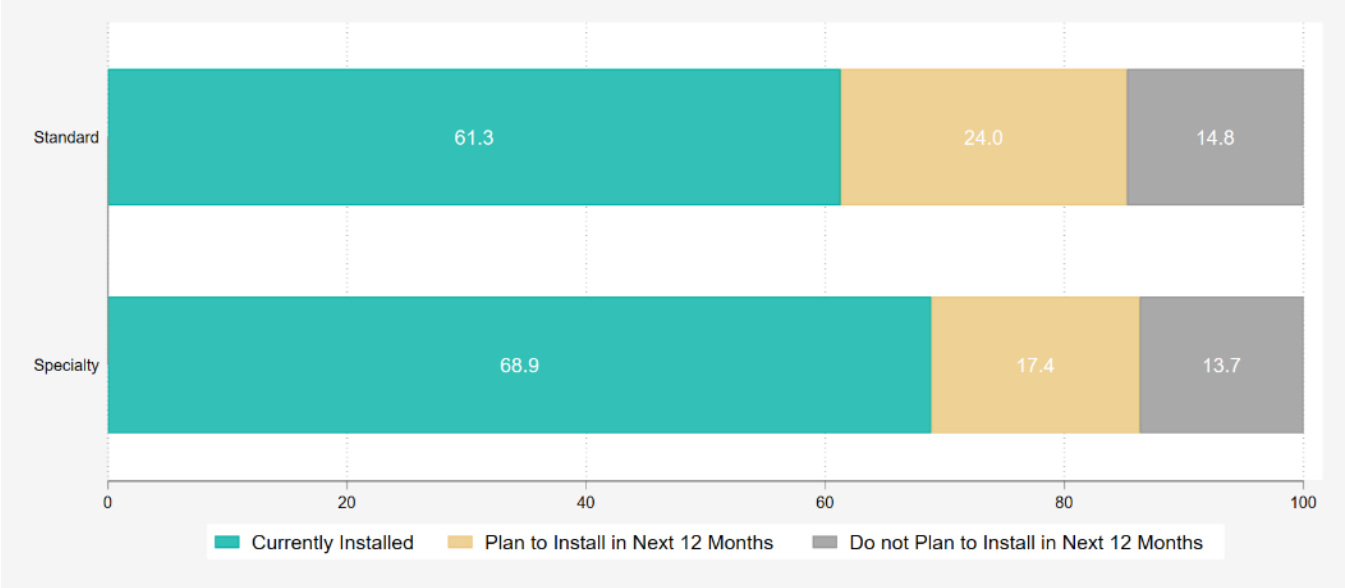
Based on survey responses, we categorized lightbulb purchases into one of three buckets: currently installed, will be installed in the next 12 months, and will not be installed in the next 12 months. Table 119 shows the distribution of bulbs into these three bins. Figure 97 shows the relative shares of each bin. The ISR combines the "installed" and "plan to install" bins and divides by the total number of bulbs purchased.

Table 119. 2023 Distribution of Lighting Purchases by Installation Bin and Bulb Type

CATEGORY	STANDARD	SPECIALTY + REFLECTOR
Number Installed	872	810
Plan to Install in Next 12 Months	341	205
Do not Plan to Install in Next 12 Months	210	161
Total	1,423	1,176

CATEGORY	STANDARD	SPECIALTY + REFLECTOR
ISR	**85.2%**	**86.3%**

Figure 97. Relative Shares by Installation Bin and Bulb Type



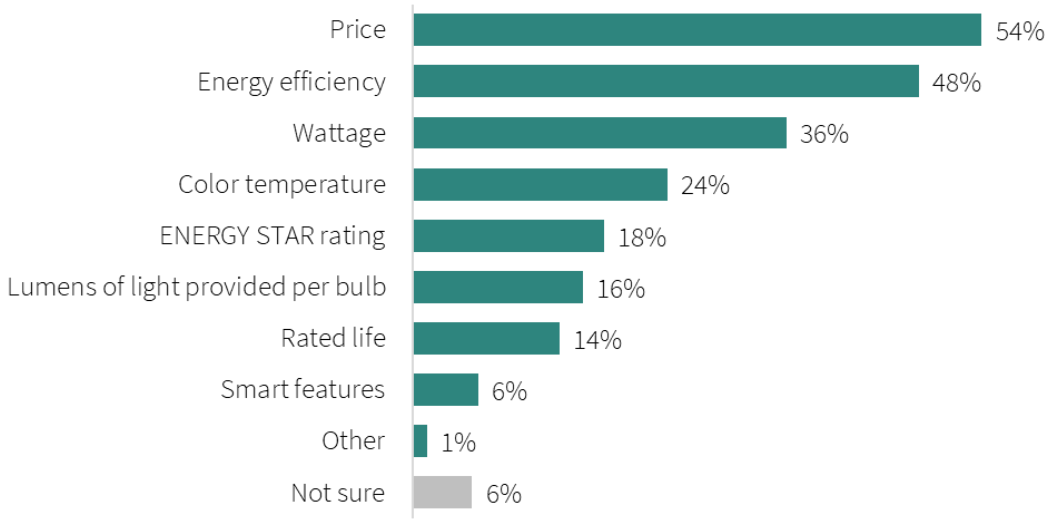
Appendix 4C. Additional Survey Findings

This section details additional findings from the participant and general population survey analysis.

General Population Lighting

As part of the general population survey, the evaluation team asked respondents what factors influence their decision to purchase lighting. Price (54%) and energy efficiency (48%) were the most common responses, with others displayed below in Figure 98.

Figure 98: 2023 Important Factors Towards Deciding Which Lightbulbs to Buy (n=350)



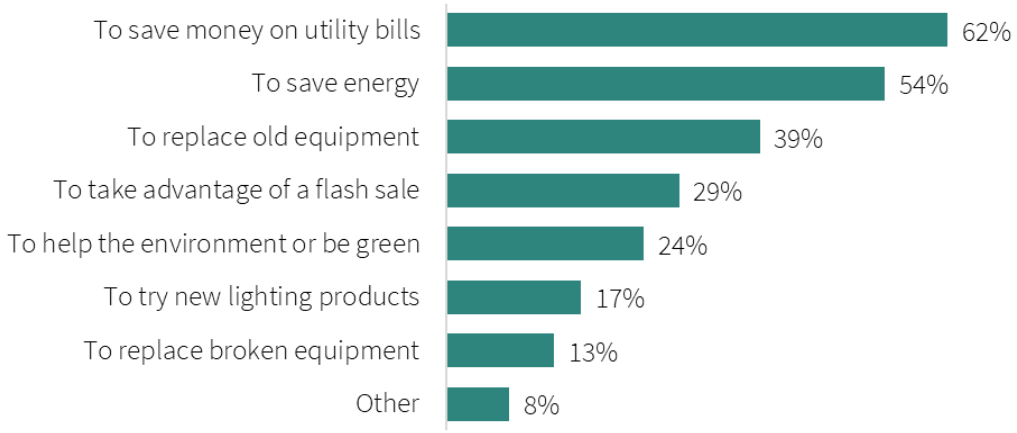
Source: General Population survey. D32. Which of the following factors are important in your decision of which lightbulbs to buy for your home? Please select up to 3 options. Multiple responses allowed so percents may not add to 100%.

Smart features were not a priority to respondents, with just 6% reporting that it was an important factor in their decision to buy lightbulbs.

Motivations to Use the Online Marketplace

Most respondents that bought lighting were motivated to purchase energy-efficient lighting products at the time they did to save money on utility bills (62%), to save energy (54%) and to replace old equipment (39%). Figure 99 below summarizes these responses.

Figure 99. 2023 Reasons for Purchasing from Online Marketplace (n=90)

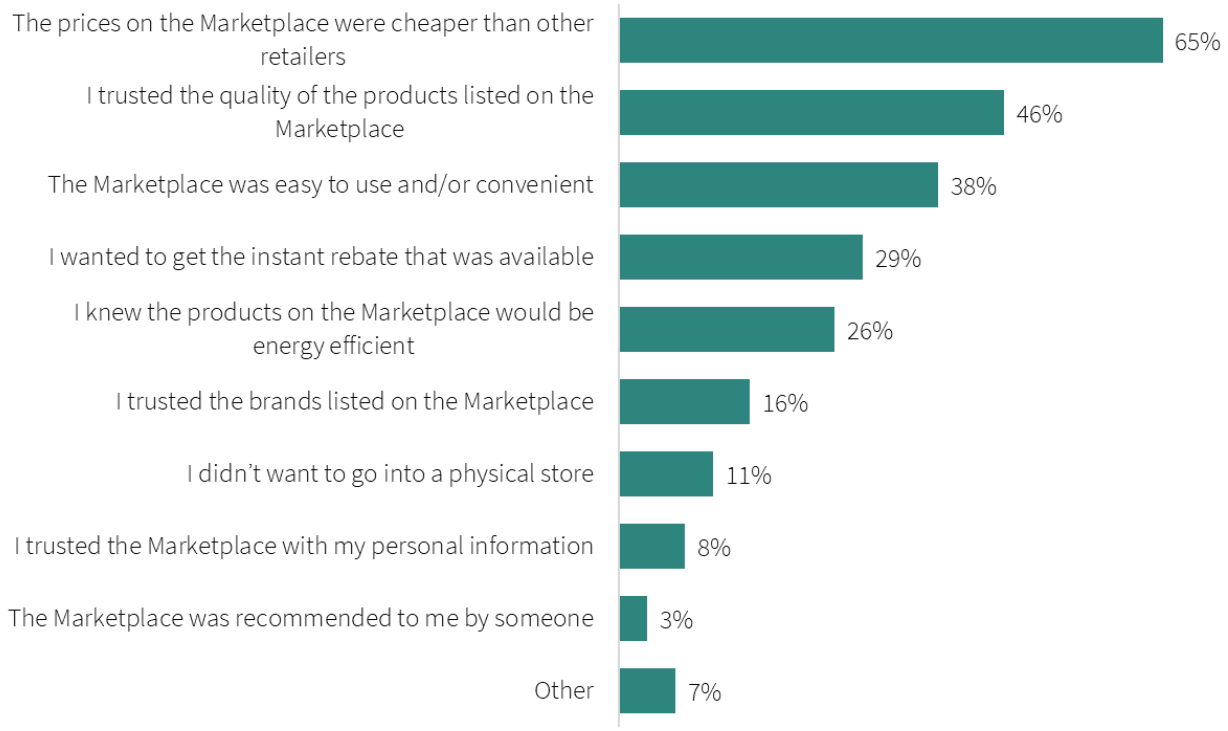


Source: Online Marketplace customer survey. D1. Why did you decide to buy energy-efficient lighting products at the time you did? Multiple responses allowed so percents may not add to 100%.

Like the previous evaluation of this program, the main reason that respondents chose to buy lighting products from the Online Marketplace instead of another retailer is because the prices on the Online Marketplace were cheaper than other retailers (65%).

Trust in the quality of products increased from 38% last evaluation cycle to 46% this evaluation cycle, but the fact that the Online Marketplace was easy to use and/or convenient fell from 54% to 38%. However, all but one respondent reported they would use the Online Marketplace again in the future, indicating this is not a significant issue impacting customer behavior. When asked to rate how easy it was to the Online Marketplace to buy products, 86% reported that it was “very easy”. Respondent reasons for purchasing from the Online Marketplace are below in Figure 100.

Figure 100: 2023 Reasons for Purchasing from Online Marketplace Instead of Another Retailer (n=89)



Source: Online Marketplace customer survey. D2. Why did you decide to buy lighting products from the Georgia Power Marketplace instead of another retailer? Multiple responses allowed so percents may not add to 100%.

5. APPENDIX - HEIP

Appendix 5A. Survey Demographics

Below is a detailed table of the survey respondent demographics. Table 120 includes characteristics of respondents' homes and Table 121 details respondent demographics.

Table 120. 2023 Home Characteristics

HOME CHARACTERISTICS		PERCENT
Rent or own home	Rent	17%
	Own	83%
	Total respondents (n)	185
Type of home	Single-family	67%
	Manufactured Home	29%
	Multifamily	2%
	Duplex	2%
	Total respondents (n)	172
Heating fuel	Electricity	63%
	Natural gas	34%
	Propane	2%
	Wood	1%
	Total respondents (n)	167
Primary Water Heater Fuel	Electricity	65%
	Natural gas	33%
	Propane	1%
	Wood	1%
	Total respondents (n)	159
Number of years lived in home	One year or less	23%
	2 – 3 years	32%
	4 – 5 years	11%
	6 – 10 years	13%
	More than 10 years	22%
	Total respondents (n)	173
Year home was built	Before 1900	2%
	1900 to 1939	10%
	1940 to 1959	8%
	1960 to 1979	26%
	1980 to 1989	16%
	1990 to 1999	13%
	2000 to 2004	7%
	2005 or later	18%
	Total respondents (n)	136

HOME CHARACTERISTICS		PERCENT
Number of people living in home	1	13%
	2	35%
	3	23%
	4	17%
	5	7%
	6	4%
	7	1%
	8	1%
	Total respondents (n)	164
Change in number of people living in the home	Increased	8%
	Decreased	15%
	Stayed the same	77%
	Total respondents (n)	168

Source: HEIP customer survey . P1-P8

Table 121. 2023 Respondent Characteristics

RESPONDENT CHARACTERISTICS		PERCENT
Generation age grouping	Silent generation - 77 or older	1%
	Baby boomer - between 58 and 76	22%
	Gen X - between 46 and 57	23%
	Millennials - between 27 and 45	47%
	Gen Z – 27 or younger	3%
	Total respondents (n)	150
Total annual household income	Less than $25,000	19%
	$25,000 to less than $50,000	22%
	$50,000 to less than $75,000	9%
	$75,000 to less than $100,000	6%
	$100,000 to less than $150,000	19%
	$150,000 to less than $200,000	14%
	$200,000 or over	12%
	Total respondents (n)	142
Highest level of education completed	Some high school or less	9%
	High school graduate or equivalent	18%
	Some college, no degree	7%
	Technical college degree or certificate	3%
	Two-year college degree	6%
	Four-year college degree	28%
	Graduate or professional degree	29%
	Total respondents (n)	160

RESPONDENT CHARACTERISTICS		PERCENT
Employment situation	Working or attending school outside of the home	61%
	Working or attending school from home	34%
	Retired	21%
	Stay-at-home parent or care provider	11%
	Unemployed	3%
	On medical, disability or maternity leave	3%
	Total respondents (n)	211
Change in Employment situation	Yes	14%
	No	86%
	Total respondents (n)	159
Race or ethnicity	White	58%
	Black or African American	11%
	Asian	7%
	Hispanic, Latino, or Spanish origin	29%
	American Indian or Alaska Native	2%
	Middle Eastern or North African	1%
	Total respondents (n)	164
Language spoken at home	English	85%
	Spanish	25%
	Vietnamese	1%
	Hindi	1%
	Hebrew	1%
	Greek	1%
	Mandarin	1%
	Total respondents (n)	184

Source: HEIP customer survey . P9-P13.

Appendix 5B. HEIP Non-Thermostat Impact Calculation Overview

This appendix contains the assumptions used in electric savings and demand reduction algorithms for the measures within HEIP. The team used industry standard algorithms and customized each assumption to reflect the population of projects claimed in 2023. Where appropriate, we leverage assumptions from the Georgia Power TRM 3.0 and other state TRMs. Detailed information on the analysis and supporting assumptions for the following HEIP measures are included within this appendix:

- Attic insulation
- Duct sealing
- Heat pump water heater
- Air sealing

Table 122 lists the key parameters for each measure.

Table 122. 2023 HEIP Program Measures

MEASURE	REVIEWED ASSUMPTIONS
Attic Insulation	Pre-install and post-install R-values, square footage of installed insulation, cooling degree hours, heating degree days, cooling system SEER, heating system COP
Duct Sealing	Pre-install and post-install duct leakage rates, full load cooling hours, heating degree days, indoor and outdoor design enthalpy, efficiencies of heating and cooling equipment
Air Sealing	Pre-install and post-install infiltration rates, N-factor, latent multiplier, cooling and heating degree days, efficiencies of heating and cooling equipment
Heat Pump Water Heater	Daily water heating usage, water temperature difference, baseline and installed uniform energy factor

The algorithms and assumptions the evaluation team used to calculate *verified* savings for each of these measures follow.

Attic Insulation

The team used the following equation to calculate electric energy and peak demand cooling savings for attic insulation:

$$kWh\ cooling\ savings = \frac{\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) \times CDD \times 24 \times DUA \times Area \times Adj_{cool}}{1{,}000 \times \eta Cool}$$

$$Summer\ kW\ savings = kWh\ cooling\ savings \times DTE_{cooling}$$

For homes with electric heating, the team used the following equation to calculate electric energy and peak demand heating savings for attic insulation:

$$kWh\ heating\ savings = \frac{\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) \times HDD \times 24 \times Area \times 293.1 \times Adj_{heat}}{1{,}000{,}000 \times \eta Heat}$$

$$Winter\ kW\ savings = kWh\ heating\ savings \times DTE_{heating}$$

Where:

R_{exist} = Pre-installation R-value

R_{new} = Post-installation R-value

CDD = Cooling degree days

DUA = Discretionary use adjustment to account for not always running the cooling system above 75 degrees (F) outdoor air temperature

Area = Square footage of area covered by new insulation

Adj_{cool} = Adjustment factor to account for real world savings from calculation

1,000 = Constant to convert watts to kW

ηCool = Efficiency of the cooling system, SEER2

HDD = Heating degree days

24 = Constant to convert days to hours

293.1 = Constant to convert MMBtu to kWh

Adj_{heat} = Adjustment factor to account for real world savings from calculation

1,000,000 = Constant to convert Btu to MMBtu

ηHeat = Efficiency of the heating system, COP2

$DTE_{cooling}$ = Demand-to-energy ratio for space cooling end use

$DTE_{heating}$ = Demand-to-energy ratio for space heating end use

Table 123 lists the input assumptions and source of each assumption for the attic insulation measure savings calculations.

Table 123. 2023 Assumptions and Inputs for Attic Insulation

INPUT	VALUE	SOURCE
R_{exist}	Actual	Site-specific from project file review and site visits
R_{new}	Actual	Site-specific from program tracking database, project file review, and site visits
CDD	Atlanta: 1778.7 Alma: 2690.4 Brunswick: 2899.4 Macon: 2347.7 Rome: 1916.1	TMYX 2007-2021 weather data
DUA	0.75	Mid-Atlantic TRM version 9[51] which cites Energy Center of Wisconsin, May 2008 metering study. "Central Air Conditioning in Wisconsin, A Compilation of Recent Field Research", p31.
Area	Estimated	Estimated attic area based on home square footage from Georgia Power HEIP tracking database.
Adj_{cool}	0.8	Mid-Atlantic TRM version 9[52], which cites Illinois TRM, 9 as demonstrated in two years of metering evaluation by Opinion Dynamics. Adjusts savings derived through engineering algorithms to actual savings measured in field.
ηCool	Actual	Specific to each site
HDD	Atlanta: 2992.1 Alma: 1632.3 Brunswick: 1064.6 Macon: 2212.8 Rome: 3064.4	TMYX 2007-2021 weather data.
Adj_{heat}	0.6	Mid-Atlantic TRM version 9, which cites Illinois TRM, 9 as demonstrated in two years of metering evaluation by Opinion Dynamics. Adjusts savings derived through engineering algorithms to actual savings measured in field.
ηHeat	Actual	Specific to each site
$DTE_{cooling}$	0.00057	Average hourly fraction of residential space cooling load shape that falls in Georgia Power summer peak definition.
$DTE_{heating}$	0.00062	Average hourly fraction of residential space heating load shape that falls in Georgia Power summer peak definition.

Duct Sealing

The team used the following equation to calculate electric energy and peak demand cooling savings for duct sealing:

[51] Mid-Atlantic Technical Reference Manual, Version 9.0

[52] Illinois Technical Reference Manual, Version 9.0

$$kWh\ cooling\ savings = \frac{\Delta CFM25DL \times EFLH_c \times 12{,}000 \times TRF_{cool}}{400 \times \eta Duct \times SEER2 \times 1{,}000}$$

$$Summer\ kW\ savings = kWh\ cooling\ savings \times DTE_{cooling}$$

For homes with electric heating, the team used the following equation to calculate electric energy and peak demand heating savings for duct sealing:

$$kWh\ heating\ savings = \frac{\Delta CFM25DL \times EFLH_h \times 12{,}000 \times TRF_{heat}}{400 \times \eta Duct \times HSPF2 \times C_{IV-III} \times 1{,}000}$$

$$Winter\ kW\ savings = kWh\ heating\ savings \times DTE_{heating}$$

Where:

ΔCFM25DL = Duct leakage reduction @ 25 pascals, CFM

$EFLH_c$ = Equivalent full-load hours of cooling

$EFLH_h$ = Equivalent full-load hours of heating

12,000 = Constant to convert tons to Btu/h

400 = Nominal CFM per ton of refrigeration

1,000 = Constant to convert watts to kW

SEER2 = Efficiency of the cooling system, SEER2, Btu/W-hr

HSPF2 = Efficiency of the heating system, HSPF2, Btu/W-hr

TRF_{cool} = Thermal regain factor for cooling depending on duct location

TRF_{heat} = Thermal regain factor for heating depending on duct location

ηDuct = Pre-duct sealing system distribution efficiency

C_{IV-III} = Conversion from rated HSPF to HSPF appropriate for AHRI climate zone III

$DTE_{cooling}$ = Demand-to-energy ratio for space cooling end use

$DTE_{heating}$ = Demand-to-energy ratio for space heating end use

Table 124 lists the input assumptions and source of each assumption for the duct sealing measure savings calculations.

Table 124. 2023 Assumptions and Inputs for Duct Sealing

INPUT	VALUE	SOURCE
ΔCFM25DL	Actual	Site-specific from program tracking database
EFLHc	Atlanta: 1423.0 Alma: 2152.3 Brunswick: 2319.5 Macon: 1878.2 Rome: 1532.9	TMYX 2007-2021 normalized weather data.
EFLHh	Atlanta: 1504.1 Alma: 820.4 Brunswick: 534.9 Macon: 1112.4 Rome: 1540.2	TMYX 2007-2021 normalized weather data.
SEER2	Actual	Specific to each site
HSPF2	Actual	Specific to each site
TRFcool	1.0	MN TRM v3.2, value for unconditioned spaces (attic, crawl space, outdoors)
TRFheat	1.0	MN TRM v3.2, value for unconditioned spaces (attic, crawl space, outdoors)
ηDuct	0.89	Building Performance Institute, Inc., 11/20/2007, Distribution Efficiency look- Up Table, Building Performance Institute Technical Standards for the Heating Professional. Cited in MN TRM v3.2
CIV-III	1.1	C.K. Rice et al. An Analysis of Representative Heating Load Lines for Residential HSPF Ratings. July 2015. https://info.ornl.gov/sites/publications/files/Pub56184.pdf. Fig. B.4 shows an actual HSPF approximately 10% greater than rated HSPF for zone V, using the standard AHRI 210/240 load line. Cited in MN TRM 3.2 and adjusted for prevailing GA climate zone
DTEcooling	0.00057	Average hourly fraction of residential space cooling load shape that falls in Georgia Power winter peak periods
DTEheating	0.00062	Average hourly fraction of residential space heating load shape that falls in Georgia Power winter peak periods

Net Savings

The HEIP evaluation uses the self-report approach outlined by the Uniform Method Project (UMP) for all channels, though the Manufactured Homes channels and measures included in the Online Marketplace survey included a modified approach. The participant surveys for both the Whole House, Individual Improvements and Manufactured Homes channels, as well as for the Online Marketplace included questions to measure free-ridership and spillover in the same survey. Free-ridership measures the portion of savings that would have occurred absent program intervention, where a full free-rider would have made no changes to the project and/or activity without program intervention, a non-free-rider would not have completed the project and/or activity without the influence of the program, and a partial free-rider would have partially replicated the program activity. Participant spillover focuses on the program influence on customers' decisions to invest in additional energy efficiency measures for which they did not receive a rebate. Free-ridership and spillover are both discussed in more detail below.

Free-ridership

The free-ridership approach used by the evaluation team assesses free-ridership in two steps: intention and influence. Intention asks respondents about the likelihood of carrying out the energy efficiency measure without the energy efficiency program's support, while influence gathers information about the rationale behind taking the energy-efficient action to determine the energy efficiency program's direct influence. Both influence and intention questions result in a score between zero and one. To streamline data collection where free-ridership questions were asked for multiple measures, including for the Manufactured Homes channel as well as measures included in the Online Marketplace survey, the evaluation team included a simplified free-ridership battery that only assessed participant intention. The final free-ridership value is calculated as the average of the intention and influence scores. Additional details on intention and influence free-ridership methodologies are included in the sections below.

