Massachusetts Single-Family Market Opportunities Study (MA23R62-B-MOSF)

Findings Report

Prepared for:

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Executive Summary

As part of the 2022–2024 Three-Year Energy Efficiency Plan, the Guidehouse Inc. (Guidehouse) team (including ILLUME Advising), in collaboration with the Massachusetts Program Administrators (PAs) and Energy Efficiency Advisory Council consultants (EEAC), scoped a targeted, market-opportunity study to understand opportunities for greater single-family participation.

This study set out to explore whether remaining savings opportunity exists within single-family buildings that have already participated in offerings through the Sponsors of Mass Save®. As eligible measures change (e.g., changes in lighting baselines), these re-engagements with customers that have already experienced positive benefits of the Mass Save offerings may provide opportunities to cost-effectively realize additional savings. Additionally, studies focused on participation traditionally define participants dichotomously: they did or did not participate in a Mass Save offering (excluding upstream lighting or Home Energy Report interventions). However, there has been little evaluation research to identify unrealized savings at participating homes and understand how to encourage these customers to continue to make improvements through the Mass Save offerings.

We note at the outset that this exploration into opportunities for repeat participation does not negate or counter the real need to expand program reach to customers who have previously not participated. This study was not focused on better reaching nonparticipants but instead explored untapped opportunities with customers who have previously participated to support the PAs increasing savings goal.[1] We understand that an effective program strategy moving forward will need to expand both breadth (reaching more participants) and depth (achieving more savings from each program participant).

What about nonparticipants?

The PAs have completed several recent studies of residential nonparticipation. These include the Residential Nonparticipant Market Characterization and Barriers Study (2020), the Small Multifamily Barriers Study (2022), and the Multifamily Market Opportunity Study (2025). Collectively, these studies provided the PAs with meaningful insight into nonparticipation, as well as opportunities to encourage participation. To supplement these nonparticipant-focused studies and offer a complementary perspective, the PAs directed the Guidehouse Team to focus this study on realizing the remaining savings potential for customers that previously engaged with Mass Save offerings. Capturing the previously identified but unrealized savings in these homes, as well as new opportunities resulting from new and evolving measure offerings, alongside engaging nonparticipants is essential for the PAs to meet their energy and GHG targets during the 2025–2027 three-year cycle.

This study was guided by one central research question:

> ***What are the opportunities to expand savings among previously participating single-family households (including 2–4-unit buildings)?***

[1] Initial conversations about this study did include discussions of a nonparticipant study, but given that the PAs were in the process of making program changes in response to findings from the 2020 Nonparticipant barriers study, there was not interest in conducting another comprehensive study of nonparticipant barriers. Instead, the PAs were interested in understanding where there might be opportunities to deepen participation among those who had previously participated.

As an example, the PAs have been offering a comprehensive, assessment-based residential retrofit program for more than two decades. Over the last ten years, an average of about 100,000 customers per year received a home energy assessment (HEA). The last process evaluation to assess HEAs (RES35, 2018) found that around 40% of these customers acted on a recommended major measure (i.e., weatherization, HVAC, or water heating). We find a similar rate in our study here. While not every customer receives a recommendation for post-assessment improvements, most do. This means that an untapped savings potential exists in approximately 50,000 assessed homes per year in the state. Accessing and realizing these savings—alongside the PAs simultaneous efforts to bring in nonparticipants—represents a significant opportunity in the PAs' efforts to reach statewide goals. The PAs were also interested in understanding whether the programs served income eligible (IE) customers through the right channels (primarily, the IE program) and any insights into renter participation.

To address this question, the team began with a comprehensive data mining activity to characterize customers, their participation, and resulting savings trends by marrying four data sources pulling from 2013 – 2022 data:

1. Residential Building Use and Equipment Characterization Study (RBUECS Phase 7). This was the primary, or foundational, data source for the study. It included customer demographics and home characteristics, key analytic points to inform participation trends.

2. Ten years of Mass Save residential programs tracking data joined to the RBUECS data set provided objective data related to programs, measures, and related savings per surveyed customers.

3. Billing rate information provided to the PAs that verified income status and eligibility for the IE program.

4. On-site data collected as part of the RBUECS to identify equipment opportunities not apparent in the RBUECS survey data[2].

Why did the study only focus on RBUECS respondents?

The study focused on RBUECS respondents to leverage insights from the survey blended with participation data. Gaining these personal insights does introduce a recognized bias, however. This group may be more engaged compared to the general