Intention

The approach the evaluation team used breaks out intention into three components: timing, quantity, and efficiency, asking about these elements independently. The participant survey includes questions asking about how the program impacted these three elements.

Influence

To estimate influence, the evaluation team asked respondents one question with several options to identify how program elements influenced their decisions about the energy efficiency measure they installed. These questions help to determine how influential the program was in that decision-making process.

Consistency Checks

The evaluation team also included consistency checks, open-ended questions about the program that are a best practice recommended by the UMP, to confirm that the understanding of program influence as reflected in the intention and influence scores is accurate. No respondents were excluded from the analysis due to inconsistent responses.

Spillover

The evaluation team also assessed whether respondents purchased and installed energy efficiency measures for which the evaluation team could accurately estimate energy savings and whether the program had an influence on respondent decision making. We calculated total spillover savings for each participant as the product of measure savings, number of units and influence score, before estimating the participant spillover for the survey sample, adjusting it for the population, and estimating an overall spillover ratio.

Appendix 5C. HEIP Thermostat Net Impact Analysis

This appendix contains the detailed methodology used in electric savings and demand reduction algorithms for the Online Marketplace measure. The team followed the methodological approach outlined in the UMP for Smart Thermostats for the analysis to ensure defensible and reliable results. Detailed information on the analysis and supporting assumptions for the Online Marketplace measure are included within this appendix.

Matching

The quasi-experimental design used in this study involved the identification of comparison group customers that served as matches for smart thermostat participants. The evaluation team developed a matched control group for the identified treatment group of participating customers using propensity-score matching. This method allows for comparison of treatment customers with nonparticipant customers in the baseline period using a multidimensional comparison. Monthly billing data was calendarized to monthly average energy usage per day to control for difference in meter read dates. The evaluation team considered multiple matching algorithms and combinations of observable characteristics including monthly average energy consumption, annual energy consumption, geographic location, and premise type. We also considered using future thermostat participants in the matching process. The final matched control group was selected by considering the balance between the treatment and control group in the baseline period.

Thermostat purchase and installation occurred on a continuous basis. Variation in treatment timing was considered by defining a post-installation variable. The evaluation team assumed the post-installation period for each participant to begin 90 days following thermostat purchase, to account for shipping, installation, and thermostat setup delays. This lagged participation variable sought to provide a buffer period between the pre- and post-period billing data to allow for isolation of the thermostat impacts.

The evaluation team compared 12 months of pre-period usage data for participating customers to the same 12 months for all nonparticipant customers. Our matching mechanism used propensity-score matching to

match each participant to the nearest three nonparticipating customers. The evaluation team performed matching without replacement, such that each participant had a unique comparison group that best matched its pre-period usage.

Figure 101 shows the average monthly usage for the treatment and control groups during the baseline period Figure 102 shows the distribution of balance in the matched data. Although some imbalance was observed, the figure shows groups that are generally well balanced across the range of total annual energy consumption.

Figure 101. Monthly Average kWh per day - baseline period

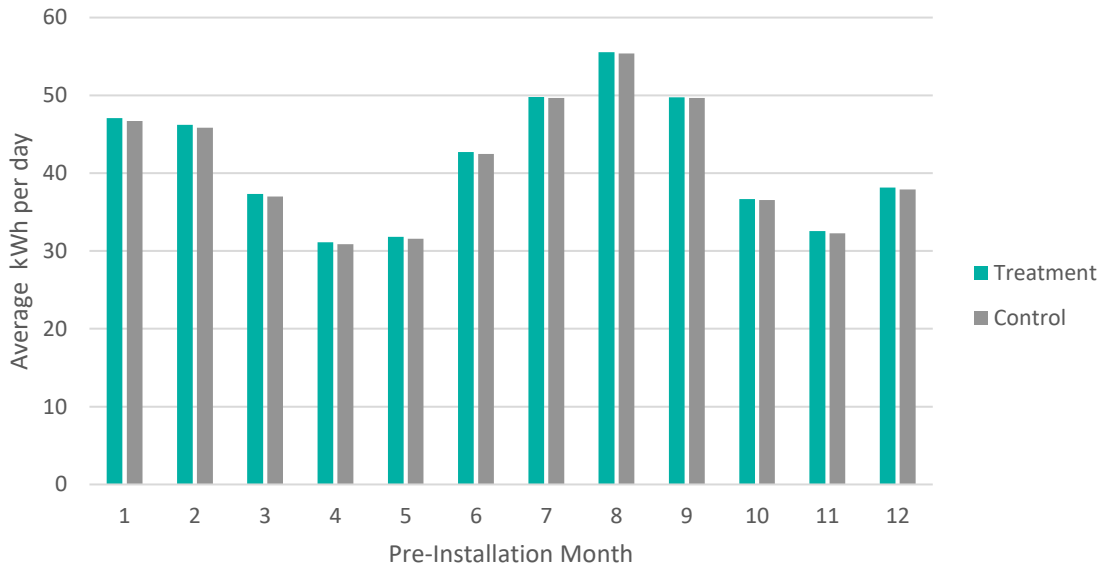
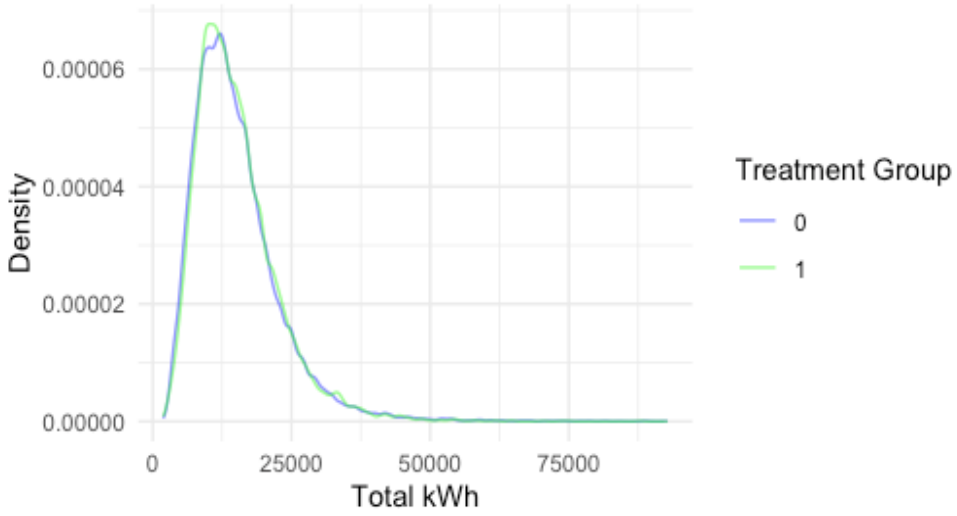


Figure 102. Distribution of matched annual kWh for treatment and control groups



Modeling

After selecting a matched comparison group, the evaluation team used regression analysis to find smart thermostat program savings by controlling for consumption differences, time-varying factors such as weather as well as for the impacts of premise type and installation dates between the control and treatment groups. The evaluation team conducted the regression modeling using a two-way fixed effect panel regression model of average daily energy consumption.

The model estimated daily usage (kWh) with the average daily usage of the comparison group for each month, a post-period indicator, a customer fixed effect to control for time differences between customers in energy consumption, heating, and cooling degree days for each customer in each month, and a participation indicator identifying customers who participated in the smart thermostat program versus those who did not participate. The following regression specification was used:

$$E_{it} = \alpha_i + \tau_t + \beta_0 DD_{it} + \beta_1 DD_{it} * Part_i + \gamma_0 DDit * Post_t + \gamma_1 Part_i * Post_t + \gamma_2 Part_i * Post_t * DD_{it} + \varepsilon_{it}$$

Where:

Eit = Average energy consumption of utility customer i in month t

αi = Customer fixed effect to control for time-invariant differences between customers in energy consumption

τt = Time period fixed effect.

DDit = Degree days for customer i in month t; Model included both cooling degree days (base 70F) and heating degree days (base 60F).

$Part_i$ = Indicator for Online Marketplace smart thermostat program participant—these variable equals 1 if the customer was a participant and equals 0 otherwise.

$Post_t$ = Indicator for the reporting period after the thermostat was installed—these variable equals 1 if the period t was post-installation and equals 0 otherwise. This analysis assumed thermostat installation had occurred 90 days after purchase.

ε_{it} = Error term for customer in i in period t.

The regression analysis was performed on residential customer billing data across all premise types and customers all over the Georgia Power service territory. Weather variables were populated using NOAA weather observations for the specific billing dates of each analyzed billing record. Multiple base temperatures were considered, and the final selection was chosen based on the associated model fit statistics. For cooling degree-days (CDDs), a base temperature of 70F was selected. For heating degree-days (HDDs), a 60F base temperature gave the best fit.

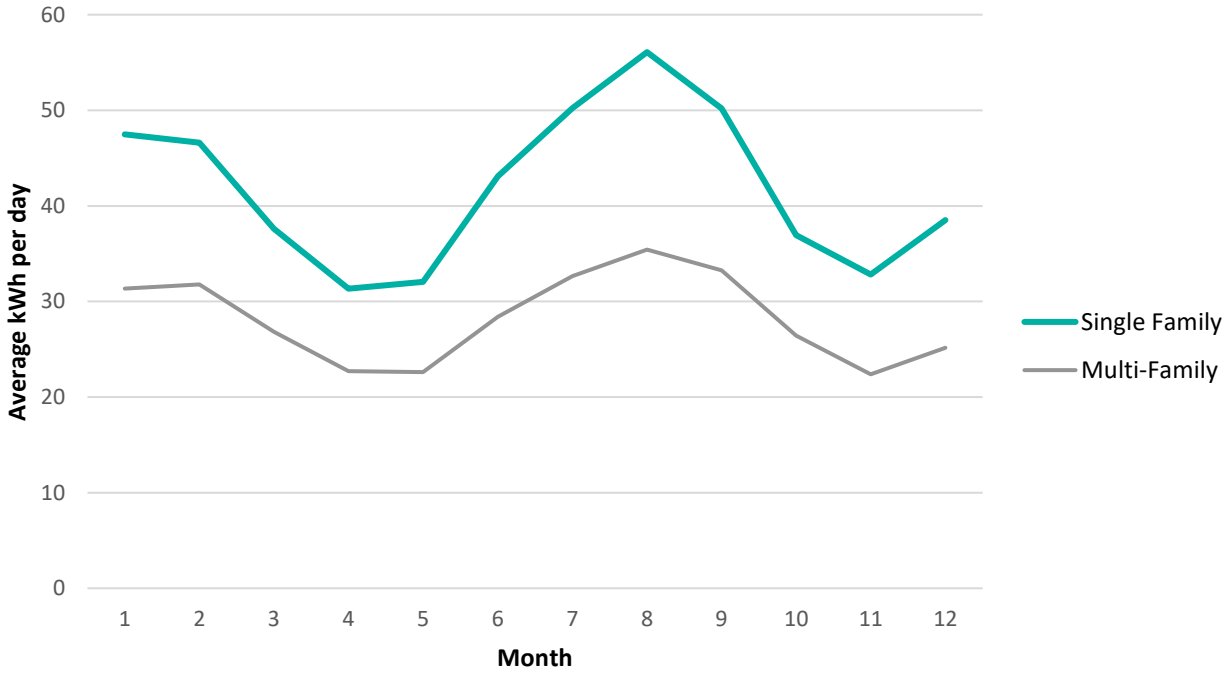
The annual savings attributable to participation in the Online Marketplace smart thermostat offering was estimated for a normal weather year using the results of this regression analysis. The final savings estimate was determined using -1 * (365.25 * γ_1 + γ_2AnnualDDit), where AnnualDDit is the degree days for a normal

weather year. Normal weather was estimated using TMYx (2007-2021) weather data files available from Climate.OneBuilding.org as the most recently available TMY.[53]

Disaggregation

The key output of the regression analysis was a weighted average energy savings value for the treatment group of 2022 participants. To extrapolate this result to the 2023 program, we disaggregated the average energy savings to four cohorts of participants – single-family and multifamily households, with either electric heating or natural gas/propane heating. Multifamily households make up a small percentage of participants, but they have a significantly lower consumption on average, as shown in Figure 103. Both segments have a significant share of electric heat, as evidenced by the dual peaking loadshape in both segments.

Figure 103. 2023 Baseline Monthly Average kWh per day by premise type for participants



Smart thermostats save electric energy for all homes with air conditioning, but in heating season electricity savings are achieved only for electrically heated homes. For this analysis, the share of electrically heated homes was assumed to be 51%, as reported by 2023 participants in the Temp✓ survey. Table 125 shows this weighting factor as well as the proportions of single-family and multifamily homes in the analyzed treatment group vs the 2023 population.

[53] https://climate.onebuilding.org/

Table 125. 2023 Weighting Factor Applied to Disaggregate Savings

WEIGHTING FACTORS	VALUE
Single-Family vs Multifamily	95% / 5% for 2023 population 98% / 2% for treatment group
Electric vs Gas Heat	51% electric / 49% gas

Verified Net Savings

The results of the regression analysis showed an average annual net energy savings of 359 kWh per home (Table 126). This value is a weighted average of single-family and multifamily homes as well as homes with electric vs natural gas heating within the evaluation sample. Across the sample, the total energy savings equated to approximately 6.92% savings of the annual HVAC load.

Table 126. 2023 Per-Home Percent Net Savings

METRIC	VALUE
Annual HVAC Load (kWh/home)	5,179
Annual Net Energy Savings (kWh/home)	359
Savings Per Home as a Percent of HVAC Load	6.92%

This result was disaggregated to estimate the impacts on four different segments of the participant population, considering single-family versus multifamily and home heating type. Table 127 shows the result of this disaggregation. Homes heated with electricity save considerably more than their gas-heated counterparts because of the additional electric energy savings achieved during the heating season. Multifamily homes have a lower overall HVAC load, likely due to smaller average home size, so the achieved savings through smart thermostat installation are lower. All values shown in Table 127 are presented as gross savings amounts, backed out from the net savings results of the billing analysis, using the 2023 NTG result (0.71) described previously.

Table 127. 2023 Gross Savings Estimates for Smart Thermostat Installation by Segment

SAVINGS TYPE	ANNUAL GROSS SAVINGS PER THERMOSTAT		
	ENERGY (kWh)	SUMMER DEMAND (kW)	WINTER DEMAND (kW)
Single-family - Electric Heat	527	0.16	0.15
Single-family - Gas Heat	238	0.16	-
Multifamily - Electric Heat	290	0.09	0.08
Multifamily - Gas Heat	121	0.09	-

Net and gross savings attributable to the 2023 Online Marketplace thermostat measure on average were determined by applying proportions of single-family versus multifamily homes and electric heating fuel shares observed in the 2023 participant population. Values in Table 128 are the per-thermostat averages for the 2023 program year.

Table 128. 2023 Online Marketplace Verified Net and Estimated Gross Savings Per Thermostat

SAVINGS TYPE	ANNUAL SAVINGS PER THERMOSTAT		
	ENERGY (kWh)	SUMMER DEMAND (kW)	WINTER DEMAND (kW)
Reported	346	0.07	n/a
Estimated Gross	410	0.16	0.15
Verified Net	291	0.11	0.10

Appendix 5D. Detailed Study Methodology For HEIP

Research Questions and Activity Overview

The HEIP program evaluation sought to address the following process and impact evaluation research questions:

Process Questions

- How has the transition of the HEIP to a third-party implementer from in-house Georgia Power staff affected the HEIP experience for participants, auditors, and contractors, if at all?
- How are customers learning of the program? Are program marketing initiatives resonating with customers? Are contractors using HEIP funding as a sales tool for their business?
- Are customers aware of the different program pathways? If so, why do customers choose to participate in the individual pathways versus the Whole House approach (or both)? Are there program components that are barriers or pain points to participation?
- What influences customers' decisions to participate in the program? Are there opportunities to improve the conversion of assessments into completed projects, or to move customers from the Individual Improvements pathway to a Whole House approach?
- To what extent is the program servicing multifamily buildings compared with single-family? Are there barriers to serving multifamily customers that could be addressed through program design, outreach, and/or delivery?
- Is the program serving manufactured homes effectively? What are the barriers to reaching and serving these customers, if any?
- How satisfied are customers with the program overall as well as individual program components?
- Are there additional cost-effective measures that should be added to this program to get deeper kWh and kW savings?
- How are contractors engaging in the program and with Georgia Power?
- How do contractors feel the program has affected their services, offerings, and business models, if at all? Does this vary by contractor firmographics?

Impact Questions

- How do the gross and net verified per-unit energy assumptions compare to planning estimates? How and why should they be adjusted?
- Does the VisionDSM program tracking system capture all the relevant data needed to calculate savings?
- What are the average annual energy savings associated with installing a smart thermostat?
- Are the energy and demand savings estimates produced by the simulation software reasonable from an engineering standpoint? Are there opportunities to calibrate the models with additional information about the home or upgrades?
- How did program participation and energy savings compare to projections for the various program components (Whole House vs. Individual Improvements, Manufactured Homes, Single-Family vs. Multifamily)?

Data Collection Approach

This section details the method of data collection for the evaluation. The evaluation team collected data through interviews with program staff and the program third party implementer, participant surveys, and interviews with program contractors. We conducted an interview with program staff to understand the program history, context, goals, and challenges. We also interviewed the program implementer to understand their experience and perspective of the program.

Participant Surveys:

The evaluation team invited 1,331 HEIP participants to complete a web- or phone-based survey through an email invitation and phone calls in November 2023. The survey was available in English and Spanish. Customers received reminders to complete the survey. Those who completed the survey were entered into a drawing to win one of five $100 gift cards. The evaluation team received 185 completed surveys, including 47 respondents that participated in the Whole House pathway, 70 that participated in the Individual Improvements pathway, and 68 that participated in the Manufactured Homes pathway. The overall survey response rate was 14%, and it did not differ by pathway. See Appendix 5A. Survey Demographics, for more details on the survey sampling and response rates.

In addition, customers that purchased measures through the Online Marketplace were surveyed in October 2023. Details on this survey are included in Chapter 3. Residential Specialty Lighting Program Evaluation.

A general population survey was fielded in October of 2023. More details on this survey can be found in Chapter 4. Home Energy Improvement Program (HEIP).

Contractor Interviews:

The evaluation team interviewed contractors who participated through the HEIP Whole House or Individual Improvements path. The interviews took place November of 2023 through January of 2024. We completed eight interviews with contractors that completed work for HEIP.

One contractor completed only Whole House multifamily projects, six completed projects for both the Whole House and Individual Improvements paths, and one only completed projects in the Individual Improvements path. Four of the contractors interviewed also worked with the EASE program. These interviews were completed via phone or on Zoom and lasted approximately 45 minutes. Contractors received a $75 gift card for participating in this research.

Impact Evaluation Approach

This section details each step of the impact evaluation for HEIP. Evaluation activities were tailored to each program pathway as summarized in Table 129.

Table 129. 2023 HEIP Gross and Net Impact Evaluation Approaches

COMPONENT	GROSS IMPACT METHOD	NET IMPACT METHOD
Individual Improvements and Online Marketplace Non-Thermostat Measures	Engineering analysis based on desk reviews and site visits	Participant self-report, contractor interviews
Individual Improvements and Online Marketplace Wi-Fi Connected Smart Thermostats	Regression analysis of consumption data with a matched comparison group	
Whole House	Billing data review, engineering analysis based on desk reviews and site visits	Participant self-report, contractor interviews
Manufactured Homes	Engineering analysis based on participant self-report and site visits	Participant self-report, contractor interviews

Verified Gross Savings Approach – Non-Thermostat Measures

The evaluation team's approach to developing estimates of gross energy and demand savings included the following steps:

- **Reviewed and cleaned program tracking data.** The evaluation team reviewed extracts from VisionDSM that included customer contact information and measure characteristics (such as age, size, and configuration) to confirm and understand the tracked savings methodologies in use by the program.
- **Conducted desk reviews of project documentation.** The evaluation team selected a sample of 62 HEIP participants from all program pathways for desk review. For each of these sampled projects, the team reviewed all supporting documentation stored in the program tracking system comparing measure types, heating types, and equipment counts against tracking records.

- **Conducted site visits.** The evaluation team conducted in-person and virtual site visits with a sample of 26 projects from all program pathways. The site visits visually verified installed measures, confirmed HVAC and water heating system type, measured square footage and insulation depths, and discussed equipment usage with participants.
- **Conducted participant surveys (Manufactured Homes only).** For the Manufactured Homes pathway, participant surveys provided key information about measure ISRs.
- **Reviewed historical billing data (Whole House only).** For projects in the Whole House pathway, the evaluation team reviewed billing records along with Beacon model outputs for homes in the evaluation sample.
- **Completed engineering analysis.** The evaluation team completed an engineering analysis for all projects in the evaluation sample, calculating verified gross savings using engineering algorithms with input parameters updated based on primary data collection.

The evaluation team primarily referred to savings values in the Georgia Power TRM 3.0. In cases where tracked savings was determined through prior evaluations or building simulations, or when the algorithmic approach in the Georgia Power TRM 3.0 did not line up well with the available data, the evaluation team utilized algorithms and approaches from alternative sources. These TRMs included, but were not limited to, the Illinois TRM v12 and the Arkansas TRM v9.1.[54,55] Where appropriate, the same algorithms used to determine tracked savings were used to calculate verified savings with updates to parameters based on primary data collection.

More detail on the estimation of savings is described in Appendix 5B. HEIP Non-Thermostat Impact Calculation Overview.

Key parameters collected via site visits and surveys included:

- Home size
- HVAC system type, tonnage, and efficiency
- Insulation square footage, type, and depth
- Measure installation verification
- ISRs for LED bulbs, aerators, shower heads, APS, etc.

Program trade allies calculated savings for participants in Whole House pathway using Beacon energy models customized for each participating home. Therefore, for this evaluation, the evaluation team reviewed Beacon model inputs and outputs for projects in the sample, with comparison against historical billing data as an additional point of triangulation.

[54] 2024 Illinois Statewide Technical Reference Manual Version 12.0 vol. 2

[55] 2022 Arkansas Technical Reference Manual Version 9.1, vol. 2

Verified Net Savings Approach – Thermostat Measures

The evaluation team's methodology for evaluating savings for thermostats delivered through the Online Marketplace in 2023 was guided by the DOEs UMP published in June 2023, Smart Thermostat Evaluation Protocol.[56] Because the evaluation method requires a full year of post-installation meter data, the evaluation team analyzed consumption data for Georgia Power customers who purchased a smart thermostat through Online Marketplace in 2022. This analysis directly estimates net savings because we assume the matched comparison group (composed of nonparticipating customers) does what the participants "would have done" in the absence of the program – including potentially purchasing and installing a smart thermostat. Gross savings values are estimated by backing out the estimated NTGR for Online Marketplace thermostats.

The data processing included thorough cleaning and preparation steps which resulted in the removal of some participating customers from the analysis. The counts included in the verified savings estimation represent the accounts that remained through the full cleaning process. The data cleaning step filtered out (or removed) participants under the following conditions.

- Customers without a full year of billing data prior to thermostat purchase and a full year after purchase to ensure consumption patterns are observed during a full range of seasons
- Customers who participated in other Georgia Power Energy Efficiency programs
- Customers without important characteristics such as zip code and premise type
- Customers with unrealistically low or high usage for a residential premise

In 2022, there were 16,266 customers that purchased at least one thermostat through the Online Marketplace. The data cleaning steps reduced the number of customers included in the analysis to 9,687. Most of the attrition resulted from the requirement that a customer must have a full year of billing data before and after their thermostat purchase. Table 130 shows the distribution of participating customers by premise types included in the regression analysis.

Table 130. 2023 Thermostat and Customer Distribution by Premise Type – Analysis Sample

PREMISE TYPE	PARTICIPATING CUSTOMERS IN ANALYSIS SAMPLE	THERMOSTATS PER CUSTOMER
Single-family	9,505	1.33
Multifamily	182	1.31
Total	**9,687**	**1.33**

The evaluation team used propensity score matching to select a matched control group from nonparticipant Georgia Power residential customers. Nonparticipant billing histories of sufficient length were cleaned for potential inclusion in the matching process. Following cleaning, a total of over 1 million residential accounts were identified for potential matching. The matching process used a logistic regression to match participants

[56] Smart Thermostat Evaluation Protocol: Dec 2016 - May 2023 (nrel.gov)

on average monthly energy use from the baseline period, as well as geographic location and premise type. The nearest neighbor's method was used within the matching algorithm to pair each participant with the three most similar nonparticipants.

The final step of the analysis was a two-way fixed effects regression analysis to determine a weather-normalized net impact. Details of this analysis are more fully defined in Appendix 5C. HEIP Thermostat Net Impact Analysis.

The billing data analysis produced impacts at the customer or home level, but the savings results were divided by the number of Online Marketplace thermostats per customer to arrive at per-unit impacts. Winter and summer peak demand savings were estimated by applying the percent impact on energy to summer and winter hourly load profiles for customers as determined through the Temp✓ savings analysis.

Appendix 5E. Additional Survey and Interview Findings

This section details additional findings from the participant survey analysis.

Home Energy Assessments

The evaluation team asked customers a series of questions related to the home energy assessment to understand their experience and satisfaction with the process to complete the assessment and the delivered report.

All but one survey respondent in the Whole House pathway remembered receiving a home energy assessment, indicating high awareness of this key step in the participation process for this channel. Only one of the Individual Improvements respondents received a home energy assessment along with the other rebated measures they installed. More Individual Improvements respondents (18%) received a home energy assessment last cycle. The participant survey didn't include questions that could help understand what's driving this lower incidence of home energy assessments among Individual Improvements pathway participants. Nearly all customers who received a home energy assessment (93%) reported that it was somewhat or extremely helpful (Figure 105).

Some (10%) of Manufactured Homes respondents found the home energy assessment to be not very helpful or not at all helpful. When asked why the home energy assessment was not helpful, these respondents did not speak to the assessment itself, but instead shared that they have not seen a change in their bill or have seen an increase in their energy bills. Multiple factors other than program participation could impact the amount of a customer's bill, including if rates change or if a customer is on a budget billing program that charges them the same amount each month regardless of their usage (e.g., FlatBill).

Participant Experience

The evaluation team assessed customer experience in various aspects of the program: experiences with contractors, the application process, and self-installation, summarized below.

Experience with Contractors

Customers had a positive experience with contractors. All respondents reported that they were extremely or somewhat satisfied with the quality of work of their contractor. Further, almost all respondents (98%) found it somewhat or extremely easy to find a contractor to perform their home energy assessment. Respondents most often found their contractor through:

- Georgia Power's "Find a Contractor" feature (41%) (an increase from last cycle, 14%)
- A referral from a friend, family, or neighbor (28%)
- A web search (18%)

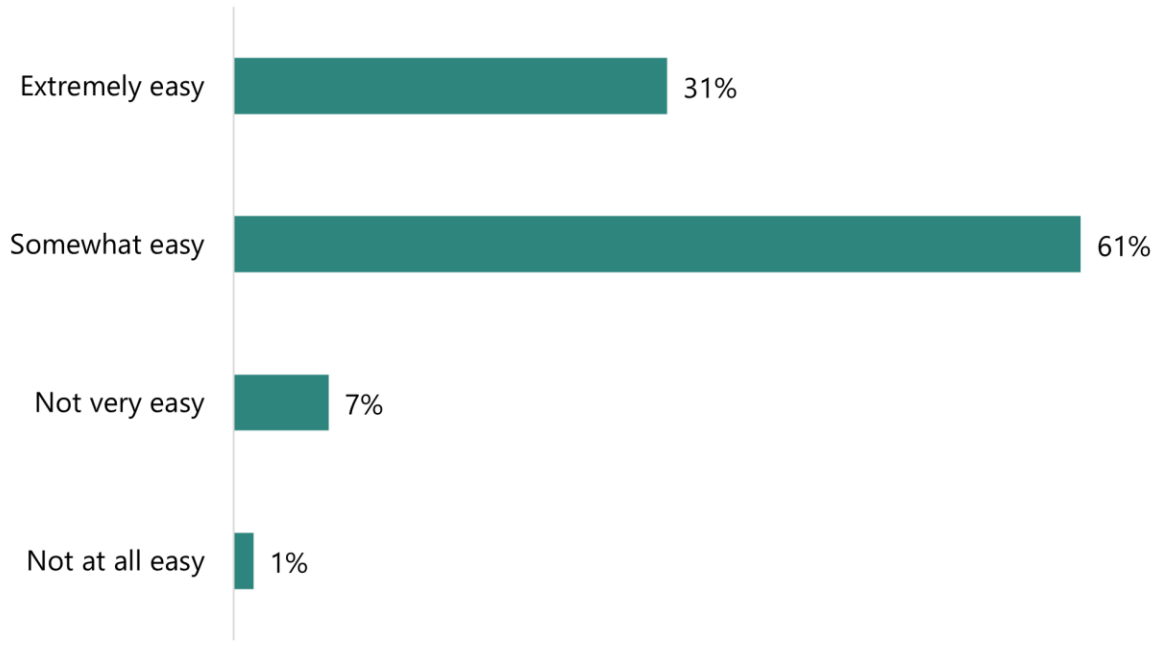
Experience with Self-Installation

Some customers who participated in the Individual Improvements pathway chose to complete the measure installations themselves. The survey respondents who did so (n=21) most often cited cost savings (n=9), that the improvements were easy to do themselves (n=9), faster to do themselves (n=1), or mentioned an inability to find contractors to do the work (n=1) as the main reasons for completing the work themselves. Ninety percent of the customers who self-installed equipment did not experience any challenges. Those who did experience challenges mentioned that the materials were hard to work with or the equipment was a different size than expected.

Experience with Rebate Application and Payment

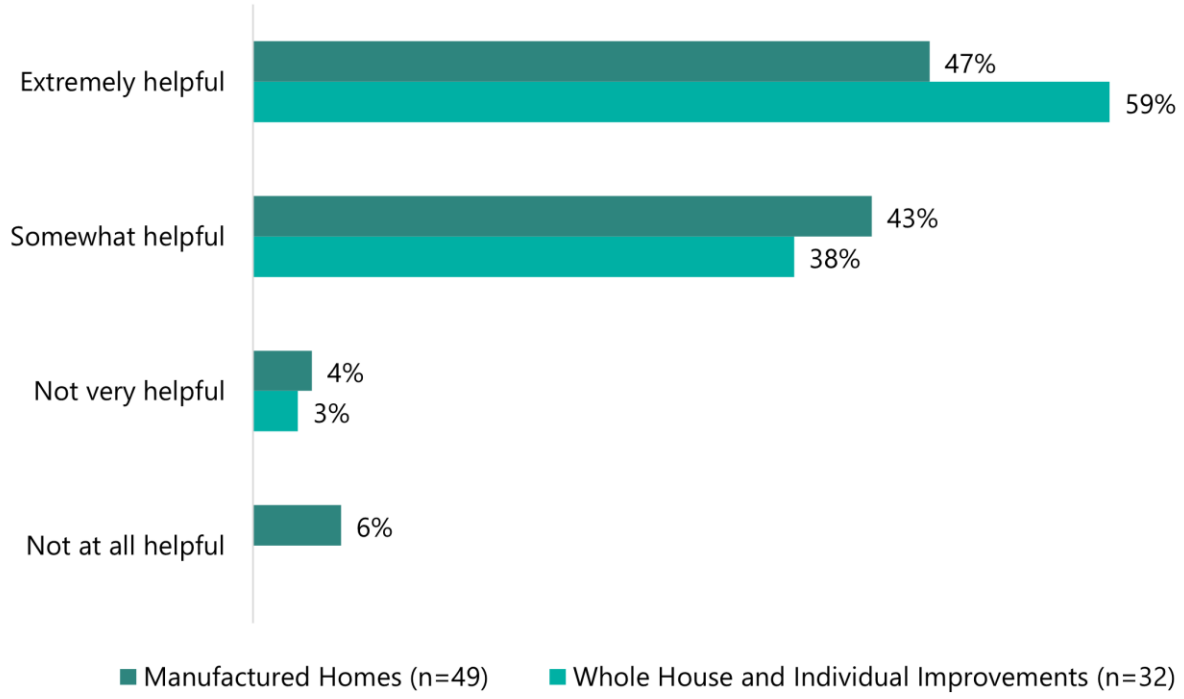
Most respondents (87%) said the application was somewhat or extremely easy to complete and submit (Figure 104). However, almost 20% of respondents experienced problems, delays, or difficulties with the rebate application or payment process. In discussing these problems, respondents most often discussed issues with the application itself including that the application had too many steps, was too difficult to understand, and was time consuming.

Figure 104. 2023 Customer ease of completing and submitting application form (n=74)



Source: HEIP customer survey. G11. How easy was it to complete and submit the application form? Would you say it was…? Note the percentages may not sum to 100% due to rounding.

Figure 105. 2023 Home Energy Assessment Report Helpfulness (n=81)



Source: HEIP customer survey. F1. Our records indicate you received a home energy assessment. How helpful did you find the home energy assessment? Note the percentages may not sum to 100% due to rounding.

A quarter of Whole House and Individual Improvements customers that received recommendations during the home energy assessment (24%) chose not to install improvements suggested in the home energy assessment, including adding insulation, buying new appliances, or replacing HVAC equipment. Respondents did not make these improvements because they were too expensive or there were not sufficient rebates.

The assessment generally provides customers with the information they need to make decisions, although some respondents provided opportunities to enhance the process. Just over half of the Whole House and Individual Improvements respondents (63%) found that the home energy assessment included all the information they needed to inform their decision about which improvements to make. Customers that said the report did not have all the information they needed also provided feedback about what additional information would have been helpful. Respondents suggested that the auditor provide more context, better explanations, information about expected savings, and more recommendations. One respondent noted that a blower door test was the only assessment their contractor completed, and they would have liked the contractor to look at more in the house.

Contractor Engagement and Experience

There are two areas that contractors raised that negatively affect, or could potentially affect, their experiences with the program. These areas are program changes, rebate availability and the energy modeling software.

Program changes/rebate availability. Contractors shared that uncertainty in the program offerings, or changes in the program, are problematic for them and can make it difficult for them to participate year to year. Some contractors discussed program requirements or rebate amounts changing between program years that can lead to a feeling of whiplash. They are concerned for their businesses to rely on the program in the event it would be cancelled and/or change and impact their business. One contractor said they feel that there is a risk of rebates decreasing.

Modeling software. Contractors provided constructive feedback on the energy simulation reports created using the program energy modeling software, Beacon HEA. Specifically, they noted:

- The software is cumbersome to use with inconsistencies or quirks in the Beacon HEA energy modeling.
- Energy savings estimates are inaccurate (either high or low); some feel the work they do is underrepresented in Beacon HEA.
- The modeling has the potential for others to "game the system" to get 20% energy savings to participate in Whole House. Multiple contractors referenced that including lighting was helpful to achieving 20% energy savings. In the impact evaluation, we found that LED lighting measures were observed to be a part of most Whole House projects in 2023 and that savings from LED lighting were overrepresented.
- Contractor offerings to customers would improve by a report of actual savings compared to modeled savings to understand how savings compare to what they see in the reports.

The evaluation team heard similar feedback in last cycle's evaluation, including concerns that the model doesn't accurately represent energy savings and requests to see "back-end" energy savings results.

Multifamily customers. We spoke with a contractor that completes HEIP projects in multifamily buildings with a focus on income-qualified affordable housing. This company does the initial assessments and testing before and after, but not the improvements themselves. They said that projects are usually combined with planned renovations. The contractor maps out options for multifamily buildings with planned renovations to reach 20% energy savings. If achieving the savings necessary to participate requires changing many of the renovation plans, the building usually won't participate. Clients that are familiar with the program or have other funding pushing them to go greener it's "more of a check the box exercise". They will likely tweak their plans, like using ENERGY STAR kitchen appliances instead of standard appliances without changing their process. They said that multifamily customers primarily participate by achieving 20% energy reduction. The program includes a second rebate tier for multifamily properties that achieve at least a 35% energy reduction. This contractor shared that the clients they work with rarely reach this higher tier.

This contractor runs into barriers with the program design for participating with multifamily buildings. These barriers include:

- Needing to complete projects within the calendar year. With big projects, it can be difficult to fit them into the program cycle.

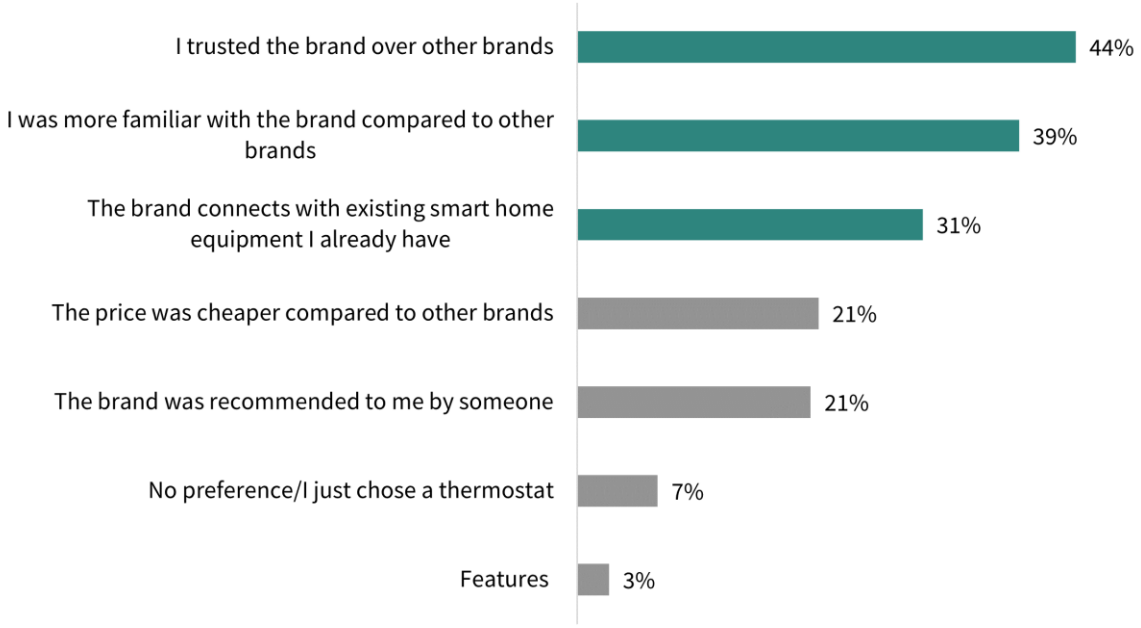
"We spend a lot of our program cycle discouraging people from doing it because of the uncertainty of if they'll be done in time."

- Uncertainty with the availability of rebate funds. This contractor struggles with uncertainty about whether there will be sufficient budget to receive the full rebate for their projects. This is important because it's hard for developers to commit financial resources to a renovation when they are not certain they will get the incentive money.

Online Marketplace Thermostat: Purchase Decision-Making

Trust in a specific brand drove customers' decisions to purchase that brand of thermostat (Figure 106). Several other customers indicated that they were more familiar with that brand compared to others or the brand connects with existing smart home equipment they already have.

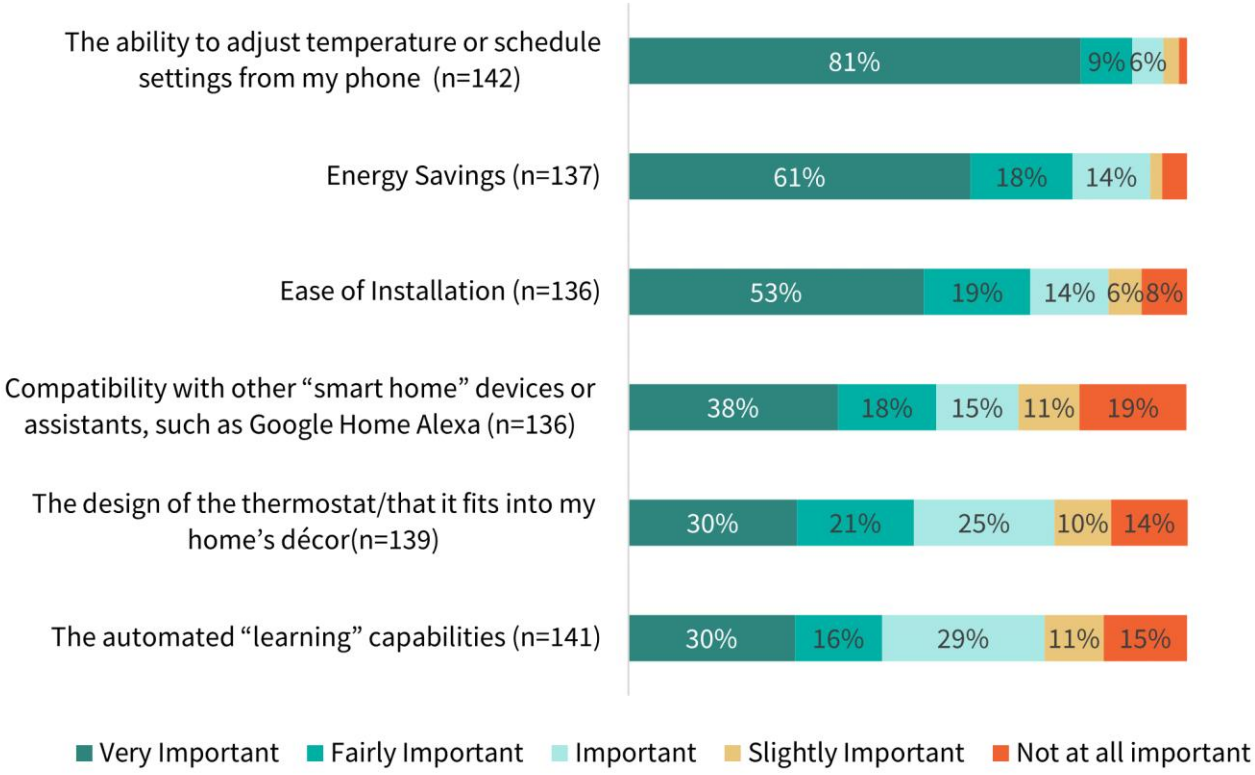
Figure 106. 2023 Factors Influencing Thermostat Brand Choice (n=141)



Source: Online Marketplace customer survey. F2. Why did you go with the brand of thermostat that you did. Note the percentages may not sum to 100% because multiple response options were allowed.

Functionality and savings were also factors in customers' decisions. (Figure 107). Customers reported the ability to adjust temperature or schedule from their phone, energy savings, and ease of installation as the most important factors in their decision-making process. The thermostat design and the automated "learning" capabilities were least important to customers.

Figure 107. 2023 Factors Influencing Customers' Decision-Making Process

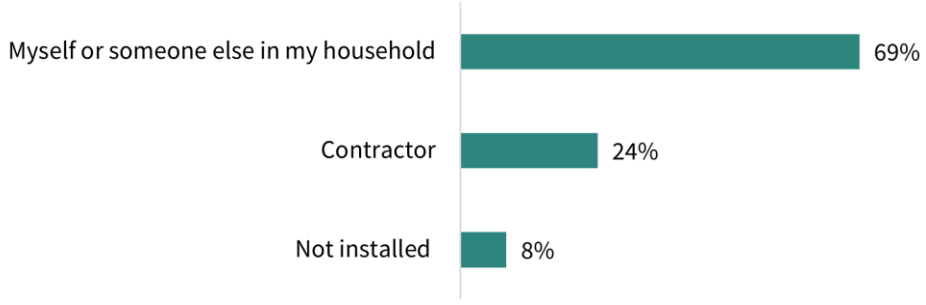


Source: Online Marketplace customer survey. F3. When thinking about purchasing a smart thermostat for your home, how important were each of the following factors in your decision-making process? Please rate on a scale of 1 to 5, where 1 is not at all important and 5 is very important.

Thermostat: Installation and Use

Nearly all customers reported the thermostats they purchased were currently installed (92%). Of those whose thermostat was installed, most (69%) reported a member of their household, or a friend, installed their thermostat, while a smaller proportion indicated that a contractor installed their thermostat (Figure 108).

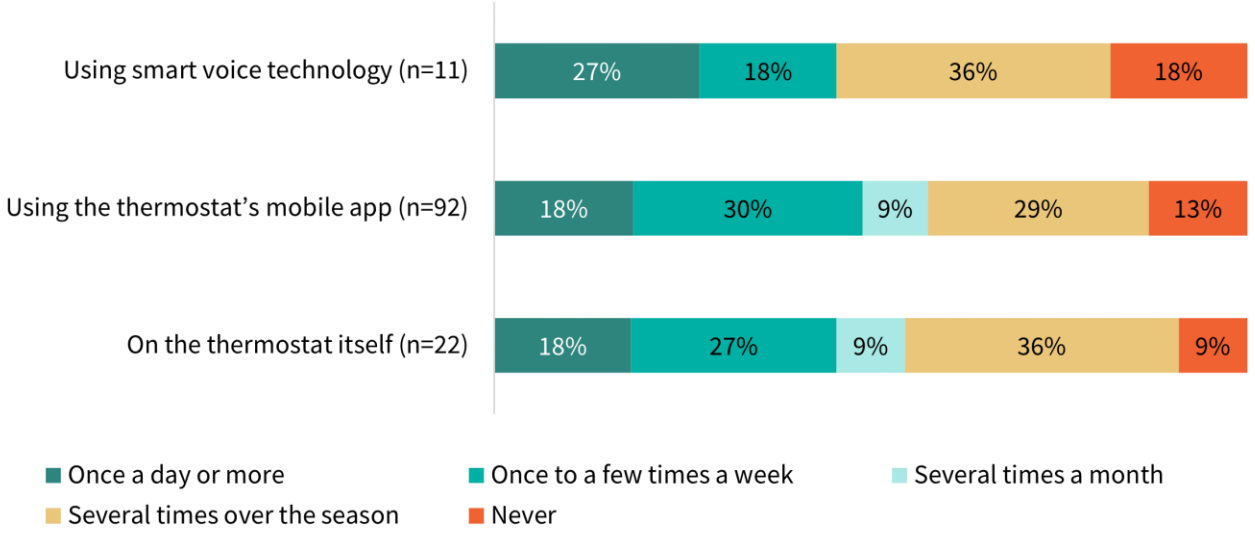
Figure 108. 2023 How the Thermostat was Installed (n=140)



Source: Online Marketplace customer survey. G1. Who installed your thermostat?

Most survey respondents (81%) programmed their own heating and cooling schedule, while 19% kept the thermostat's default settings. It was more common for customers to control their thermostat from the mobile app (74%) compared to using smart voice technology (e.g., Google Home, Alexa, Siri, etc.) or on the thermostat itself (Figure 109). About half of customers (48%) reported changing the temperature manually at least once a week and up to once a day or more regardless of method.

Figure 109. 2023 Frequency of Temperature Adjustments



Source: Online Marketplace customer survey. G3. How often do you use smart voice technology to control your thermostat? (e.g., Google Home, Alexa, Siri, etc.) G5. How often do you manually adjust the temperature on your thermostat, either using an app or on the thermostat itself?

6. APPENDIX - EASE

Appendix 6A. Detailed Study Methodology for EASE Program Evaluation

The EASE program evaluation sought to address the following process and impact evaluation research questions:

Process Evaluation Questions

- How are customers learning of the program?
- Are program marketing initiatives resonating with customers? Why do they choose to participate?
- Do customers understand the process for participation? Did the process meet their expectations?
- How accessible did participants find the program staff or contractors for asking questions?
- To what extent is the program servicing multifamily buildings compared with single-family?
- Are there barriers to serving multifamily customers that could be addressed through program design, outreach, and/or delivery?
- How satisfied are customers with the program overall as well as individual program pathways?
- Is the program meeting the needs of income-qualified customers?

Impact Evaluation Questions

- How do the gross verified per-unit energy assumptions compare to planning estimates? How and why should they be adjusted?
- Does the program tracking system capture all the relevant equipment properties needed to calculate savings?
- How did program participation and energy savings compare to projections across measures?

Activities employed to address these questions are detailed below in two sections: Data Collection Approach (which addresses process and impact evaluation activities) and Impact Evaluation Approach.

Data Collection Approach

The evaluation team collected data through interviews with program staff and the program 3rd party implementer, participant surveys, and interviews with participating program contractors and Public Housing Authorities. We conducted an interview with program staff to understand the program history, context, goals, and challenges. We also interviewed the program implementer to understand their experience and perspective of the program.

Participant surveys:

The evaluation team invited 385 EASE participants to complete a web- and phone-based survey through an email invitation and phone calls between November and December 2023. Customers received reminders to complete the survey. Those who completed the survey were entered into a drawing to win one of five $100 gift cards. The evaluation team received 100 completed surveys. The overall survey response rate was 26%.

Contractor Interviews:

The evaluation team interviewed eight contractors who participated through the EASE program. Four of the contractors interviewed also worked with HEIP. Most contractors that we spoke with traveled across the state for projects. One contractor completed work for multifamily buildings through EASE and the other seven worked with individual customers, primarily in single-family homes. These interviews were completed via phone or on Zoom and lasted approximately 45 minutes. Contractors received a $75 gift card for participating in this research.

Public Housing Authority Interviews

The evaluation team conducted three interviews with public housing authority staff who participated in the EASE program. The staff we spoke with worked with sites ranging from single-family and multifamily to senior housing. Interviews were completed via Microsoft Teams and lasted approximately 45 minutes to one hour. Public housing authority staff received $100 gift cards for participating in this research.

Impact Evaluation Approach

This section details each step of the impact evaluation for EASE. Evaluation activities were the same across the two pathways as summarized in Table 131.

Table 131. 2023 EASE Gross and Net Impact Evaluation Approaches

PATHWAY	GROSS IMPACT METHOD	NET IMPACT METHOD
SF and MF Non-Thermostat Measures	Engineering analysis based on desk reviews and site visits	Participant self-report, contractor interviews
SF and MF Thermostat Measures	Results of regression analysis conducted for HEIP Online Marketplace, extrapolated to EASE home types and fuel shares.	

Verified Gross Savings Approach

The evaluation team's approach to developing estimates of gross energy and demand savings included the following steps:

- **Reviewed and cleaned program tracking data.** The evaluation team reviewed extracts from VisionDSM that included customer contact information and measure characteristics (such as age, size, and configuration) to confirm and understand the tracked savings methodologies in use by the program.
- **Conducted desk reviews of project documentation.** The evaluation team selected a sample of 60 EASE participants from single-family and multifamily pathways for desk review. For each of these sampled projects, the team reviewed all supporting documentation stored in the program tracking system comparing measure types, heating types, and equipment counts against tracking records.
- **Conducted site visits.** The evaluation team conducted in-person and virtual site visits with a sample of 31 projects across the single-family and multifamily program pathways. The site visits visually verified installed measures, confirmed HVAC and water heating system type, measured square footage and insulation depths, and discussed equipment usage with participants.
- **Completed engineering analysis.** The evaluation team completed an engineering analysis for all projects in the evaluation sample, calculating verified gross savings using engineering algorithms with input parameters updated based on primary data collection.

The evaluation team primarily referred to savings values in the Georgia Power TRM 3.0. In cases where reported savings were determined through prior evaluations or building simulations, or when the algorithmic approach in the Georgia Power TRM 3.0 did not line up well with the available data, the evaluation team utilized algorithms and approaches from alternative sources. These TRMs included, but were not limited to, the Illinois TRM v12 and the Arkansas TRM v9.1.[57,58] Where appropriate, the same algorithms used to determine reported savings were used to calculate verified savings with updates to parameters based on primary data collection.

Key parameters collected via site visits and desk reviews included:

- Home size
- HVAC system type including heating fuel type, tonnage, and efficiency
- Insulation square footage, type, and depth
- Measure installation verification
- ISRs for LED bulbs, aerators, shower heads, advanced power strips, etc.
- Pre-retrofit lamp types

Net Savings Approach

Industry standard practice for programs targeting IQ population deems NTG at 1.0. However, per stakeholder request, the evaluation team calculated free-ridership and spillover for the EASE program. The evaluation team calculated free-ridership and spillover, and developed a NTGR, based on surveys with EASE program participants. We customized free-ridership and spillover batteries based on existing NTG approaches,

[57] 2024 Illinois Statewide Technical Reference Manual Version 12.0 vol. 2
[58] 2022 Arkansas Technical Reference Manual Version 9.1, vol. 2

customizing these approaches to align with the program design and -IQ population. Findings from contractor interviews were used as a consistency check. Additional detail on the NTG methodology can be found in Appendix 6A. Detailed Study Methodology for EASE Program Evaluation.

Appendix 6B. Additional Survey Findings

This section details additional findings from the participant survey analysis.

Awareness of Other Georgia Power Programs

Most respondents (88%) indicated they were not aware of another Georgia Power Energy Efficiency program aside from the EASE program. Among those who indicated awareness of another program (n=12) in the residential general population survey, HEIP was the most cited (n=6), followed by the Online Marketplace (n=5), the RR+ (n=5), and the Specialty Lighting Program (n=4). Few respondents were aware of the HopeWorks Program (n=2). HopeWorks provides free energy efficiency improvements (attic insulation, air sealing, duct sealing, LED lighting, or HVAC servicing) to IQ seniors 60 years of age or older. Although there is an overlap in the services provided by HopeWorks and EASE, there may be an opportunity for greater awareness of HopeWorks among this population to ensure that they are accessing the program that's the right fit for them; 22 respondents are 60 years of age or older and might qualify for HopeWorks.

Ease of Participation

The few respondents that said the participation process was not easy mentioned issues related to timing and rescheduling (n=3). The evaluation team asked additional questions specific to scheduling, as well as other program elements including the home energy assessment and receiving improvements. Most respondents indicated that all elements of the participation process were somewhat or very easy. However, where customers reported challenges, they most often related to communication and long wait times across all program elements.

The few respondents that did not find it easy to complete the program application were confused about the required information (n=2), struggled to complete the online form and upload documents (n=2), or needed to resubmit the form (n=2). Those participants that said it was not easy to schedule the initial assessment mostly said it was because it took a long time. The sections below detail customers' experiences with home energy assessments, receiving improvements, and changes to comfort.

Georgia Power staff, auditors, or contractors visited most homes (84%) once or twice to complete a home energy assessment and the improvements. A few (6%) participants had more than three visits from staff or contractors for their participation. Multiple visits to a customer's home are expected in the program design because multiple contractors may visit a customer's home to install different measures.

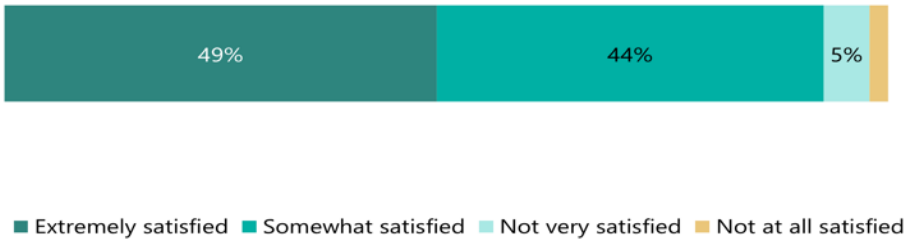
Experiences Contacting Georgia Power

Most respondents indicated that they did not have to contact Georgia Power for any reason throughout the participation process (77%, n=100). Of those that did, the most common reason was to ask about a delay (n=4). Other respondents had to contact Georgia Power regarding communication issues with contactors (n=3), to schedule the assessment (n=3), get support with the application (n=2), or inquire about things not addressed (n=2). It was relatively easy for customers to reach Georgia Power. Of the 23 customers that needed to contact Georgia Power, 16 (69%) said that it was somewhat or very easy to get in touch with Georgia Power. Of those who had trouble getting in touch with Georgia Power, the most common response was they didn't get a response back (n=4). However, responses suggest that respondents may be referring to both Georgia Power and participating contractors in response to this question.

Satisfaction with Georgia Power

Like program satisfaction, respondents indicated high levels of satisfaction with Georgia Power as their utility provider overall. Most respondents (93%, Figure 110) were somewhat or extremely satisfied with Georgia Power as their utility provider.

Figure 110. 2023 Satisfaction with Georgia Power (n=96)



Source: EASE Participant Survey. H7. How satisfied are you with Georgia Power as your utility service provider?

Appendix 6C. Survey Demographics

Customers were asked a series of demographic questions. Overall, respondents:

- Live in single-family homes (97%)
- Have lived in their current home for some time, over four years (67%)
- Live in homes built before 2000 (67%)
- Have at least some college but no degree (80%)
- Identify as Black or African American (69%) or White (29%)
- Identified English as their primary language (100%) though some respondents also speak Spanish, Vietnamese, and French at home

Below is a detailed table of the survey respondent demographics including home characteristics in Table 132 and respondent characteristics in Table 133.

Table 132. 2023 EASE Participant Survey Respondent Home Characteristics

HOME CHARACTERISTICS		PERCENT
Rent or own home	Rent	12%
	Own	88%
	Total respondents (n)	100
Type of home	Single-family	97%
	Manufactured Home	1%
	Multifamily	1%
	Duplex	1%
	Total respondents (n)	97
Heating fuel	Electricity	57%
	Natural gas	43%
	Total respondents (n)	96
Primary Water Heater Fuel	Electricity	53%
	Natural gas	47%
	Total respondents (n)	96
Number of years lived in home	One year or less	10%
	2 – 3 years	23%
	4 – 5 years	13%
	6 – 10 years	14%
	More than 10 years	39%
	Total respondents (n)	97
Year home was built	Before 1900	1%
	1900 to 1939	3%
	1940 to 1959	18%
	1960 to 1979	20%
	1980 to 1989	13%
	1990 to 1999	12%
	2000 to 2004	9%
	2005 or later	14%
	Don’t Know	9%
	Total respondents (n)	97
Number of People living in home	1	22%
	2	24%
	3	20%
	4	13%
	5	7%
	6	12%
	7	1%
	8	1%
	Total respondents (n)	91

HOME CHARACTERISTICS		PERCENT
Change in number of people living in the home	Increased	8%
	Decreased	14%
	Stayed the Same	78%
	Total respondents (n)	95

Source: EASE customer survey. I1-I5

Table 133. 2023 Respondent Characteristics

RESPONDENT CHARACTERISTICS		PERCENT
Generation age grouping	Silent generation - 77 or older	1%
	Baby boomer - between 58 and 76	30%
	Gen X - between 46 and 57	21%
	Millennials - between 27 and 45	44%
	Total respondents (n)	80
Total annual household income	Less than $25,000	36%
	$25,000 to less than $50,000	47%
	$50,000 to less than $75,000	17%
	Total respondents (n)	86
Highest level of education completed	Some high school or less	2%
	High school graduate or equivalent	17%
	Some college, no degree	21%
	Technical college degree or certificate	9%
	Two-year college degree	13%
	Four-year college degree	15%
	Graduate or professional degree	23%
	Total respondents (n)	92
Employment situation	Working or attending school outside of the home	39%
	Working or attending school from home	22%
	Retired	22%
	Stay-at-home parent or care provider	13%
	Unemployed	10%
	On medical, disability or maternity leave	27%
	Total respondents (n)	122
Change in Employment situation	Yes	13%
	No	87%
	Total respondents (n)	93

RESPONDENT CHARACTERISTICS		PERCENT
Race or ethnicity	White	29%
	Black or African American	69%
	Asian	1%
	Hispanic, Latino, or Spanish origin	5%
	Some other race, ethnicity, or origin	3%
	American Indian or Alaska Native	1%
	Native Hawaiian or Other Pacific Islander	1%
	Total respondents (n)	87
Language spoken at home	English	96%
	Spanish	2%
	Vietnamese	1%
	French	1%
	Total respondents (n)	101

Source: Online Marketplace customer survey thermostat customers. I8-I14.

Appendix 6D. EASE Impact Calculation Overview

Gross Savings

This appendix contains the assumptions used in electric savings and demand reduction algorithms for the measures within the EASE program. The team used industry standard algorithms and customized each assumption to reflect the population of projects claimed in 2023. Where appropriate, we leverage assumptions from the Georgia Power TRM 3.0 and supplemented with other TRMs. Detailed information on the analysis and supporting assumptions for the following EASE measures are listed in Table 134. The algorithms and assumptions the evaluation team used to calculate *verified* savings for each of these measures follow.

Table 134. 2023 EASE Program Measures

MEASURE	REVIEWED ASSUMPTIONS
Air Sealing	Pre-install and post-install infiltration rates, N-factor, latent multiplier, cooling and heating degree days, efficiencies of heating and cooling equipment
Attic Insulation	Pre-install and post-install R-values, square footage of installed insulation, cooling degree hours, heating degree days, cooling system SEER, heating system COP
Duct Sealing	Pre-install and post-install duct leakage rates, full load cooling hours, heating degree days, indoor and outdoor design enthalpy, efficiencies of heating and cooling equipment

Air Sealing

The team used the following equation to calculate electric energy and peak demand cooling savings for air Sealing:

$$kWh\ cooling\ savings = \frac{(CFM50_{pre} - CFM50_{post}) \times 60 \times 24 \times CDD2 \times C_{air} \times LM}{1{,}000 \times SEER \times N_{factor}}$$

$$Summer\ kW\ savings = kWh\ cooling\ savings \times DTE_{cooling}$$

For homes with electric heating, the team used the following equation to calculate electric energy and peak demand heating savings for air sealing:

$$kWh\ heating\ savings = \frac{(CFM50_{pre} - CFM50_{post}) \times 60 \times 24 \times HDD \times C_{air} \times 293.1}{1{,}000{,}000 \times COP2 \times N_{factor}}$$

$$Winter\ kW\ savings = kWh\ heating\ savings \times DTE_{heating}$$

Where:

$CFM50_{pre}$ = Pre-improvement air flow needed to depressurize the home to -50 pascals
$CFM50_{post}$ = Post improvement air flow needed to depressurize the home to -50 pascals
60 = Constant to convert from minutes to hours
24 = Constant to convert from days to hours
CDD = Cooling degree days
C_{air} = Volumetric heat capacity of air, Btu/cu.ft.-°F
LM = Latent multiplier to account for latent cooling performed by air conditioner
1,000 = Constant to convert watts to kW
SEER2 = Efficiency of the cooling system, SEER2
N_{factor} = Conversion factor to convert from CFM50 to natural air flow
HDD = Heating degree days
293.1 = Constant to convert MMBtu to kWh
1,000,000 = Constant to convert Btu to MMBtu
COP2 = Efficiency of the heating system, COP2
$DTE_{cooling}$ = Demand-to-energy ratio for space cooling end use
$DTE_{heating}$ = Demand-to-energy ratio for space heating end use

Table 135 lists the input assumptions and source of each assumption for the air sealing measure savings calculations.

Table 135. 2023 Assumptions and Inputs for Air Sealing

INPUT	VALUE	SOURCE
$CFM50_{pre}$	Actual	Site-specific from project documentation for the evaluation sample
$CFM50_{post}$	Actual	Site-specific from project documentation for the evaluation sample
CDD	Atlanta: 1778.7 Alma: 2690.4 Brunswick: 2899.4 Macon: 2347.7 Rome: 1916.1	TMYX 2007-2021 weather data[a]
C_{air}	0.018	Constant
LM	7.9	Dehumidification and Cooling Loads from Ventilation Air; Harriman, Plager, Kosar; ASHRAE Journal, November 1997, pp 37 – 45[a]
SEER2	Actual or 12.29	Actual or Average cooling efficiency from the sampled projects in the EASE evaluation sample
N_{factor}	40.5	Infiltration as Ventilation: Weather- Induced Dilution; William J. N. Turner, Max H. Sherman, Iain S. Walker; Environmental Energy Technologies Division; December 2012; average of climate zones 3A and 4A[b]
HDD	Atlanta: 2992.1 Alma: 1632.3 Brunswick: 1064.6 Macon: 2212.8 Rome: 3064.4	TMYX 2007-2021 weather data[c]
COP2	Actual or Heat Pump: 2.16 Electric Resistance: 1.0	Actual or Average heating efficiency from the sampled projects in the EASE evaluation sample
$DTE_{cooling}$	0.00057	Average hourly fraction of residential space cooling load shape that falls in Georgia Power summer peak demand definition
$DTE_{heating}$	0.00062	Average hourly fraction of residential space cooling load shape that falls in Georgia Power winter peak demand definition

[a] https://climate.onebuilding.org/WMO_Region_4_North_and_Central_America/USA_United_States_of_America/index.html#IDGA_Georgia-
[b] https://static1.squarespace.com/static/52ed80f1e4b0354340039c3c/t/55ee091ee4b0677742860249/1441663262601/Ventilation_Loads.pdf
[c] https://eta-publications.lbl.gov/sites/default/files/lbnl-5795e.pdf

Attic Insulation

The team used the following equation to calculate electric energy and peak demand cooling savings for attic insulation:

$$kWh\ cooling\ savings = \frac{\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) \times CDD \times 24 \times DUA \times Area \times Adj_{cool}}{1{,}000 \times \eta Cool}$$

$$Summer\ kW\ savings = \ kWh\ cooling\ savings\ \times DTE_{cooling}$$

For homes with electric heating, the team used the following equation to calculate electric energy and peak demand heating savings for attic insulation:

$$kWh\ heating\ savings = \frac{\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) \times HDD \times 24 \times Area \times 293.1 \times Adj_{heat}}{1{,}000{,}000 \times \eta Heat}$$

$$Winter\ kW\ savings = \ kWh\ heating\ savings\ \times DTE_{heating}$$

Where:

R_{exist} = Pre-installation R-value

R_{new} = Post-installation R-value

CDD = Cooling degree days

DUA = Discretionary use adjustment to account for not always running the cooling system above 75 degrees (F) outdoor air temperature

Area = Square footage of area covered by new insulation

Adj_{cool} = Adjustment factor to account for real world savings from calculation

1,000 = Constant to convert watts to kW

ηCool = Efficiency of the cooling system, SEER2

HDD = Heating degree days

24 = Constant to convert days to hours

293.1 = Constant to convert MMBtu to kWh

Adj_{heat} = Adjustment factor to account for real world savings from calculation

1,000,000 = Constant to convert Btu to MMBtu

ηHeat = Efficiency of the heating system, COP2

$DTE_{cooling}$ = Demand-to-energy ratio for space cooling end use

$DTE_{heating}$ = Demand-to-energy ratio for space heating end use

Table 136 lists the input assumptions and source of each assumption for the attic insulation measure savings calculations.

Table 136. 2023 Assumptions and Inputs for Attic Insulation

INPUT	VALUE	SOURCE
R_{exist}	Actual	Site-specific from project file review and site visits
R_{new}	Actual	Site-specific from program tracking database, project file review, and site visits
CDD	Atlanta: 1778.7 Alma: 2690.4 Brunswick: 2899.4	TMYX 2007-2021 weather data[a]

INPUT	VALUE	SOURCE
	Macon: 2347.7 Rome: 1916.1	
DUA	0.75	Mid-Atlantic TRM version 9 which cites Energy Center of Wisconsin, May 2008 metering study. "Central Air Conditioning in Wisconsin, A Compilation of Recent Field Research", p31.[b]
Area	Estimated	Estimated attic area based on home square footage from Georgia Power EASE tracking database.
Adj_{cool}	0.8	Mid-Atlantic TRM version 9, which cites Illinois TRM, 9 as demonstrated in two years of metering evaluation by Opinion Dynamics. Adjusts savings derived through engineering algorithms to actual savings measured in field.[c]
ηCool	Actual	Specific to each site
HDD	Atlanta: 2992.1 Alma: 1632.3 Brunswick: 1064.6 Macon: 2212.8 Rome: 3064.4	TMYX 2007-2021 weather data[a]
Adj_{heat}	0.6	Mid-Atlantic TRM version 9, which cites Illinois TRM, 9 as demonstrated in two years of metering evaluation by Opinion Dynamics. Adjusts savings derived through engineering algorithms to actual savings measured in field. [c]
ηHeat	Actual	Specific to each site
$DTE_{cooling}$	0.00057	Average hourly fraction of residential space cooling load shape that falls in Georgia Power summer peak definition.
$DTE_{heating}$	0.00062	Average hourly fraction of residential space heating load shape that falls in Georgia Power summer peak definition.

[a] https://climate.onebuilding.org/WMO_Region_4_North_and_Central_America/USA_United_States_of_America/index.html#IDGA_Georgia-
[b] Dehumidification and Cooling Loads from Ventilation Air
[c] Infiltration as Ventilation: Weather- Induced Dilution

Duct Sealing

The team used the following equation to calculate electric energy and peak demand cooling savings for duct sealing:

$$kWh\ cooling\ savings = \frac{\Delta CFM25DL \times EFLH_c \times 12{,}000 \times TRF_{cool}}{400 \times \eta Duct \times SEER2 \times 1{,}000}$$

$$Summer\ kW\ savings = kWh\ cooling\ savings \times DTE_{cooling}$$

For homes with electric heating, the team used the following equation to calculate electric energy and peak demand heating savings for duct sealing:

$$kWh\ heating\ savings = \frac{\Delta CFM25DL \times EFLH_h \times 12{,}000 \times TRF_{heat}}{400 \times \eta Duct \times HSPF2 \times C_{IV-III} \times 1{,}000}$$

$$Winter\ kW\ savings = kWh\ heating\ savings \times DTE_{heating}$$

Where:

ΔCFM25DL = Duct leakage reduction @ 25 pascals, CFM
$EFLH_c$ = Equivalent full-load hours of cooling
$EFLH_h$ = Equivalent full-load hours of heating
12,000 = Constant to convert tons to Btu/h
400 = Nominal CFM per ton of refrigeration
1,000 = Constant to convert watts to kW
SEER2 = Efficiency of the cooling system, SEER2, Btu/W-hr
HSPF2 = Efficiency of the heating system, HSPF2, Btu/W-hr
TRF_{cool} = Thermal regain factor for cooling depending on duct location
TRF_{heat} = Thermal regain factor for heating depending on duct location
ηDuct = Pre-duct sealing system distribution efficiency
C_{IV-III} = Conversion from rated HSPF to HSPF appropriate for AHRI climate zone III
$DTE_{cooling}$ = Demand-to-energy ratio for space cooling end use
$DTE_{heating}$ = Demand-to-energy ratio for space heating end use

Table 137 lists the input assumptions and source of each assumption for the duct sealing measure savings calculations.

Table 137. 2023 Assumptions and Inputs for Duct Sealing

INPUT	VALUE	SOURCE
ΔCFM25DL	207.3	Average CFM25 reduction from the 2021 EASE evaluation.
$EFLH_c$	816.4	Georgia Power TRM 2.0.
$EFLH_h$	728.7	Georgia Power TRM 2.0.
SEER2	Actual	Specific to each site
HSPF2	Actual	Specific to each site
TRFcool	1.0	MN TRM v3.2, value for unconditioned spaces (attic, crawl space, outdoors).[a]
TRFheat	1.0	MN TRM v3.2, value for unconditioned spaces (attic, crawl space, outdoors).[b]
ηDuct	0.89	Building Performance Institute, Inc., 11/20/2007, Distribution Efficiency look- Up Table, Building Performance Institute Technical Standards for the Heating Professional. Cited in MN TRM v3.2.[b]

INPUT	VALUE	SOURCE
CIV-III	1.1	C.K. Rice et al. An Analysis of Representative Heating Load Lines for Residential HSPF Ratings. July 2015. https://info.ornl.gov/sites/publications/files/Pub56184.pdf. Fig. B.4 shows an actual HSPF approximately 10% greater than rated HSPF for zone V, using the standard AHRI 210/240 load line. Cited in MN TRM 3.2 and adjusted for prevailing GA climate zone.[b]
DTEcooling	0.00057	Average hourly fraction of residential space cooling load shape that falls in Georgia Power winter peak periods
DTEheating	0.00062	Average hourly fraction of residential space heating load shape that falls in Georgia Power winter peak periods

[a] Minnesota Technical Reference Manual, Version 3.2
[b] 2023 Illinois Statewide Technical Reference Manual Version 11.0 vol. 2

LED Lighting

The team used the following equation to calculate electric energy and peak demand cooling savings for LED lighting:

$$kWh = Qty * \frac{Watts_{Baseline} - Watts_{Efficient}}{1{,}000} * HOU_R * 365.25 * ISR * HVAC_E$$

$$Summer\ kW\ Savings = kWh * ETDF_S * HVAC_{D_S}$$

$$Winter\ kW\ Savings = kWh * ETDF_W * HVAC_{D_W}$$

Where Table 138 lists the input assumptions and source of each assumption for the LED lighting measure savings calculations:

Table 138. 2023 Assumptions and Inputs for LED Lighting

IMPACT FACTOR	VALUE	SOURCE
$Watts_{Baseline}$	Variable	Baseline wattages determined from review of pre-retrofit photo documentation for projects in evaluation sample.
$Watts_{Efficient}$	Variable	Efficient wattages from equipment specifications for program-installed LED bulbs.
Daily Hours of Use (HOU)	HOU_R: 2.62 HOU_E: 6.78	Used research from 2013 Georgia Power Light Meter Study and 2017 Demand Side Management (DSM) Program Evaluation. Illinois TRM v11 for exterior lamps (daylight sensors).[a]

IMPACT FACTOR	VALUE	SOURCE
Summer and Winter Energy to Demand Factors (ETDF) and Coincidence Factors (CF)	$ETDF_S$: 0.0114% $ETDF_W$: 0.0172% CF_S: 57.4%	The ETDF values used in the 2017 evaluation, which were drawn from the load shape of a large southeastern state utility.
Interactive Effects (HVAC)	$HVAC_E$: 0.98 $HVAC_{D_S}$: 1.175 $HVAC_{D_W}$: 0.849	Our team performed interactive effects modeling in the prior evaluation cycle. We estimate separate factors for energy ($HVAC_E$) and summer/winter peak demand ($HVAC_{D_S}$ and $HVAC_{D_W}$).
ISR	Variable	Based on quantity of bulbs verified as installed during site visits.

[a] 2023 Illinois Statewide Technical Reference Manual Version 11.0 vol. 2

Net Savings

The EASE evaluation uses a modified version of the self-report approach outlined by the UMP. The participant survey included questions to measure free-ridership and spillover in the same survey. Free-ridership measures the portion of savings that would have occurred absent program intervention, where a full free-rider would have made the same changes to their home without program intervention, a non-free-rider would not have completed the project and/or activity without the influence of the program, and a partial free-rider would have partially replicated the program activity. For the EASE program, the free-ridership questions focused on the participant's ability to pay for the improvements they received. Participant spillover focuses on the program influence on customers' decisions to invest in additional energy efficiency measures for which they did not receive a rebate. Free-ridership and spillover are both discussed in more detail below.

Free-ridership

The free-ridership approach used by the evaluation team assesses free-ridership in two steps: intention and influence. Intention asks respondents about the likelihood of carrying out the energy efficiency measure without the energy efficiency program's installation, while influence gathers information about the rationale behind taking the energy-efficient action to determine the energy efficiency program's direct influence. Both influence and intention questions result in a score between zero and one. Participants were asked free-ridership questions about all the improvements they received as a whole. The final free-ridership value is calculated as the average of the intention and influence scores. Additional details on intention and influence free-ridership methodologies are included in the sections below.

Intention

The approach the evaluation team used breaks out intention into three components: timing, quantity, and efficiency, asking about these elements independently. The participant survey included questions asking about how the program impacted these three elements.

Influence

To estimate influence, the evaluation team asked respondents one question with several options to identify how program elements influenced their decisions about the energy efficiency measure they installed. These questions help to determine how influential the program was in that decision-making process.

Consistency Checks

The evaluation team also included consistency checks, open-ended questions about the program that are a best practice recommended by the UMP, to confirm that the understanding of program influence as reflected in the intention and influence scores is accurate. No respondents were excluded from the analysis due to inconsistent responses. The evaluation team also looked at findings from contractor interviews as a consistency check.

Spillover

The evaluation team also assessed whether respondents purchased and installed energy efficiency measures for which the evaluation team could accurately estimate energy savings and whether the program had an influence on respondent decision making. We calculated total spillover savings for each participant as the product of measure savings, number of units and influence score, before estimating the participant spillover for the survey sample, adjusting it for the population, and estimating an overall spillover ratio. In this case, spillover was calculated to be less than 0.1% so was not included in the analysis.

7. APPENDIX – REFRIGERATOR RECYCLING+ (RR+)

Appendix 7A. Detailed Study Methodology for RR+ Program Evaluation

The RR+ program evaluation sought to address the following process and impact research questions:

Process Questions

- How are customers learning of the program?
- What influences customer decisions to participate in the program?
- How satisfied are customers with the process, the implementation contractor, and their experiences in general?
- What is customer understanding and interest in the new add-on recycling options (A/Cs and dehumidifiers)?
- Are customers installing kit equipment? Are some measures more of-interest to customers than others?
- What are customer experiences with recycling/drop-off events?
- What is the vintage of equipment recycled, and how does that vintage compare with the general population as well as prior years' appliances? Based on these trends, what changes might the program consider for future program years?

Impact Questions

- What are updated savings values for refrigerators and freezers based on in-situ metered data?
- Are the savings assumptions for room A/Cs, dehumidifiers, and kits accurate? If not, what should be updated?
- How did the program perform against participation and savings goals?
- Is the program as implemented cost-effective according to the Total Resource Cost (TRC) Test? Are there any program modifications that could make this program more cost-effective according to the TRC Test?
- How influential was the program in encouraging the removal of their equipment, and what components of the program have the greatest influence on customers' decisions?

Activities employed to address these questions are detailed below in two sections: Data Collection Approach (which addresses process and impact evaluation activities) and Impact Evaluation Approach.

Data Collection Approach

The evaluation team conducted a series of evaluation activities to address the research questions listed above.

Program staff and stakeholder interviews: The evaluation team interviewed the RR+ program manager to understand current program processes, history of the offerings, outreach and marketing strategies, program

goals and objectives, and prospects and barriers for meeting those goals. Additionally, the evaluation team interviewed program implementation contractor, UES, and sub-contractor staff, ARCA, for additional context around program processes and current activities.

Tracking system analysis and engineering review: In the early stages of the evaluation, the evaluation team requested an extract of the detailed RR+ tracking data representing participation in the 2023 program year. Having this data allowed the team to set up data cleaning and sampling procedures and provide an opportunity to review the data for any anomalies or issues that would be important for Georgia Power to be aware of. Specifically, the evaluation team identified whether the following key information is captured for refrigerators and freezers:

- Customer contact information
- Appliance age or year manufactured
- Appliance size (cubic feet)
- Configuration (equipment style)

These data points were necessary for estimating gross savings estimates and providing longitudinal, market-focused analysis. The evaluation team requested refreshed detailed program data extracts, in preparation for data collection and engineering analysis monthly. In May 2024, the team received the final, updated tracking data.

As described below, the evaluation team used an in-situ metering study to provide updated savings estimates for refrigerators and freezers. For all other measures, the evaluation team used an engineering review to estimate savings using inputs from tracking data and participant surveys. The evaluation team reviewed current Technical Resource Manuals (TRMs) to determine an appropriate savings algorithm for each measure (beginning with the Georgia Power TRM 3.0).

Participant surveys: The evaluation team conducted 246 customer surveys in November and December 2023 to program participants who recycled refrigerators, freezers, dehumidifiers, and room A/Cs and received a free kit after they recycled their appliance(s).

- **Process Evaluation.** To inform the process evaluation, the survey gathered information from customers about their experiences with the program including satisfaction with the ease of the program participation process, interactions with the program implementers, and the appliance removal process for scheduled pick-ups. The survey asked about why customers participated and their experiences with kits and to seek recommendations for program improvement.
- **Impact Evaluation.** To inform the impact evaluation, the survey provided critical inputs to inform the savings calculations for recycled measures. Specifically, the survey gathered customers' reports of their usage of refrigerators and freezers to inform calculations for the UEC, part-use factors, and other characteristics.

The survey also collected NTG related data, including what the customer would have done with the appliance absent the program, and influence the offerings (e.g., incentive, and free pick-up) had on their decision to retire the appliance through the program.[59] For kit measures, the surveys captured key impact inputs such as ISRs. To calculate the primary and secondary units that were recycled, we included a question in the survey that asked where the appliance was located prior to the appliance being removed. If kitchen was selected, it was coded as primary, and other options (garage, porch/patio, basement, other) were coded as secondary. Survey instruments were provided to Georgia Power and Georgia Public Service Commission staff for review prior to fielding.

In-situ Metering: The evaluation team metered a total of 31 appliances and modeled 21 appliances (20 refrigerators and 1 freezer) based on availability of necessary appliance characteristic information (see In-situ Metering Study Recruitment for additional detail). Meters were installed for a minimum of 10 days, as recommended in Chapter 7. Refrigerator Recycling Evaluation Protocol of the Uniform Methods Project (UMP) and gathered information to estimate the annual energy consumption of units in the program population to inform the impact evaluation. [60]

Residential general population surveys: The evaluation conducted 350 residential general population surveys in October 2023 to inform both the process and impact evaluation activities. To support impact evaluation, the general population survey gathered information about:

- Awareness of RR+ (process evaluation)
- Number of refrigerators and freezers in home (market and impact/NTG evaluation)
- Age of refrigerators and freezers in home (market evaluation)
- Intent to, means of, and timeframe for potentially removing or replacing refrigerators/freezers (market and NTG evaluation)

The results of this cross-cutting activity were integrated into the process and impact evaluation results as is useful and applicable.

In-situ Metering Study Recruitment

The evaluation team initially planned to launch the metering study in July of 2023 and to be completed before the end of 2023. The study was designed with a sample target of 70 metered refrigerators and 30 metered freezers, to ensure a robust and representative sample of appliances. Program tracking data through June of 2023 showed 2,125 refrigerators and freezers were recycled, which suggested sufficient population to recruit from for the metering study to achieve the target number of refrigerators and freezers.

[59] The sample for customers who recycled room A/Cs and dehumidifiers was too small to meaningfully inform these calculations.

[60] Kurnik, Charles W., Josh Keeling, and Doug Bruchs. "Chapter 7. Refrigerator Recycling Evaluation Protocol. The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures." National Renewable Energy Lab. (NREL), Golden, CO (United States), October 4, 2017. https://doi.org/10.2172/1398879

However, just prior to launching the study, ARCA, the primary subcontractor to the program's implementer, --UES-, ceased business operations and discontinued scheduling appliance pick-ups.

The program was paused until Georgia Power and UES relaunched the program in August 2023. The relaunch of the program was not able to get fully up-to-speed right away. UES resources were stretched to overcome new resource limitations and continue program implementation with fewer drivers available for pick-ups and new drivers needing time to get up to speed. To relieve some pressure, Georgia Power paused marketing the RR+ program. These roadblocks indicated that there would be fewer customers overall available to participate in the study.[61]

The evaluation team took steps in September 2023 to get the metering study underway, including, 1) onboarding and badging of field technicians, 2) meetings with Georgia Power and UES about metering equipment, clarifying UES's role in removing the devices, and impact evaluation training, and 3) submitting a formal customer data request (9/25).The pause delayed the launch of recruitment for the metering study while UES focused initial efforts on customers who had pick-up appointments scheduled before ARCA ceased operations.

The study team began recruitment the week of Oct 23, 2023. Georgia Power, UES, and the study team agreed to a plan for data sharing: Georgia Power/UES would provide weekly customer lists and the study team would provide weekly study participant schedule updates.

The planned weekly cadence for data sharing was more difficult to maintain than anticipated given the slow progress both on identification of new customers to recruit from UES and on successful recruitment of study participants. From Oct 23, 2023, to Feb 7, 2024, a period of 16 weeks including holidays, the team received 6 new customer lists and provided 3 updated participant schedules plus two verbal updates when no new customers were scheduled. Through February 2024, the evaluation team received only 388 customers for recruiting that were pending pick-up appointments.

In anticipation of slower than expected recruitment, the team also added a residential general population survey effort to screen for customers who would be willing to participate in the metering study. A total of 141 customers indicated they would be open to participation. The recruitment team followed up with these customers to confirm eligibility for the metering study. Eligibility criteria included:

- Appliances that would meet criteria for recycling – residential refrigerators or freezers between 10 and 30 cubic feet.
- Appliances at least seven years old, as newer appliances would not be representative of those recycled through the program.
- Appliances kept in a location that would be safely accessible for the field technicians.
- Appliances in homes located within geographies accessible to field technicians, for example, avoiding 8-hour round trip for a single meter installation.

[61] Per Georgia Power, UES since contracted with a new vendor, Resource Innovations, to support scheduled pick-ups.

The evaluation team initially offered participants $100 for participating in the metering study. The team increased the incentive amount to $150 to try and boost participation. However, lack of interest on the part of the program participants waiting on their appliance to be collected and recycled was not the greatest barrier. Rather, many participants would have been willing to participate and have meters installed, but their appliances had already been emptied of food and moved to a new location. The change in how these appliances were used within homes made them ineligible as these would not be representative of typical refrigerator and freezer usage.

The recruiting team contacted all 141 customers via email following the close of the general population survey and completed metering at seven households from the general population survey respondents. The remaining homes either did not respond to emails or were determined to be ineligible.

Overall, the metering study achieved a response rate of approximately 7% from the recruited customers including both program participants and general population survey respondents. However, the metering study fell short of its target, metering only 31 total appliances rather than the target of 100 total appliances.

The response rate is reasonable given the potential inconvenience of participating in the metering study. Many customers who are scheduling pick-ups through the program to recycle appliances already prepare their appliances for collection and recycling before or very shortly after scheduling a pick-up, meaning they moved the appliance from the location where it had been used historically within the household and food was emptied from the appliance. The goal of an in-situ metering study is to capture energy use as the appliances are typically used in the homes. Installing meters on appliances that had been moved and emptied of food would not be an accurate representation of energy use in the absence of the program.

The response rate was not the reason the study fell short of the target, despite continuing recruitment for an additional three months into 2024. Rather, participation was significantly lower after relaunch than it was before ARCA ceased operations. The tracking data through June of 2023 contained 2,125 refrigerators and freezers, while the customer lists received between October 2023 and March 2024 contained fewer than 600 total customers. Had participation in the second half of 2023 been equivalent to the first half, with 2,125 appliances and nearly 2,000 customers to recruit from, a 7% response rate would have surpassed the planned target of 100 appliances.

Survey Sampling

The evaluation team collected surveys from both participants and nonparticipants to provide input into the gross and net impact evaluations as well as process evaluation.

PARTICIPANT SURVEY SAMPLING

The evaluation team pulled a sample from the program tracking data on October 30, 2023, and utilized a stratified random sample of program participants for the process and impact evaluations. The sample was stratified by large appliance type targeting 70 survey completes each for refrigerators and freezers. A census of small appliance participants and kit recipients were included in the sample, targeting up to 70 completes combined for all small appliances (up to 35 dehumidifiers, up to 35 room A/Cs (Table 139).

By design, kits were distributed to all participants and therefore sampling design did not include kits. However, delays in kit distribution and tracking data updates indicated that not all participants would have received a kit by the time they took the survey. To address this, the survey asked all respondents if they received a kit, and if so, directed them to complete the kit measure battery.

Table 139. 2023 Participant Survey Sampling and Response Rate

MEASURE	POPULATION [a]	TARGET	SAMPLE [a]	COMPLETES [a]	RESPONSE RATE
Refrigerators	2,279	70	2,145	166	8%
Freezers	406	70	384	87	23%
Dehumidifiers	69	Up to 35	66	29	44%
Room A/Cs	88	Up to 35	84	45	56%
Kits – Electric	N/A	Up to 70 per kit measure	N/A	55	N/A
Kits – Dual fuel	N/A	Up to 70 per kit measure	N/A	123	N/A
Overall Total	4,809	N/A	2,558	252	10%

[a] Population, Sample, and Completes counts reflect unique customers per measure. Some customers recycled more than one measure.

GENERAL POPULATION SURVEY SAMPLING

The evaluation team randomly sampled 3,500 nonparticipant Georgia Power customers with a goal of 350 completed surveys and achieved a 7% response rate (Table 140). In addition to providing process and market findings, a primary goal of this survey was to identify customers who have disposed of a refrigerator or freezer as a point of triangulation for the RR+ NTG analysis (per UMP recommendations). Of the 250 surveys completed, the evaluation team estimated that approximately 70 had disposed of an appliance recently (based on other similar surveys completed).

Table 140. 2023 General Population Survey Sampling and Response Rate

TARGET	SAMPLE	COMPLETES	DISPOSED OF APPLIANCE	ACTUAL RESPONSE RATE
350	3,500	350	80	7%

RR+ Participant Survey Demographics

Customers were asked a series of demographic questions. Table 141 lists respondent characteristics. Overall, respondents:

- Live in single-family homes (97%)
- Have lived in their current home for some time, over four years (80%)
- Live in homes built before 2000 (69%)
- Have at least some college, but no degree (88%)
- Identify as Black or African American (16%) or White (59%).

Below, is a detailed table of survey respondent demographics.

Table 141. 2023 RR+ Participant Survey Demographic Data (n = 246)

VARIABLE	PROPORTION
OWNERSHIP STATUS (n = 229)	
Own	93%
Rent	7%
HOUSE TYPE (n = 230)	
Single-Family	97%
Manufactured home	1%
Duplex (2 units)	<1%
Multifamily (3+ units)	2%
HOME TENURE (n = 235)	
One year or less	8%
2-3 years	12%
4-5 years	6%
6-10 years	15%
More than 10 years	59%
YEAR HOME WAS BUILT (n = 220)	
Before 1900	2%
1900 to 1939	5%
1940 to 1959	10%
1960 to 1979	23%
1980 to 1989	11%
1990 to 1999	18%
2000 to 2004	10%
2005 or later	22%
HOUSEHOLD INCOME (n = 158)	
Less than $25,000	6%
$25,000 to less than $50,000	22%
$50,000 to less than $75,000	22%
$75,000 to less than $100,000	15%
$100,000 to less than $150,000	13%

VARIABLE	PROPORTION
$150,000 to less than $200,000	13%
$200,000 or over	10%
EDUCATION (n = 215)	
Some high school or less	2%
High school graduate or equivalent	10%
Some college, no degree	13%
Technical college degree or certificate	6%
Two-year college degree	7%
Four-year college degree	31%
Graduate or professional degree	31%
AGE (n = 245)	
Less than 30	4%
30 - 39	10%
40 - 49	13%
50 - 59	17%
60 - 69	32%
70+	24%
RACE/ETHNICITY (Select all that apply) (n = 200)	
American Indian or Alaska Native	<1%
Asian	4%
Black or African American	16%
Hispanic, Latino, or Spanish origin	2%
Middle Eastern or North African	1%
White	59%
HOUSEHOLD SIZE (n = 208)	
1 person	20%
2 people	43%
3 people	15%
4 people	13%
5+ people	9%

Impact Evaluation Approach

This section details each step of the impact evaluation for RR+.

Verified Gross Savings Approach

The evaluation team's approach to developing estimates of gross energy and demand savings varied by measure type. Each approach is described below within the following subsections:

- Refrigerators and Freezers.
- Dehumidifiers and Room A/Cs.
- Kits.

REFRIGERATORS AND FREEZERS

Chapter 7 of the UMP directs evaluators on approaches for calculating savings resulting from refrigerator and freezer recycling programs.[62] The evaluator has three options: (1) **conduct in-situ metering using participants from Georgia Power's program,** (2) use meter data or a model derived from meter data collected from another evaluation deemed representative, or (3) apply inputs gathered through primary and secondary sources to the prescribed UMP regression equation to calculate UEC.[63] The evaluation team determined the first option—in-situ metering from a sample of Georgia Power's customers—is the optimal to evaluate RR+ as available metering data from other evaluations are no longer representative of current RR+ appliances. The previous metering study was conducted in 2011 and the vintage of these appliances is more heavily weighted toward appliances that were manufactured under older, less stringent performance standards.

Below, we list the steps taken to determine the regression model and estimate savings.

Overall, to develop estimates of gross impacts, the evaluation team took the following steps:

- **Reviewed and cleaned program tracking data.** The evaluation team reviewed extracts from VisionDSM that included key appliance characteristics (such as age, size, and configuration) to ensure recycled appliances met program requirements and to estimate calculation inputs for the regression equation.
- **Conduct in-situ metering.** The Evaluation Team conducted a metering study of 31 participating refrigerators and freezers, of which 21 had appliance characteristics necessary for modeling to estimate the annual energy consumption of units in the program population.
- **Conducted a literature review of contemporary estimates of energy use for refrigerators and freezers.** The evaluation team reviewed timelines of various appliance efficiency standards and the estimated trends in annual kWh.

[62] https://www.energy.gov/eere/uniform-methods-project-determining-energy-efficiency-program-savings

[63] Average Annual Energy Consumption of participating appliances.

- **Calculated UEC using a regression model.** The evaluation team used key appliance inputs from 2023 program tracking data to estimate current savings with the 2023 Georgia Power regression model.
- **Conducted participant and nonparticipant surveys.** These surveys provided key appliance information, such as how often appliances were used prior to being recycled, in addition to other data that fed into the NTG and process evaluations. More details on how these surveys were sampled and fielded are included in Appendix 7A. Data Collection Approach.
- **Developed estimates of part use factor.** The evaluation team utilized the participant surveys to calculate a self-reported estimate of how often appliances were used annually.

The 2023 RR+ impact evaluation included an appliance metering study and developed a regression model for this specific purpose (as specified in Appendix 7B. Impact Calculation Overview). Given the high cost of metering, the UMP recommends this approach where reliable and territory specific data exists. Gross savings are calculated as such:

Gross_kWh = *N * Existing_UEC * Part_use*

Where:

Gross_kWh = *Annual electricity savings*

N = *Number of appliances recycled*

Existing_UEC = *Average Annual Energy Consumption of participating appliances*

Part_use = *Portion of year the average appliance would likely be plugged in and operating*

The calculations and additional details on the approaches used to develop *Existing_UEC* and *Part_use factors* can be found in Appendix 7B. Impact Calculation Overview: Gross Savings.

DEHUMIDIFIERS AND ROOM A/CS

The evaluation team calculated verified savings using algorithms from the Georgia Power - TRM 3.0 and the 2021 Pennsylvania TRM.[64] Then, the team updated the assumed capacity values with the actual values captured at pick-up.

Overall, to develop estimates of gross impacts, the evaluation team took the following steps:

- **Reviewed and cleaned program tracking data.** The evaluation team reviewed extracts from VisionDSM that included customer contact information and key appliance characteristics (e.g., size) to ensure recycled appliances met program requirements.
- **Calculated verified savings.** The evaluation team used key appliance inputs from the 2023 program tracking data to estimate current savings using algorithms from the Georgia Power TRM 3.0

[64] https://www.puc.pa.gov/filing-resources/issues-laws-regulations/act-129/technical-reference-manual/

(dehumidifiers) and the 2021 Pennsylvania TRM (room A/C units), then adjusted the 2021 Pennsylvania TRM weather variables to reflect the Atlanta climate.

- **Conducted participant and nonparticipant surveys.** These surveys provided key appliance information that fed into the NTG and process evaluations. The Appendix includes additional details on how these surveys were sampled and fielded.

KITS

The evaluation team referred to the Georga Power TRM 3.0 for the algorithms to calculate verified savings for:

- Bathroom aerators.
- Kitchen aerators.
- Low-flow showerheads.
- Pipe insulation.

And the Illinois TRM 11.0 for:

- Gaskets.
- Rope caulk.
- Weatherstripping.

Verified savings were not assigned to LEDs.

The evaluation team used updated algorithms based on the 2023 inputs from the 2023 participant survey, such as people per household, bathroom faucets per home, and showerheads per home, which adjusted weather variables for the prescriptive air sealing measures (gaskets, rope caulk, and weatherstripping) to reflect the Atlanta climate. Next, the team applied the survey-derived, measure-specific ISRs and updated the savings based on the presence of electric water and space (home) heating.

Net Savings Approach

The evaluation team calculated net savings for refrigerators and freezers recycled and kit measures distributed through RR+. We calculated free-ridership and developed a NTGR based on surveys with RR+ participants. Few participant survey respondents recycled small appliances (n=11); therefore, the evaluation team could not draw meaningful conclusions about net savings for these appliances.

Appendix 7B. Impact Calculation Overview

In this appendix, the evaluation team describes the equations we used to calculate electric savings and demand reduction for all recycled appliances and kits measures. The section is organized by:

- Measure Verification.
- Gross Savings Calculation by Measure.

Gross Savings

This appendix contains two sections, Deemed Savings and Verified Gross Savings, that describe the assumptions used in electric savings and demand reduction algorithms for the measures within RR+. The team used industry standard algorithms and customized each assumption to reflect the population of projects claimed in 2023. Where appropriate, we leveraged assumptions from the Georgia Power -TRM 3.0 and supplemented with other TRMs. The algorithms and assumptions the evaluation team used to calculate verified savings for each of these measures are shown under Verified Gross Savings, including detailed information on the analysis and supporting assumptions for each.

Deemed Savings

REFRIGERATORS AND FREEZERS

Deemed energy savings values currently used by the program were derived from the 2021 program evaluation, and values used for this evaluation were calculated using the most recent program tracking data and results from the in-situ metering study. As the per-unit energy savings value is comprised of both average annual energy consumption of participating appliances (existing UEC) and portion of the year the average appliance would likely have been plugged in and operating (participant-use factor), changes in these values (i.e., the attributes of the appliances recycled each year) result in corresponding changes to the per-unit savings value (Existing UEC). The evaluation team found significantly lower energy savings for this cycle (see Verified Gross Savings Approach for more detail).

DEHUMIDIFIER AND ROOM A/CS

The dehumidifier deemed savings are based on the Georgia Power TRM 3.0, which references the 2021 Pennsylvania TRM, and the room A/C deemed savings are based on the Georgia Power TRM 3.0 and a computer simulation. These appliances' vintage and capacity ratings serve as key considerations in the savings equations, directly influencing the per-unit savings. Year-over-year fluctuations in the capacity ratings of recycled appliances and improvements in appliance efficiencies contribute to disparities between deemed and gross savings.

Notably, the average capacity for the program year 2023 recycled dehumidifier capacity ratings (34 pints per day) was lower than the assumed capacity ratings for the deemed savings (36 pints per day), which resulted in lower gross savings. For the room A/C units, the team relied on the 2021 Pennsylvania TRM to incorporate actual capacity ratings of the PY2023 recycled units, resulting in lower savings compared to the deemed savings based on a 2020 model.

KITS

Deemed savings for kits were based on kit type, electric or dual fuel. Both kits contained LEDs, bathroom aerator, kitchen aerator, low-flow showerhead, pipe insulation, rope caulk, gaskets, and weatherstripping. Electric kits assigned deemed savings to all measures, whereas dual fuel kits only included savings for LEDs. The EISA backstop took effect July 1, 2023, before kits were distributed, so the evaluation team accounted for this change and set LED savings to zero.

Water-based measure deemed savings, including aerators, low-flow showerheads, and pipe insulation, are derived from the Georgia Power TRM 3.0 and the 2021 Pennsylvania TRM. Participant characteristic input values, such as people per household, bathroom, and showerheads, align with the TRM assumptions. As demographics change, these participant characteristics can be updated with survey-based values to provide more representative savings. The evaluation team updated gross savings calculation input values based on survey results, which increased the per-unit gross savings values compared to the deemed savings.

Deemed savings for the prescriptive air sealing measures, including rope caulk, gaskets, and weatherstripping, are calculated using algorithms and assumptions based on the Illinois TRM 9.0 (effective January 2021), exclude cooling savings, and are based on air source heat pumps. The evaluation team calculated verified gross savings using the Illinois TRM 11.0 (effective January 2023) which assigns cooling savings. The gross savings also account for the survey-based distribution of electric furnaces and heat pumps and are adjusted for the Atlanta climate.

Notably, deemed savings do not account for customer home or water heating type and assign savings for all kit measures to electric kit recipients and only LED savings to the dual fuel kit recipients. The evaluation team referred to survey results to calculate electric home and water heating incidence rates, then assigned electric savings to dual fuel kit customers for the respective water and prescriptive air sealing measures. Specifically, the evaluation team assigned gross savings for water-based and prescriptive air sealing measures based on the presence of electric home and water heating to all participants who received kits, whether electric or dual fuel.

Verified Gross Savings

REFRIGERATORS AND FREEZERS

The evaluation team collected data from the 2023 participation tracking data, customer surveys, and nonparticipant surveys to calculate the parameters included in both the ***Participant_Use*** and ***Existing_UEC*** algorithms. Specifically, Table 142 shows the data collected, analyzed, and used to evaluate gross impacts, as appropriate, depending on the regression model being used:

Table 142. 2023 Data Inputs and Sources to Calculate Gross Impacts

INPUT FOR MODEL	DATA SOURCE
Age (in years or year manufactured)	Tracking data
Size (in cubic feet)	Tracking data
Configuration (e.g., top freezer, side-by-side)	Tracking data
Use of appliance (primary or secondary)	Tracking and/or self-report survey data
Location of appliance (conditioned or unconditioned space)	Tracking and/or self-report survey data
Appliance use (percentage of year it was plugged in)	Self-report survey data

EXISTING UEC

The evaluation team calculated the ***Existing_UEC*** using the regression equation derived from the current in-situ Georgia Power field study of 20 program refrigerators and 1 freezer.

As noted in the Data Collection Approach section describing recruiting for the in-situ metering study, the sample of appliances collected through the in-situ study was significantly smaller than the target after the program was interrupted in July 2023 when ARCA ceased business operations.

The evaluation team metered a total of 31 appliances as part of the study. However, one participant in the metering study did not return meters according to instructions left behind by the field technicians, resulting in the loss of data for two appliances. Additionally, the field technicians collected data on site when performing meter installations, but some of the serial numbers were worn away to a degree that the team could not determine the vintage of nine appliances. Despite the lack of serial number of nameplate information, the evaluation team attempted to match model numbers to available appliance databases to determine the vintage, including the Database of Energy Efficiency Resources (DEER) Non-Commercial Refrigerators and Freezers database, ENERGY STAR qualified product lists, and other recent program tracking databases for Mid-Atlantic region and Northeastern utility programs.[65] Ultimately, the evaluation team could only determine appliance characteristics necessary for modeling for 21 of the metered appliances – 20 refrigerators and a single freezer. A similar share of appliances were missing key information in the program tracking data. A total of 506 (17%) refrigerators recycled in 2023 and 78 freezers (15%) were missing vintage, size, or model numbers. Meters were installed for a minimum of 10 days, as recommended in the UMP protocol. The original study plan included metering in summer and fall months to capture potential seasonal differences in daily energy consumption. The program pause and relaunch resulted in meters being primarily installed and data collection occurring in winter months, between November 2023 and March 2024.

[65] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/database-of-energy-efficiency-resources-updates. Downloaded March 2016.

The analysis did not find any significant temperature-related patterns in energy use. However, for units kept in unconditioned spaces (e.g., garages lacking insulation) energy use may increase slightly during summer months during warmer temperatures and, therefore, this analysis may underestimate annual energy use for appliances kept in unconditioned spaces.

First-Stage Models

Because each unit's weather sensitivity (due to location in home) and time-of-day & day-of-week sensitivity (due to usage patterns) may vary, the Evaluation team tested for different relationships in these factors by including variables other than temperature. This was to determine whether inclusion of time-of-day or day-of-week terms provided a better fit than temperature alone. Each set of models was tested using hourly data. Among each set of models, the evaluation team selected the best-fitting model separately for each unit primarily based on Akaike Information Criterion (AIC).[66]

A potential basic form of a model with additional terms is:

$$Avg\ kW_{it} = B_0 + B_1 * Temp_{it} + B_2 * Peak\ Hour_{it} + B_3 * WeekendHoliday_{it}$$

Where:

B_0	=	The intercept term of the regression equation
B1	=	Coefficient determined during the modeling process. This represents the additional hourly kW for metered appliance **i** in hour **t** for a given change in temperature of one degree
Temp	=	The hourly temperature measured in degrees Fahrenheit
B_2	=	Coefficient determined during the modeling process. This represents the additional hourly kW for metered appliance **i** if hour **t** is a peak hour
PeakHour	=	A dummy variable taking a value of 1 when the hour is in peak hours (4:00-5:00PM EDT in July and 8:00-9:00AM EST in January).
B_3	=	Coefficient determined during the modeling process. This represents the additional hourly kW for metered appliance **i** if hour **t** falls on a weekend or holiday.
PeakHour	=	A dummy variable taking a value of 1 for metered appliance **i** when the hour **t** falls on a weekend or holiday.

[66] Portet S. A primer on model selection using the Akaike Information Criterion. Infect Dis Model. 2020 Jan 7;5:111-128. doi: 10.1016/j.idm.2019.12.010. PMID: 31956740; PMCID: PMC6962709. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6962709/

Additional parameters tested include:

$dewpoint_t$	=	Average hourly dewpoint time **t**, at the weather station closest to the participant's home
$DayofWeek_t$	=	Value ranging from 1-7 at time **t**, to test for fixed effects of each day of the week.
$holiday_t$	=	A dummy variable taking a value of 1 when the hour falls on a federal holiday (0 otherwise).
$weekend_t$	=	A dummy variable taking a value of 1 when the hour falls on a weekend (0 otherwise).
HDH_t	=	Heating degree hour time **t**, using a setpoint of 65°F.
$humdity_t$	=	Humidity time **t**, calculated from temperature and dewpoint at time **t**.
$Events_t$	=	Total number of times in an hour when the light is turned on in an appliance when the door is opened (tracked only if the device has a light logger installed).
$EventLength_t$	=	Total length at time **t** that the light is on in a given appliance.
$Avg\ Length_t$	=	Average length of time the light is on (or that the door is open) for an appliance.

Due to variations in the length of time each appliance was metered and time of the year for which the meter was collecting data, each selected model had different important predictors. For some units, hourly temperature or hourly dewpoint alone was the best predictor of hourly demand. Those two terms were the most common predictors chosen across the different models.

Second-Stage Models

After predicting Average kW at hour **t** for each meter, the evaluation team rolled up the predictions to the daily level to get total predicted consumption in each 24-hour period. The team then tested Stage 2 models that use various appliance characteristics to predict a final annual UEC value for each appliance.

The evaluation team considered all relevant appliance characteristics available in the metering study tracking data for inclusion in alternative models, such as:

1. Dummy variables for all configurations (top freezer, bottom freezer, side-by-side, single-door, chest, and upright freezers).
2. Dummy variables for appliance features (e.g., manual defrost and through-door ice).
3. Alternate specification of continuous variables – age, cubic feet, label amps.

4. Location in home. The program tracks location in home but does not currently track summer or winter space conditioning. Therefore, location in home served as a proxy for potential weather sensitivity – for example, units located in a garage, porch or patio may show more sensitivity to climactic conditions.
5. Interaction terms. Variables like those named in items 1-4 above may interact in a way that causes a change in annual compensation calculations. Where these changes are accounted for in modeling, they are called "interaction terms".

We examined model fit, precision, and statistical significance of individual terms under different specifications. Since there was only 1 freezer meter with viable demographic characteristics, we pooled all appliances into one single model.

The best model used a specification very similar to the previous 2011 metering study:

$$In\ Situ\ UEC_i = B_0 + B_1 * Age_i + B_2 * Size_i + B_3 * Side\text{-}by\text{-}Side\ Indicator_i + B_3 * Freezer\ Indicator_i$$

Where:

B_0	=	The intercept term of the regression equation
B_1	=	Coefficient determined during the modeling process. This represents the change in annual kWh for appliance i for each year of appliance age
Age_i	=	The age of appliance i calculated as 2023 minus the year of manufacture
B_2	=	Coefficient determined during the modeling process. This represents the change in annual kWh for appliance i for each cubic foot of volume
$Size_i$	=	The conditioned volume of appliance i measured in cubic feet
B_3	=	Coefficient determined during the modeling process. This represents the change in annual kWh if appliance i is a side-by-side configuration
$Side\text{-}by\text{-}Side_i$	=	An indicator equaling 1 if appliance i is a side-by-side configuration (zero otherwise)
B_4	=	Coefficient determined during the modeling process. This represents the change in annual kWh if appliance i is a freezer
$Freezer_i$	=	An indicator equaling 1 if appliance i is a freezer (zero otherwise)

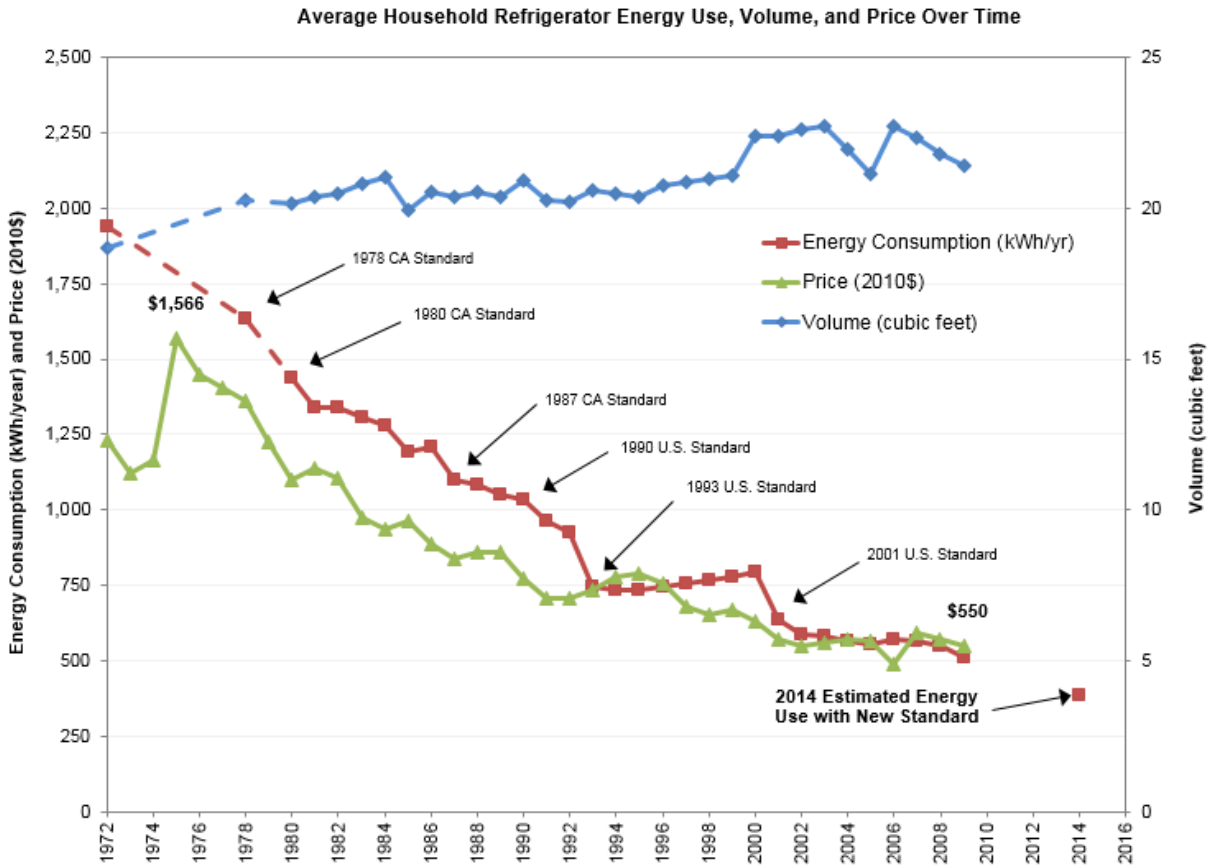
The estimated in-situ UECs from this study are significantly lower than the previous 2011 metering study (see Appendix 7A. Data Collection Approach). UECs derived from each study are presented in Table 143.

Table 143. 2011 and 2023 Estimated Annual Unit Energy Consumption by Appliance Type

APPLIANCE	2023 IN-SITU ANNUAL UEC (kWh)	2011 IN-SITU ANNUAL UEC (kWh)
Refrigerator	535	1,346
Freezer	584	1,472

The decrease in UECs, while significant, is consistent with estimates that coincide with the federal appliance standards. Figure 111 from the Appliance Standards Awareness Project shows the significant appliance standards between 1972 and 2010, along with the average energy consumption for each year (along with average price and volume).[67]

Figure 111. Average Household Refrigerator Energy Use, Volume, and Price Over Time



[67] https://appliance-standards.org/blog/how-your-refrigerator-has-kept-its-cool-over-40-years-efficiency-improvements

The graph shows a clear decreasing trend in average annual energy consumption for refrigerators. Appliances manufactured just before the national standard in 1990, the average refrigerator consumed more than 1,000 kWh annually. Between 1980 and 1990, which represents the average vintage of refrigerators and freezers in the 2011 study, average annual energy use varied from approximately 1,000 and 1,300 kWh, which closely aligns with the UEC estimates from the 2011 study. Between the year 2000 and 2010, which aligns with the current sample of metered appliances and the 2023 program tracking data, average annual energy use for refrigerators varied between 500 and 600 kWh, which closely aligns with UEC estimates from the current study.

Table 144 shows the average annual kWh in-situ UEC estimates for refrigerators and freezers in the 2023 program tracking data, summarized by decade.

Table 144. Average Annual kWh from In-situ UEC Estimates by Decade

APPLIANCE	REFRIGERATORS (AVERAGE ANNUAL kWh)	FREEZERS (AVERAGE ANNUAL kWh)
Pre-1980	1,188	1,246
1980s	963	978
1990s	748	756
2000 and later	454	432

The average estimates for each decade largely follow the same pattern shown in the above graph showing the trends in average annual consumption by year following appliance standards.

Additionally, the evaluation team analyzed the rated annual energy consumption in kWh of ENERGY STAR Qualified refrigerator and freezer product lists, focusing on models that were qualified between 2003 and 2012 (Table 145).

Table 145. Range of ENERGY STAR Rated Annual Energy Consumption (kWh) of Appliances Qualified 2003-2012

APPLIANCE	MIN/MAX ENERGY STAR (kWh)	MIN/MAX FEDERAL STANDARD (kWh)
Refrigerator	171/573	349/718
Freezer	258/635	289/707

The average 2000 and later UEC estimates for both refrigerators and freezers shown in Table 144 are well within the ranges reported in Table 145 for the ENERGY STAR product lists and for federal standard models not meeting the ENERGY STAR performance standards.

Despite the small sample size of metered refrigerators, the average appliance characteristics are comparable between the metered sample and the program population (Table 146). The meter sample contained a larger share of side-by-side refrigerators, 74% compared to 37% among the program population.

Side-by-side configurations tend to consume more energy, on average and holding all else constant, meaning the sample may overestimate annual energy use since side-by-side units are over-represented relative to the population.

Table 146. 2023 Comparison of Refrigerator Characteristics Between In-situ Sample and Program Population

INPUT FOR MODEL	IN-SITU SAMPLE MEAN	PROGRAM POPULATION MEAN
Age (in years or year manufactured)	15.75	17.99
Size (in cubic feet)	23.64	19.69
Configuration (side-by-side)	74%	37%

Table 147 compares the coefficient estimates between the 2011 and the current 2023 in-situ studies.

Table 147. 2023 and 2011 Comparison of Refrigerator Model Coefficients from In-situ Metering Studies

INPUT FOR MODEL	2023 COEFFICIENT	2011 COEFFICIENT
Intercept	-91.88	-704.81
Age (in years or year manufactured)	23.07	35.21
Size (in cubic feet)	6.69	59.86
Configuration (side-by-side)	205.29	78.37

The marginal impact of age on UECs decreased from 35.21 in 2011 to 23.07. The 2011 study included refrigerators manufactured before and after 1993 federal appliance standard and the age coefficient in the 2011 study likely captured the higher annual energy use of appliances manufactured before the standard came into effect. The current 2023 study has only one refrigerator manufactured in 1992 and most appliances manufactured post-2001, after a second federal appliance standard went into effect.

The change in the size coefficients between the in-situ studies in 2011 and 2023 is more significant than the age coefficient. For every additional cubic foot of volume, the increase in annual energy consumption is significantly less than refrigerators in the previous study. The federal appliance standards effective in 1993 and 2001 significantly improved the efficiency of refrigerators and freezers.

Only one freezer had meter data that could be incorporated into the analysis. Meter data was collected for two other freezers, but the evaluation team could not determine the vintage of these appliances and, therefore, was not able to include. The single freezer in the analysis was younger than the average freezer recycled in 2023 and was smaller.

Despite only having a single freezer included in the analysis sample, the evaluation team believes estimates of annual consumption derived from the analysis are more appropriate than using the 2011 regression model. The previous sample of appliances in the 2011 study had an average vintage of 1986 while the 2023 tracking data reports an average vintage of 2003. Given the changes in expected annual energy consumption from the ENERGY STAR product lists and the trends in the appliance standards, relying on the previous study would significantly overpredict energy use for the freezers recycled in 2023, which are significantly younger vintage than the previous metering study.

PART-USE

The participant use (part-use) factor represents the average amount of time that appliances recycled through the program were plugged in during the year prior to program intervention and is used to convert the UEC into an average per-unit gross savings value. The evaluation used participant survey to determine the portion of the year that the average recycled appliance would have been operational in the absence of the program intervention. The part-use factor used in the gross savings calculation is a weighted average of the part use factor of all secondary units, and of all units (primary and secondary). This analysis acknowledges that the Georgia Power program is intended to only recycle secondary units; however, the UMP directs evaluators to treat any appliance that was indicated to have been in the participants kitchen (prior to any movement in preparation for disposal) as a primary appliance. Table 148 and Table 149 display these results.

Table 148. 2023 RR+ Refrigerator Part-Use factors

USAGE TYPE AND PART-USE CATEGORY	% OF RECYCLED UNITS	PART-USE FACTOR	PER-UNIT ENERGY SAVINGS (kWh)
Secondary Units Only			
Not in Use	0%	0.00	0
Used Part-Time	7%	0.28	149
Used Full-Time	93%	1.00	535
Weighted Average	**100%**	**0.95**	**507**
All Units (Primary and Secondary)			
Not in Use	3%	0.00	0
Used Part-Time	6%	0.31	167
Used Full-Time	91%	1.00	535
Weighted Average	**100%**	**0.93**	**498**

Table 149. 2023 RR+ *Freezer Part-Use factors*

USAGE TYPE AND PART-USE CATEGORY	% OF RECYCLED UNITS	PART-USE FACTOR	PER-UNIT ENERGY SAVINGS (kWh)
Secondary Units Only			
Not in Use	0%	0.00	-
Used Part-Time	7%	0.25	146
Used Full-Time	93%	1.00	584
Weighted Average	**100%**	**0.95**	**554**
All Units (Primary and Secondary)			
Not in Use	4%	0.00	-
Used Part-Time	6%	0.25	146
Used Full-Time	90%	1.00	584
Weighted Average	**100%**	**0.91**	**533**

Historically observed part-use factors were then weighted against the self-reported action of survey respondents regarding whether they would have kept the appliance had the program not been available, and if so, where. The final part-use factors were determined to be 0.94 for refrigerators (Table 150), and 0.93 for freezers (Table 151).

Table 150. 2023 RR+ *Refrigerator Part-Use factors*

USAGE PRIOR TO RECYCLING	LIKELY USE INDEPENDENT OF RECYCLING	PART-USE FACTOR	% OF PARTICIPANTS (N=30)
Primary	Kept (as primary unit)	1.00	3%
	Kept (as secondary unit)	0.95	3%
	Discarded	0.93	27%
Secondary	Kept (as secondary unit)	0.95	43%
	Discarded	0.93	23%
Total	**All**	**0.94**	**100%**

Note: Due to rounding, values may not add up to 100%.

Table 151. 2023 RR+ *Freezer Part-Use factors*

USAGE PRIOR TO RECYCLING	LIKELY USE INDEPENDENT OF RECYCLING	PART-USE FACTOR	% OF PARTICIPANTS (N=34)
Primary	Kept (as primary unit)	1.00	6%
	Kept (as secondary unit)	0.95	0%
	Discarded	0.91	0%
Secondary	Kept (as secondary unit)	0.95	47%
	Discarded	0.91	47%
Total	**All**	**0.94**	**100%**

GROSS SAVINGS

Table 152 and Table 153 present the gross savings for refrigerators and freezers for 2023. The gross savings values presented here were calculated using the program tracking data and reflect the number of units with "commit dates" that fell within the evaluation time frame; as such, they do not align with the reported savings values presented in the report.

Table 152. 2023 RR+ - *Refrigerator and Freezer Gross kWh Savings*

MEASURE	NUMBER OF RECYCLED UNITS (N)	EXISTING UEC VALUE (kWh)	PART-USE FACTOR	PLANNED GROSS PER-UNIT SAVINGS (kWh)	FINAL VERIFIED GROSS PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Refrigerators	3,064	535	0.94	927	503	1,540,886
Freezers	529	584	0.94	885	549	290,400
Total	**3,593**	**-**	**-**		**-**	**1,831,285**

Table 153. 2023 RR+ - *Refrigerator and Freezer Gross kW Savings*

MEASURE	NUMBER OF RECYCLED UNITS (N)	PLANNED GROSS PER-UNIT SAVINGS (kW)	FINAL VERIFIED GROSS PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Refrigerators	3,064	0.11	0.06	176
Freezers	529	0.10	0.06	33
Total	**3,593**		**-**	**209**

DEHUMIDIFIERS

The evaluation team used the following equations from the Georgia Power TRM 3.0 to calculate electric savings and demand reduction for recycled dehumidifiers. Table 154 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \left(CAPY * \frac{CONV}{24}\right) * HOU * \left(\frac{1}{EFF_{base}}\right)$$

$$GROSS_{kW} = \frac{GROSS_{kWh}}{HOU} * CF$$

Where:

$GROSS_{kWh}$	=	Annual electric savings for recycled dehumidifiers, in kilowatt-hours
N	=	Number of dehumidifiers recycled through the program
CAPY	=	Average capacity rating of recycled dehumidifiers, in pints per day
CONV	=	Factor to convert pints to liters
24	=	Constant, hours per day
HOU	=	Average hours of dehumidifier use per year (= 68 * 24)
EFF_{base}	=	Federal baseline standard efficiency (energy factor) for dehumidifiers in liters per kWh, averaged across tracking data
$GROSS_{kh}$	=	Annual demand reduction for recycled dehumidifiers, in kilowatts
CF	=	Coincidence factor

Table 154. 2023 RR+ Data Inputs and Sources to Calculate Gross Impacts for Dehumidifiers

INPUT	VALUE	SOURCE
N	140	Tracking data
CAPY	34	Tracking data
CONV	0.473	Georgia Power TRM 3.0
HOU	1,632	Georgia Power TRM 3.0
EFF_{base}	1.6	Tracking data and Code of Federal Regulations[68]
CF	0.57	Georgia Power TRM 3.0

[68] Code of Federal Regulations. *10 CFR 430.32(v)*. https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-430/subpart-C/section-430.32#p-430.32(v)

The federal baseline efficiency standard for dehumidifiers (Eff_{base}) is based on vintage and capacity. As technology improves and the federal baseline increases, the savings for a same-capacity unit decrease. Table 155 and Table 156 illustrate dehumidifier efficiency standards over time.

Table 155. Dehumidifier Energy Factors for Units Manufactured on or after October 1, 2012

CAPACITY	ENERGY FACTOR (L/ kWh)
Up to 35.00	1.35
35.01 to 45.00	1.5
45.01 to 54.00	1.6
54.01 – 75.00	1.7
75.01+	2.5

Table 156. Dehumidifier Energy Factors for Units Manufactured on or after June 13, 2019

CAPACITY	ENERGY FACTOR (L/ kWh)
25.00 or less	1.3
25.01 to 50.00	1.6
50.01+	2.5

The evaluation team cross-referenced dehumidifier age and capacity values captured in the tracking data to determine the unit energy factor and then calculated the average value (1.6 L/kWh). The average value corresponded to the energy factor assumption used to calculate claimed savings, but the average capacity of the recycled units (34 pints per day) was slightly less than the claimed assumed value (36 pints per day).

GROSS SAVINGS

Table 157 and Table 158 present the gross savings calculation for recycled dehumidifiers, inclusive of PY2023. The reported savings were based on an average capacity of 36 pints per day, while the evaluation team based the verified savings on the tracking data average of 34 pints per day. This difference resulted in slightly lower per-unit verified savings for the recycled dehumidifiers compared to the reported savings.

Table 157. 2023 RR+ – Dehumidifier *Gross kWh Savings*

MEASURE	NUMBER OF RECYCLED UNITS (N)	REPORTED PER-UNIT SAVINGS (kWh)	FINAL VERIFIED PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Dehumidifiers	140	709	689	96,504

Table 158. 2023 RR+ – Dehumidifier *Gross kW Savings*

MEASURE	NUMBER OF RECYCLED UNITS (N)	REPORTED PER-UNIT SAVINGS (kW)	FINAL VERIFIED PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Dehumidifiers	140	0.25	0.24	34

ROOM A/CS

The Georgia Power TRM 3.0 savings for recycled room A/Cs are based on a 2020 model and do not provide input assumptions, so the evaluation referred to the 2021 Pennsylvania TRM to incorporate information about the units recycled in PY2023. The team used the following equations from the 2021 Pennsylvania TRM to calculate electric savings and demand reduction for recycled room A/C units, then adjusted savings to account for the Atlanta climate conditions. Table 159 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \frac{CAPY}{EER_{Ret}} * EFLH_c * ADJ$$

$$GROSS_{kW} = \frac{CAPY}{EER_{Ret}} * CF$$

Where:

$GROSS_{kWh}$ = Annual electric savings for recycled room A/C units in kilowatt-hours
N = Number of dehumidifiers recycled through the program
$CAPY$ = Average capacity rating of recycled room A/C units, in kBTU/h
EER_{Ret} = Energy efficiency ratio of the recycled unit, in BTU/W*h, averaged across tracking data
$EFLH_c$ = Effective full load hours of operation per year
ADJ = Climate factor to account for Atlanta climate
$Gross_{kW}$ = Annual demand reduction for recycled room A/C units, in kilowatts
CF = Coincidence factor

Table 159. 2023 RR+ Data Inputs and Sources to Calculate Gross Impacts for Room A/Cs

INPUT	VALUE	DATA SOURCE
N	173	Tracking data
CAPY	6.8	Tracking data
EER_{Ret}	10.1	Tracking data, Code of Federal Regulations, 2021 Pennsylvania TRM[a]
$EFLH_c$	178	2021 Pennsylvania TRM, Allentown
ADJ	*2.79*	2021 Pennsylvania TRM, Allentown; Weather Data Depot[a]
CF	*0.57*	Georgia Power TRM 3.0

[a] Weather Data Depot. Zip Code 30301. https:/www.weatherdatadepot.com/cooling-degree-days

The deemed retired efficiency (EER) is based on the most common room A/C type, 8000 – 14,000 capacity unit with louvered size. The evaluation team updated the efficiency ratings based on the average capacity in the tracking data (6,800 Btuh) and applied the average applicable federal standard across the recycled units by age. Like dehumidifiers, as technology improves and the federal baseline increases, the savings for a same-capacity unit decrease (Table 160).

Table 160. 2023 Room A/C Energy Factors for Louvered Units 6,000 to 7,000 Btuh Units

EFFECTIVE DATE	EFFICIENCY (EER)
October 1, 2000	9.7
June 14, 2014	11.0
PY2023 average	10.1

GROSS SAVINGS

Table 161 and Table 162 present the gross savings calculation for recycled room A/C units. The evaluation team calculated gross savings using the average capacity across the recycled units, which was likely lower than the assumed capacity used to calculate the reported savings. This difference would drive lower gross savings compared to reported savings.

Table 161. 2023 RR+ Room A/C *Gross kWh Savings*

MEASURE	NUMBER OF RECYCLED UNITS(N)	REPORTED PER-UNIT SAVINGS (kWh)	FINAL VERIFIED PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Room A/Cs	173	576	336	58,166

Table 162. 2023 RR+ Room A/C *Gross kW Savings*

MEASURE	NUMBER OF RECYCLED UNITS (N)	REPORTED PER-UNIT SAVINGS (kW)	FINAL VERIFIED PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Room A/Cs	173	0.37	0.39	67

KITS

To calculate verified gross savings for both the electric and dual fuel kits, the evaluation team assigned savings based on survey responses indicating electric water heating (relevant for the aerator, low-flow showerhead, and pipe insulation measures) and electric home heating (relevant for the rope caulk, gasket, and weatherstripping measures). This approach adjusts reported deemed savings to accommodate cases where electric kit recipients may have gas water and/or home heating, and some dual fuel kit recipients may have electric water and/or home heating.

Although LED savings were not factored into the verified gross savings, the verified gross savings exceeded reported savings. This is primarily because reported savings include only one aerator and five feet of pipe insulation, whereas verified gross savings were calculated based on program information, which indicated two aerators and 6 feet of pipe insulation. The largest portion of verified gross savings for both the electric and dual fuel kits is attributed to the bathroom and kitchen aerators, low-flow showerhead, and pipe insulation. These measures comprise 78% of the electric kit savings and over half (57%) half of the dual kit savings.

The deemed savings assumptions include an assumed ISR. The evaluation therefore also included the ISR in the verified savings. The differences in assumed versus evaluated ISR values had a significant effect on the savings values.

GROSS SAVINGS

Table 163 and Table 164 present the reported and verified gross per-unit savings by kit type. Per-measure savings are provided below.

Table 163. 2023 RR+ – Kit Verified *Gross kWh Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS (N*ISR)	PLANNED GROSS PER-UNIT SAVINGS [a] (kWh)	VERIFIED GROSS PER-UNIT SAVINGS (kWh)	VERIFIED GROSS TOTAL SAVINGS (kWh)
Electric Kit	Varies by measure	482	118	84,549
Dual fuel Kit	Varies by measure	144	38	103,311

[a] Per-unit planned and verified gross savings in this table include ISRs embedded in the tracking data savings.

Table 164. 2023 RR+ – Kit Verified *Gross kW Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS (N*ISR)	PLANNED GROSS PER-UNIT SAVINGS [a] (kW)	VERIFIED GROSS PER-UNIT SAVINGS (kW)	VERIFIED GROSS TOTAL SAVINGS (kW)
Electric Kit	Varies by measure	0.03	0.02	13
Dual fuel Kit	Varies by measure	0.01	0.01	22

[a] Per-unit planned and verified gross savings in this table include ISRs embedded in the tracking data savings.

Kit Gross Savings by Measure

KIT MEASURE VERIFICATION

Table 165 presents a breakdown of the total verified count of kit measures distributed through RR+ in 2023. The evaluation team referred to participant survey results to calculate ISRs for kit measures.

Table 165. 2023 Kit Measure Verification by Kit Type

MEASURE [a]	ISR	ISR ADJUSTED NUMBER OF UNITS (N * ISR)		TOTAL NUMBER OF UNITS FOR SAVINGS CALCULATION
		ELECTRIC KITS (N=715)	DUAL FUEL KITS (N=2,702)	
Bathroom aerators, 1 per unit	17%	122	459	581
Kitchen aerators, 1 per unit	25%	179	676	855
Low-flow showerheads, 1 per unit	18%	129	486	615
Pipe insulation (6 feet), 1 per unit	25%	179	676	855
Exterior switch/wall gaskets, 10 per unit	13%	93	351	444
Rope caulk (10 feet), 1 per unit	15%	107	405	512
V-seal Weatherstrip (17 feet), 1 per unit	22%	157	594	751
A19 LED bulbs, 4 per unit	57%	408	1,540	1,948

[a] All kits contain the same measures regardless of home heating or water heater fuel type. While kits included 4 A19 LED bulbs, no savings were claimed from LEDs due to the EISA backstop.

AERATORS

The evaluation team used the following equations from the Georgia Power TRM 3.0 to calculate electric savings and demand reduction for bathroom and kitchen aerators. Table 166 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \frac{\left((GPM_{base} - GPM_{low}) * T_{personperday} * N_{persons} * 365.25 * DF * (T_{out} - T_{in}) * 8.33\right)}{\left(N_{faucets} * 3412 * RE_{el}\right)} * ISR * \%\ elec$$

$$GROSS_{kW} = Gross_{kWh} * \frac{\%\ faucet\ use * 60}{365.25 * 40}$$

Where:

$GROSS_{kWh}$	=	Annual electric savings for aerators in kilowatt-hours
N	=	Number of aerators distributed in PY2023
GPM_{base}	=	Flow rate of the baseline aerator, in gallons per minute
GPM_{low}	=	Flow rate of the efficient aerator, in gallons per minute
$T_{personperday}$	=	Average time of use per person per day in minutes
$N_{persons}$	=	Average number of people per household
365.25	=	Constant, days per year
DF	=	Drain factor to account for percent of water flowing down the drain
T_{out}	=	Outlet temperature, in degrees Fahrenheit
T_{in}	=	Inlet temperature, in degrees Fahrenheit
8.33	=	Specific with of water, in pounds per gallon
$N_{faucets}$	=	Average number of faucets per home
3412	=	Conversion factor, from Btu to kilowatt hour
RE_{el}	=	Recovery efficiency of electric water heater
ISR	=	In-service rate for bathroom or kitchen aerators
% elec (electric kits)	=	Percentage of electric water heaters for electric kits
% elec (dual fuel kits)	=	Percentage of electric water heaters for dual fuel kits
$GROSS_{kW}$	=	Annual demand reduction for aerators in kilowatt-hours
% shower peak use	=	Percentage of time faucet is used during peak hours
60	=	Constant, minutes per day
240	=	Constant, annual minutes of use per daily peak

Table 166. 2023 RR+ Data Inputs and Sources to Calculate Gross Impacts for Aerators

INPUT	VALUE	DATA SOURCE
N (electric kits)	715	Tracking data
N (dual fuel kits)	2,702	Tracking data
GPM_{base}	2.2	Georgia Power TRM 3.0
GPM_{eff}	1.5	2023 Program information
$T_{personperday}$	1.6 (bathrooms)	2021 Pennsylvania TRM
$N_{persons}$	2.54	PY2023 survey
DF	0.90 (bathrooms)	2021 Pennsylvania TRM
T_{out}	93	Georgia Power TRM 3.0
T_{in}	63.9	Georgia Power TRM 3.0
$N_{faucets}$	3.55 (bathrooms)	PY2023 survey
RE_{el}	0.98	Georgia Power TRM 3.0
% elec (electric kits)	94%	PY2023 survey
% elec (dual fuel kits)	24%	PY2023 survey
ISR (bathroom aerators)	17%	PY2023 survey
ISR (kitchen aerators)	25%	PY2023 survey
% faucet use	19.5%	Georgia Power TRM 3.0

GROSS SAVINGS: AERATORS

Table 167 and Table 168 present the gross savings calculation for aerators.

Table 167. 2023 RR+ Aerator *Gross kWh Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS (N * ISR)	FINAL VERIFIED GROSS PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Electric Kits			**28,880**
Bathroom aerators	122	18	2,182
Kitchen aerators	179	149	26,698
Dual Fuel Kits			**27,864**
Bathroom aerators	459	5	2,105
Kitchen aerators	676	38	25,759

Table 168. 2023 RR+ Aerator *Gross kW Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS (N * ISR)	FINAL VERIFIED GROSS PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Electric Kits			**3.85**
Bathroom aerators	122	<0.01	0.29
Kitchen aerators	179	0.02	3.56
Dual Fuel Kits			**3.72**
Bathroom aerators	459	<0.01	0.28
Kitchen aerators	676	0.01	3.44

LOW-FLOW SHOWERHEADS

The evaluation team used the following equations from the Georgia Power TRM 3.0 to calculate electric savings and demand reduction for low-flow showerheads. Table 169 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \frac{\left((GPM_{base} - GPM_{low}) * T_{personperday} * N_{persons} * N_{showers_{day}} * 365.25 * (T_{out} - T_{in}) * 8.33\right)}{(N_{showers} * 3412 * RE_{el})} * ISR * \%\ elec$$

$$GROSS_{kW} = Gross_{kWh} * \frac{\%\ shower\ peak\ use * 60}{365.25 * 240}$$

Where:

$GROSS_{kWh}$	=	Annual electric savings for low-flow showerheads in kilowatt-hours
N	=	Number of low-flow showerheads distributed in PY2023
GPM_{base}	=	Flow rate of the baseline aerator, in gallons per minute
GPM_{low}	=	Flow rate of the efficient aerator, in gallons per minute
$T_{personperday}$	=	Average time of use per person per day in minutes
$N_{persons}$	=	Average number of people per household
$N_{showers_day}$	=	Average number of showers per person per day
365.25	=	Constant, days per year
T_{out}	=	Outlet temperature, in degrees Fahrenheit
T_{in}	=	Inlet temperature, in degrees Fahrenheit
8.33	=	Specific with of water, in pounds per gallon
$N_{showers}$	=	Average number of showerheads per home
3412	=	Conversion factor, from Btu to kilowatt hour

RE_{el}	=	Recovery efficiency of electric water heater
ISR	=	In-service rate for low-flow showerheads
% elec (electric kits)	=	Percentage of electric water heaters for electric kits
% elec (dual fuel kits)	=	Percentage of electric water heaters for dual fuel kits
$GROSS_{kW}$	=	Annual demand reduction for low-flow showerheads in kilowatt-hours
% shower use	=	Percentage of time shower is used during peak hours
60	=	Constant, minutes per day
240	=	Constant, annual minutes of use per daily peak

Table 169. 2023 Data Inputs and Sources to Calculate Gross Impacts for Low-flow Showerheads

INPUT	VALUE	DATA SOURCE
N (electric kits)	715	Tracking data
N (dual fuel kits)	2,702	Tracking data
GPM_{base}	2.2	Georgia Power TRM 3.0
GPM_{eff}	1.5	2023 Program information
$T_{personperday}$	7.8	2021 Pennsylvania TRM
$N_{persons}$	2.54	PY2023 survey
$N_{showersperday}$	0.6	2021 Pennsylvania TRM
T_{out}	104	Georgia Power TRM 3.0
T_{in}	63.9	Georgia Power TRM 3.0
$N_{showers}$	2.4	PY2023 survey
RE_{el}	0.98	Georgia Power TRM 3.0
% elec (electric kits)	94%	PY2023 survey
% elec (dual fuel kits)	24%	PY2023 survey
ISR	18%	PY2023 survey
% shower use	19.5%	Georgia Power TRM 3.0

GROSS SAVINGS: LOW-FLOW SHOWERHEADS

Table 170 and Table 171 present the gross savings calculation for low-flow showerheads.

Table 170. 2023 RR+ Low-Flow Showerhead *Gross kWh Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS (N * ISR)	FINAL VERIFIED PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Electric Kits			
Low-flow showerheads	129	126	16,179
Dual Fuel Kits			
Low-flow showerheads	486	32	15,610

Table 171. 2023 RR+ Low-Flow Showerhead *Gross kW Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS (N * ISR)	FINAL VERIFIED PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Electric Kits			
Low-flow showerheads	129	0.02	2.16
Dual Fuel Kits			
Low-flow showerheads	486	<0.01	2.08

PIPE INSULATION

The evaluation team used the following equations from the Georgia Power TRM 3.0 to calculate electric savings and demand reduction for pipe insulation. Table 172 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) * \left(\frac{L * C * T * 8{,}766}{12}\right) * \left(\frac{3412}{RE_{el}}\right) * \%\ elec * ISR$$

$$GROSS_{kW} = \frac{Gross_{kWh}}{8{,}766}$$

Where:

$GROSS_{kWh}$	=	Annual electric savings for pipe insulation in kilowatt-hours
N	=	Number of pipe insulation measures distributed in PY2023
R_{exist}	=	Pipe heat loss coefficient of uninsulated pipe, in (hr-˚F-ft)/Btu
R_{new}	=	Pipe heat loss coefficient of insulated pipe, in (hr-℉-ft)/Btu
L	=	Length of pipe from water heating source covered by insulation, in feet
C	=	Inside circumference of the pipe, in inches
T	=	Average temperature difference between supplied water and outside air temperature, in F
8,766	=	Constant, hours per year
12	=	Conversion factor, from inches to feet

3412	=	Conversion factor, from Btu to kWh
RE_{el}	=	Recovery efficiency of electric water heater
% elec (electric kits)	=	Percentage of electric water heaters for electric kits
% elec (dual fuel kits)	=	Percentage of electric water heaters for dual fuel kits
ISR	=	In-service rate for pipe insulation
$GROSS_{kW}$	=	Annual demand reduction for pipe insulation in kilowatt-hours

Table 172. 2023 RR+ Data Inputs and Sources to Calculate Gross Impacts for Pipe Insulation

INPUT	VALUE	DATA SOURCE
N (electric kits)	715	Tracking data
N (dual fuel kits)	2,702	Tracking data
R_{exist}	1	Georgia Power TRM 3.0
R_{new}	5.5	Georgia Power TRM 3.0
L	6	PY2023 program information
C	2.36	Georgia Power TRM 3.0
T	60	Georgia Power TRM 3.0
RE_{el}	0.98	Georgia Power TRM 3.0
% elec (electric kits)	94%	PY2023 survey
% elec (dual fuel kits)	24%	PY2023 survey
ISR	25%	PY2023 survey

GROSS SAVINGS: PIPE INSULATION

Table 173 and Table 174 present the gross savings calculation for pipe insulation.

Table 173. 2023 RR+ Pipe Insulation *Gross kWh Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Electric Kits			
Pipe Insulation	179	143	25,517
Dual Fuel Kits			
Pipe Insulation	676	36	24,620

Table 174. 2023 RR+ Pipe Insulation *Gross kW Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Electric Kits			
Pipe Insulation	179	0.02	2.91
Dual Fuel Kits			
Pipe Insulation	676	<0.01	2.81

ROPE CAULK

The evaluation team used the following equations from the Illinois TRM 11.0 to calculate electric savings and demand reduction for rope caulk. Table 175 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \left(\%elec * kWh_{heating} * FLH_{heatratio} + \%cool * kWh_{cooling} * FLH_{coolratio}\right) * L_{caulk} * ISR$$

$$GROSS_{kW} = \frac{\%cool * kWh_{cooling}}{FLH_{cooling}} * CF * L_{caulk} * ISR$$

Where:

$GROSS_{kWh}$	=	Annual electric savings for rope caulk in kilowatt-hours
N	=	Number of rope caulk measures distributed in PY2023
% elec (electric kits)	=	Percentage of homes with electric heating for electric kits
% elec (dual fuel kits)	=	Percentage of homes with electric heating for dual fuel kits
$kWh_{heating}$	=	Deemed electric heating savings for installation of rope caulk
$FLH_{heatratio}$	=	Ratio of Springfield, IL to Atlanta, GA full load heating hours
% cool	=	Percentage of homes with central cooling
$kWh_{cooling}$	=	Deemed cooling savings for installation of rope caulk
$FLH_{coolratio}$	=	Ratio of Springfield, IL to Atlanta, GA full load cooling hours
L_{caulk}	=	Length of rope caulk, in feet
ISR	=	In-service rate for rope caulk
$GROSS_{kW}$	=	Annual demand reduction for rope caulk in kilowatt-hours
CF	=	Coincidence factor

Table 175. 2023 RR+ Data Inputs and Sources to Calculate Gross Impacts for Rope Caulk

INPUT	VALUE	DATA SOURCE
N (electric kits)	715	Tracking data
N (dual fuel kits)	2,702	Tracking data
%elec (electric kits)	80%	PY2023 survey
% elec (dual fuel kits)	30%	PY2023 survey
$kWh_{heating}$	3.9	Illinois TRM 11.0 weighted average of Springfield heat pump and electric resistance values
$FLH_{heatratio}$	23%	Illinois TRM 11.0 Springfield value and Weather Data Depot calculated value
%cool	93%	PY2023 survey
$kWh_{cooling}$	0.24	IL TRM 11.0
$FLH_{coolratio}$	220%	Illinois TRM 11.0 Springfield value and Weather Data Depot calculated value
L	10	PY2023 program information
ISR	15%	PY2023 survey
CF	0.88	Georgia Power TRM 3.0

GROSS SAVINGS: ROPE CAULK

Table 176 and Table 177 present the gross savings calculation for rope caulk.

Table 176. 2023 RR+ Rope Caulk *Gross kWh Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Electric Kits			
Rope caulk	107	20	2,155
Dual Fuel Kits			
Rope caulk	405	11	4,397

Table 177. 2023 RR+ Rope Caulk *Gross kW Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Electric Kits			
Rope caulk	107	<0.01	0.32
Dual Fuel Kits			
Rope caulk	405	<0.01	1.18

GASKETS

The evaluation team used the following equations from the Illinois TRM 11.0 to calculate electric savings and demand reduction for gaskets. Table 178 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \left(\%elec * kWh_{heating} * FLH_{heatratio} + \%cool * kWh_{cooling} * FLH_{coolratio}\right) * N_{gasket} * ISR$$

$$GROSS_{kW} = \frac{\%cool * kWh_{cooling}}{FLH_{cooling}} * CF * N_{gasket} * ISR$$

Where:

$GROSS_{kWh}$	=	Annual electric savings for gaskets in kilowatt-hours
N	=	Number of gaskets distributed in PY2023
% elec (electric kits)	=	Percentage of homes with electric heating for electric kits
% elec (dual fuel kits)	=	Percentage of homes with electric heating for dual fuel kits
$kWh_{heating}$	=	Deemed electric heating savings for installation of gaskets
$FLH_{heatratio}$	=	Ratio of Springfield, IL to Atlanta, GA full load heating hours
% cool	=	Percentage of homes with central cooling
$kWh_{cooling}$	=	Deemed cooling savings for installation of gaskets
$FLH_{coolratio}$	=	Ratio of Springfield, IL to Atlanta, GA full load cooling hours
$N_{gaskets}$	=	Number of gaskets in the kit
ISR	=	In-service rate for gaskets
$GROSS_{kW}$	=	Annual demand reduction for gaskets in kilowatt-hours
CF	=	Coincidence factor

Table 178. 2023 RR+ Data Inputs and Sources to Calculate Gross Impacts for Gaskets

INPUT	VALUE	DATA SOURCE
N (electric kits)	715	Tracking data
N (dual fuel kits)	2,702	Tracking data
%elec (electric kits)	80%	PY2023 survey
%elec (dual fuel kits)	30%	PY2023 survey
$kWh_{heating}$	3.5	Illinois TRM 11.0 weighted average of Springfield heat pump and electric resistance values
$FLH_{heatratio}$	23%	Illinois TRMv11.0 Springfield value and Weather Data Depot calculated value
%cool	93%	PY2023 survey
$kWh_{cooling}$	2.27	IL TRM 11.0
$FLH_{coolratio}$	220%	Illinois TRM 11.0 Springfield value and Weather Data Depot calculated value
$N_{gaskets}$	10	PY2023 program information
ISR	13%	PY2023 survey
CF	0.88	Georgia Power TRM 3.0

GROSS SAVINGS: GASKETS

Table 179 and Table 180 present the gross savings calculation for gaskets.

Table 179. 2023 RR+ Gasket *Gross kWh Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Electric Kits			
Gaskets	93	63	5,893
Dual Fuel Kits			
Gaskets	351	55	19,316

Table 180. 2023 RR+ Gasket *Gross kW Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Electric Kits			
Gaskets	93	0.03	2.55
Dual Fuel Kits			
Gaskets	351	0.03	9.63

WEATHERSTRIPPING

The evaluation team used the following equations from the Illinois TRM 11.0 to calculate electric savings and demand reduction for weatherstripping. Table 181 shows the data inputs and sources for these calculations.

$$GROSS_{kWh} = N * \left(\%elec * kWh_{heating} * FLH_{heatratio} + \%cool * kWh_{cooling} * FLH_{coolratio}\right) * L_{wx} * ISR$$

$$GROSS_{kW} = \frac{\%cool * kWh_{cooling}}{FLH_{cooling}} * CF * L_{caulk} * ISR$$

Where:

$GROSS_{kWh}$	=	Annual electric savings for weatherstripping in kilowatt-hours
N	=	Number of weatherstripping measures distributed in PY2023
% elec (electric kits)	=	Percentage of homes with electric heating for electric kits
% elec (dual fuel kits)	=	Percentage of homes with electric heating for dual fuel kits
$kWh_{heating}$	=	Deemed electric heating savings for installation of weatherstripping
$FLH_{heatratio}$	=	Ratio of Springfield, IL to Atlanta, GA full load heating hours
% cool	=	Percentage of homes with central cooling
$kWh_{cooling}$	=	Deemed cooling savings for installation of weatherstripping
$FLH_{coolratio}$	=	Ratio of Springfield, IL to Atlanta, GA full load cooling hours
L_{wx}	=	Length of weatherstripping, in feet
ISR	=	In-service rate for weatherstripping
$GROSS_{kW}$	=	Annual demand reduction for weatherstripping in kilowatt-hours
CF	=	Coincidence factor

Table 181. 2023 RR+ Data Inputs and Sources to Calculate Gross Impacts for Weatherstripping

INPUT	VALUE	DATA SOURCE
N (electric kits)	715	Tracking data
N (dual fuel kits)	2,702	Tracking data
%elec (electric kits)	80%)	PY2023 survey
% elec (dual fuel kits)	30%	PY2023 survey
$kWh_{heating}$	4.5	Illinois TRM 11.0 weighted average of Springfield heat pump and electric resistance values
$FLH_{heatratio}$	23%	Illinois TRM 11.0 Springfield value and Weather Data Depot calculated value
%cool	93%	PY2023 survey
$kWh_{cooling}$	0.22	IL TRM 11.0
$FLH_{coolratio}$	220%	Illinois TRM 11.0 Springfield value and Weather Data Depot calculated value
L_{wx}	17	PY2023 program information
ISR	22%	PY2023 survey
CF	0.88	Georgia Power TRM 3.0

GROSS SAVINGS: WEATHERSTRIPPING

Table 182 and Table 183 present the gross savings calculation for weatherstripping.

Table 182. 2023 RR+ Weatherstripping *Gross kWh Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kWh)	VERIFIED GROSS SAVINGS (kWh)
Electric Kits			
Weatherstripping	157	38	5,925
Dual Fuel Kits			
Weatherstripping	594	19	11,502

Table 183. 2023 RR+ Weatherstripping *Gross kW Savings*

MEASURE	ISR ADJUSTED NUMBER OF UNITS	FINAL VERIFIED PER-UNIT SAVINGS (kW)	VERIFIED GROSS SAVINGS (kW)
Electric Kits			
Weatherstripping	157	<0.01	0.72
Dual Fuel Kits			
Weatherstripping	594	<0.01	2.73

Appendix 7C. Net Savings Calculation Overview

The evaluation team calculated net savings for refrigerators and freezers recycled and kit measures distributed through RR+. We calculated free-ridership and developed a NTGR based on surveys with RR+ participants. Few participant survey respondents recycled small appliances (n=11); therefore, the evaluation team could not draw meaningful conclusions about net savings for these appliances.

This appendix contains the approach, algorithms, and assumptions used to calculate the net electric savings and demand reduction for the refrigerator, freezer, and kit measures within the RR+ program.

Refrigerators and Freezers

The evaluation team followed Chapter 7 of the UMP for assessing net savings of appliance recycling programs to ensure we applied standard methods. The NTG method in the UMP protocol focuses on assessing free-ridership and does not recommend assessing participant spillover for appliance recycling programs.

The net adjustment accounts for current early replacement and recycling practice of both participants and nonparticipants, as well as hypothetical behavior of participants in the absence of the program. The total net energy savings (kWh) is calculated as follows:

$$NET_{kWh} = N * NET_FR_SMI_kWH$$

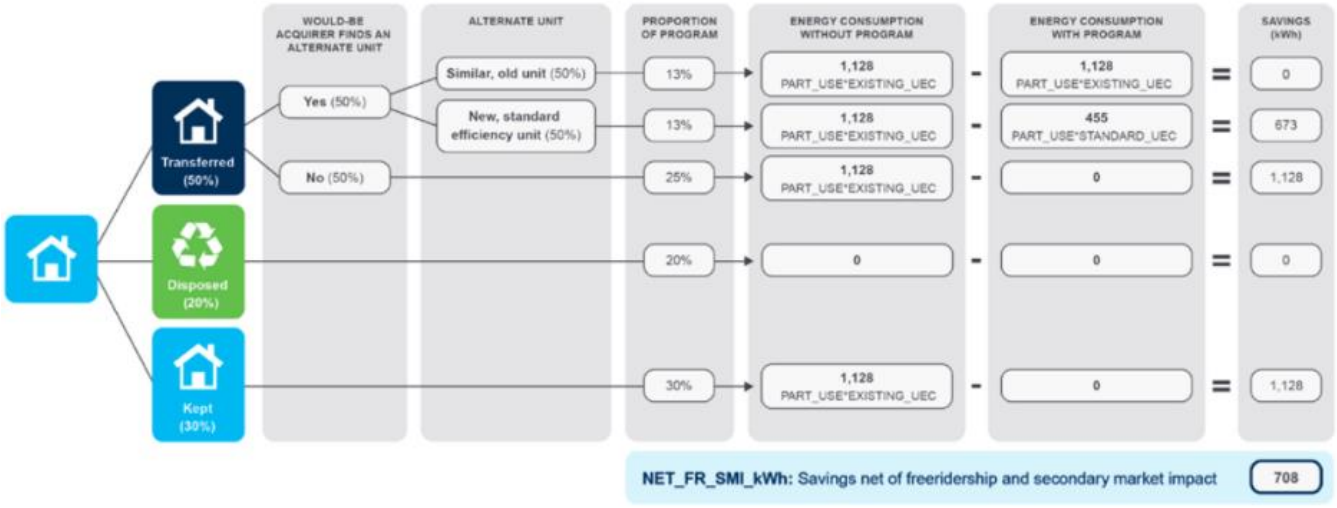
Where:

NET_FR_SMI_kWh = Average per-unit energy savings net of naturally occurring removal from grid and secondary market impacts

The UMP states that for refrigerator and freezer recycling programs, net savings are only generated when the recycled appliance would have continued to operate in the absence of program intervention, whether that be within the participating customer's home, or in the home of another utility customer. The participant survey thus asked questions designed to discern the likelihood of each of these scenarios, while the nonparticipant survey included similar questions to calculate a weighted average of hypothetical behavior in the absence of program intervention. The UMP utilizes a flow chart to illustrate how final savings are

calculated, net of free-ridership and secondary market impacts.[69] Figure 112 shows the example flow chart from the UMP. We include more detail on each of the components of this flow chart, including specific calculations, below.

Figure 112. Savings Net of Free-ridership and Secondary Market Impacts



Free-ridership

To assess free-ridership, the evaluation team conducted surveys with participants, and asked them a series of questions intended to identify what would have happened to the appliance if the program had not existed. UMP categorizes all survey responses into three major scenarios, described below. In absence of the program, the appliance would have been:

1. **Kept** by the household.
2. Discarded by a method that **transfers** the appliance to another customer for continued use.
3. Discarded by a method leading the appliance being **destroyed** or permanently removed from service.

These three scenarios comprise the free-ridership component of the NTG calculation (i.e., the proportion of appliances that would have been removed from the grid in the absence of the program). In addition to participants, the evaluation team surveyed nonparticipating customers (as recommended by the UMP) to gather information on customers who recently transferred or discarded an appliance.

Table 184 presents the free-ridership behaviors provided by respondents of the participant survey, while Table 185 provides a historical comparison of the percentage of respondents who indicated they would have kept their appliance in the absence of the program. We see a significant declining percentage of respondents

[69] The UMP does not currently recommend calculating participant spillover from appliance recycling programs, as these programs are often not used as primary channels of energy education, and spillover is typically negligible.

who indicated they would have kept their refrigerator year over year across 2017, 2020, and 2023. Respondents who would have kept their freezers reported a similar trend with a significant drop between the 2017 and 2023 study years. These results demonstrate rising levels of free-ridership over time.

Table 184. 2023 Free-ridership Behaviors, Combined and Weighted

STATED ACTION ABSENT PROGRAM	INDICATIVE OF FREE-RIDERSHIP	REFRIGERATORS (N=106)	FREEZERS (N=64)
Kept	No	17%	25%
Transferred	Varies	47%	41%
Destroyed	Yes	36%	34%

Table 185. Historical Percentage of Refrigerator and Freezer Units Kept Independent of Program

STUDY YEAR	REFRIGERATORS	FREEZERS
Georgia Power 2023	17% (n=106)	25% (n=64)
Georgia Power 2021	35% (n=110)	34% (n=91)
Georgia Power 2017	49% (n=68)	42% (n=69)

Note: Differences for refrigerators are significant between 2023 and 2021 with 95% confidence (p≥0.05) and between 2021 and 2017 with 90% confidence (p≥0.10). For freezers, the difference between 2023 and 2017 is significant with 95% confidence (p≥0.05).

Participants who reported hypothetical behaviors may be biased, as they are not fully aware of the barriers implicit in various disposal options. As such, the UMP recommends using nonparticipant data to understand customers' actual behavior discarding appliances in the absence of the program. We observe that nonparticipants who discarded an appliance within the past year indicated that they were significantly less likely to have destroyed their appliance (39%, Table 186 and Table 187) compared to the hypothetical behavior of refrigerator participants (47%, Table 186) or of freezer participants (54%, Table 187). The UMP recommends combining these estimates and weighting the overall proportion using the inverse of variance (between those that would have transferred or destroyed within each sample), to place greater weight on the more precise (less variable) values. The result is an estimate of the proportion of participating appliances that in the absence of the program would have been permanently destroyed, transferred to another user, or kept.

Table 186. 2023 Determination of Discard and Keep Distribution: Refrigerators

DISCARD /KEEP	PROPORTION OF PARTICIPANT SAMPLE	SAMPLE	DISCARD SCENARIO	N	VARIANCE	WEIGHT	PROPORTION OF DISCARDS	OVERALL PROPORTION
Discard	83%	Part	Transfer	47	0.25	0.55	53%	-
			Destroy	41			47%	-

DISCARD /KEEP	PROPORTION OF PARTICIPANT SAMPLE	SAMPLE	DISCARD SCENARIO	N	VARIANCE	WEIGHT	PROPORTION OF DISCARDS	OVERALL PROPORTION
		Non-Part	Transfer	49	0.24	0.45	61%	-
			Destroy	31			39%	-
		Weighted Average	Transfer	-	-	-	57%	**47%**
			Destroy	-			43%	**36%**
Kept	17%			18				**17%**

Table 187. 2023 Determination of Discard and Keep Distribution: Freezers

DISCARD/ KEEP	PROPORTION OF PARTICIPANT SAMPLE	SAMPLE	DISCARD SCENARIO	N	VARIANCE	WEIGHT	PROPORTION OF DISCARDS	OVERALL PROPORTION
Discard	75%	Part	Transfer	22	0.25	0.40	46%	-
			Destroy	26			54%	-
		Non-Part	Transfer	49	0.24	0.60	61%	-
			Destroy	31			39%	-
		Weighted Average	Transfer	-	-	-	55%	**41%**
			Destroy	-			45%	**34%**
Kept	25%			16				**25%**

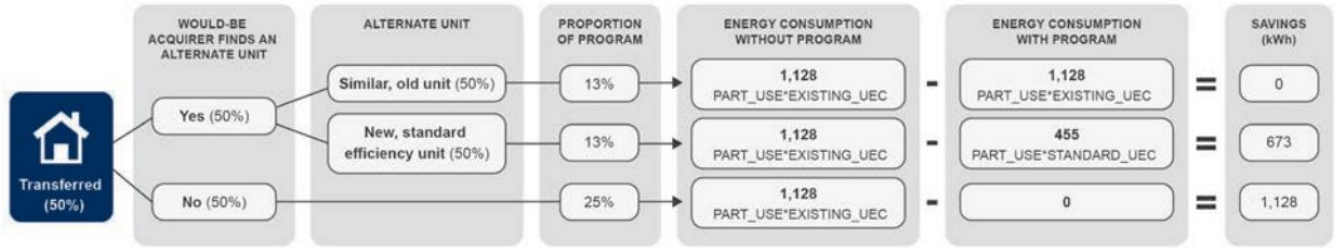
Secondary Market Impacts

If it is determined that a participant would have directly or indirectly transferred a recycled appliance to another customer on the electric grid, there are three potential scenarios that need to be addressed:

1. None of the potential recipients would find another unit.
2. All potential recipients would find another unit.
3. Some potential recipients would find another unit.

These questions are difficult to answer with certainty. As such, the UMP recommends if half of the potential secondary appliance acquirers found an alternative unit, and half would have not. Furthermore, among the half assumed to have acquired an alternative unit, half are assumed to have received a new appliance, while the other half are assumed to have received a different used appliance. Figure 113 depicts this calculation using hypothetical values taken from the UMP.

Figure 113. Secondary Market Impacts



For the half assumed to have received a new appliance, the value for energy consumption of the appliance in the absence of the program is taken as the standard operating efficiency of a new appliance as specified by ENERGY STAR.[70] The values used for energy consumption without the program are the product of the new appliances existing UEC by the product's participant use factor. Table 188 and Table 189 present these calculations as applied to the program specific data.

Table 188. 2023 Secondary Market Impacts: Refrigerator

DISCARD/ KEEP	WOULD-BE ACQUIRER FINDS AN ALTERNATE UNIT	ALTERNATE UNIT	PROPORTION OF PROGRAM	ENERGY CONSUMPTION WITHOUT PROGRAM	ENERGY CONSUMPTION WITH PROGRAM	SAVINGS
Transferred	Yes	Similar, old unit	11.8%	503.0	503.0	0.0
		New, standard efficiency unit	11.8%	503.0	442.0	61.0
	No	-	23.6%	503.0	0.0	503.0

Table 189. 2023 Secondary Market Impacts: Freezer

DISCARD/ KEEP	WOULD BE ACQUIRER FINDS AN ALTERNATE UNIT	ALTERNATE UNIT	PROPORTION OF PROGRAM	ENERGY CONSUMPTION WITHOUT PROGRAM	ENERGY CONSUMPTION WITH PROGRAM	SAVINGS
Transferred	Yes	Similar, old unit	10.3%	549.0	549.0	0.0
		New, standard efficiency unit	10.3%	549.0	360.0	189.0
	No	-	20.7%	549.0	0.0	549.0

[70] https://www.energystar.gov/products/refrigerators

Final Estimates of Net Savings

The evaluation team used the UMP approach as described above, to estimate final net savings by appliance type, using combined and weighted participant and nonparticipant data. Table 190 and Table 191 show the Georgia Power specific inputs for each step of the net savings flow chart as described by the UMP.

Table 190. 2023 Integration of Free-ridership and Secondary Market Impacts: Refrigerators

DISCARD/ KEEP	WOULD-BE ACQUIRER FINDS AN ALTERNATE UNIT	ALTERNATE UNIT	PROPORTION OF PROGRAM	ENERGY CONSUMPTION WITHOUT PROGRAM	ENERGY CONSUMPTION WITH PROGRAM	VERIFIED NET PER-UNIT SAVINGS (kWh)
Transferred	Yes	Similar, old unit	11.8%	503.0	503.0	0.0
		New, standard efficiency unit	11.8%	503.0	442.0	61.0
	No	-	23.6%	503.0	0.0	503.0
Disposed	-	-	35.7%	0.0	0.0	0.0
Kept	-	-	17.0%	503.0	0.0	503.0
Total						211.6

Table 191. 2023 Integration of Free-ridership and Secondary Market Impacts: Freezers

DISCARD/ KEEP	WOULD BE ACQUIRER FINDS AN ALTERNATE UNIT	ALTERNATE UNIT	PROPORTION OF PROGRAM	ENERGY CONSUMPTION WITHOUT PROGRAM	ENERGY CONSUMPTION WITH PROGRAM	VERIFIED NET PER-UNIT SAVINGS (kWh)
Transferred	Yes	Similar, old unit	10.3%	549.0	549.0	0.0
		New, standard efficiency unit	10.3%	549.0	360.0	189.0
	No	-	20.7%	549.0	0.0	549.0
Disposed	-	-	33.6%	0.0	0.0	0.0
Kept	-	-	25.0%	549.0	0.0	549.0
Total						270.3

Net Savings Calculation

The final NTGR for refrigerators and freezers is the quotient of the final net savings value, divided by the existing UEC value. The verified net savings are the verified net per-unit savings multiplied by the number of measures. Table 192 presents the NTGR and verified net savings for refrigerators and freezers.

Table 192. 2023 RR+ Refrigerator and Freezer NTGRs and Verified Net Savings

MEASURE	NUMBER OF MEASURES	EXISTING UEC AS UPDATED BY VERIFIED GOSS SAVINGS	VERIFIED NET PER-UNIT SAVINGS	NTGR	VERIFIED NET SAVINGS	
					ENERGY (kWh)	PEAK DEMAND (kW)
Refrigerator	3,064	503	212	42%	648,342	74
Freezer	529	549	270	49%	142,989	16
Total	3,593	-	-		791,331	90

Dehumidifiers and Room A/Cs

The evaluation could not calculate a NTGR for dehumidifiers and room A/Cs due the low number of recycled appliances and relatedly, low number of participant survey respondents who recycled one of these small appliances. As such, the evaluation applied a 100% NTGR and all net savings equate verified gross savings as reported in the Gross Savings section.

Kits

The RR+ evaluation uses the self-report approach outlined by the Uniform Method Project (UMP) to calculate net savings for all kit measures, excluding LEDs. The participant survey included questions to measure free-ridership. Free-ridership measures the portion of savings that would have occurred absent program intervention, where a full free-rider would have made no changes to their home without program intervention, a non-free-rider would not have completed the project and/or activity without the influence of the program, and a partial free-rider would have partially replicated the program activity. For RR+ kits, the free-ridership questions focused on the participant's willingness to purchase the improvements they received, and when they would have purchased the item(s). The evaluation team did not calculate spillover for the kits. Free-ridership is discussed in more detail below.

Free-ridership

The free-ridership approach used by the evaluation team assesses free-ridership based on intention. Intention asks respondents about the likelihood of carrying out the energy efficiency measure without the energy efficiency program's installation, influence questions result in a score between zero and one. Participants were asked free-ridership questions about all the improvements they received as a whole. The final free-ridership value is calculated as an intention score. Additional details on intention free-ridership methodologies are included in the sections below.

Intention

The approach the evaluation team used breaks out intention into two components: timing and quantity, asking about these elements independently. The participant survey included questions asking about how the program impacted these two elements.

Net Savings Calculation

The evaluation team calculated free-ridership of kits using the survey data collected from 2023 RR+ respondents. The final NTGR used to adjust the verified gross energy savings estimates account for free-ridership and spillover as follows:

NTGR = 1 – Free-ridership + Participant Spillover

Table 193 provides the NTGRs by measure.

Table 193. 2023 RR+ Kit NTGRs by Measure

MEASURE	FREE-RIDERSHIP	SPILLOVER	NTGR
Bathroom Aerators	4%	0%	96%
Kitchen Aerators	9%	0%	91%
Low-flow Showerheads	3%	0%	97%
Pipe Insulation	16%	0%	84%
Rope Caulk (10 feet)	5%	0%	95%
Gaskets (10 per kit)	21%	0%	79%
Weatherstripping (17 feet)	21%	0%	79%
Average Kit	**11%**	**0%**	**89%**

Table 194 provides the NTGRs by measure. The final net savings for kit measures is calculated by applying the NTGR to the program's verified gross savings as follows:

Net Savings = Verified Gross Savings x NTGR

Table 194. 2023 RR+ Kit NTGRs and Verified Net Savings by Measure

KIT TYPE	MEASURE	ISR ADJUSTED NUMBER OF UNITS (N*ISR)	VERIFIED GROSS SAVINGS		NTGR	VERIFIED NET SAVINGS	
			ENERGY (kWh)	PEAK DEMAND (kW)		ENERGY (kWh)	PEAK DEMAND (kW)
Electric	Bathroom Aerators	122	2,182	0.29	96%	2,095	0.28
	Kitchen Aerators	179	26,698	3.56	91%	24,295	3.24
	Low-flow Showerheads	129	16,179	2.16	97%	15,694	2.09
	Pipe Insulation	179	25,517	2.91	84%	21,434	2.45
	Rope Caulk (10 feet)	107	2,155	0.31	95%	2,048	0.30

KIT TYPE	MEASURE	ISR ADJUSTED NUMBER OF UNITS (N*ISR)	VERIFIED GROSS SAVINGS			VERIFIED NET SAVINGS	
			ENERGY (kWh)	PEAK DEMAND (kW)	NTGR	ENERGY (kWh)	PEAK DEMAND (kW)
	Gaskets (10 per kit)	93	5,893	2.55	79%	4,655	2.01
	Weatherstripping (17 feet)	157	5,925	0.72	79%	4,681	0.57
	Average Electric Kit	**966**	**84,549**	**12.51**	**89%**	**74,901**	**10.94**
Dual Fuel	Bathroom Aerators	459	2,105	0.28	96%	2,021	0.27
	Kitchen Aerators	676	25,759	3.44	91%	23,441	3.13
	Low-flow Showerheads	486	15,610	2.08	97%	15,142	2.02
	Pipe Insulation	676	24,620	2.81	84%	20,681	2.36
	Rope Caulk (10 feet)	405	4,397	1.18	95%	4,178	1.12
	Gaskets (10 per kit)	351	19,316	9.63	79%	15,259	7.60
	Weatherstripping (17 feet)	594	11,502	2.73	79%	9,087	2.15
	Average Dual Fuel Kit	**3,647**	**103,311**	**22.14**	**87%**	**89,809**	**18.66**

Note: Due to rounding, individual measure values may not sum to match average values.

Table 195 shows per-unit net savings for each kit measure.

Table 195. 2023 RR+ Kit Per-Unit Savings by Measure

KIT TYPE	MEASURE	PLANNED GROSS PER-UNIT SAVINGS		VERIFIED GROSS PER-UNIT SAVINGS		VERIFIED NET PER-UNIT SAVINGS	
		ENERGY (kWh)	PEAK DEMAND (kW)	ENERGY (kWh)	PEAK DEMAND (kW)	ENERGY (kWh)	PEAK DEMAND (kW)
Electric	A19 LED bulbs	144.12	0.0143	-	-	-	-
	Bathroom Aerators	14.11	0.0014	17.95	0.0024	17.23	0.0023
	Kitchen Aerators	0.00	0.0000	149.36	0.0199	135.92	0.0181
	Low-flow Showerheads	90.07	0.0090	125.71	0.0168	121.94	0.0163
	Pipe Insulation	70.82	0.0071	142.75	0.0163	119.91	0.0137
	Rope Caulk (10 feet)	41.76	0.0000	20.10	0.0029	19.09	0.0028
	Gaskets (10 per kit)	38.28	0.0000	63.40	0.0274	50.08	0.0216

KIT TYPE	MEASURE	PLANNED GROSS PER-UNIT SAVINGS		VERIFIED GROSS PER-UNIT SAVINGS		VERIFIED NET PER-UNIT SAVINGS	
		ENERGY (kWh)	PEAK DEMAND (kW)	ENERGY (kWh)	PEAK DEMAND (kW)	ENERGY (kWh)	PEAK DEMAND (kW)
	Weatherstripping (17 feet)	82.82	0.0000	37.67	0.0046	29.76	0.0036
	Average Electric Kit	**481.99**	**0.0318**	**556.93**	**0.0903**	**493.38**	**0.0790**
Dual Fuel	A19 LED bulbs	144.12	0.0143	-	-	-	-
	Bathroom Aerators	-	-	4.58	0.0006	4.40	0.0006
	Kitchen Aerators	-	-	38.13	0.0051	34.70	0.0046
	Low-flow Showerheads	-	-	32.10	0.0043	31.13	0.0042
	Pipe Insulation	-	-	36.45	0.0042	30.62	0.0035
	Rope Caulk (10 feet)	-	-	10.85	0.0029	10.31	0.0028
	Gaskets (10 per kit)	-	-	54.99	0.0274	43.44	0.0216
	Weatherstripping (17 feet)	-	-	19.35	0.0046	15.29	0.0036
	Average Dual Fuel Kit	**144.12**	**0.0143**	**196.45**	**0.0490**	**170.78**	**0.0413**

Note: Due to rounding, individual measure values may not sum to match average values.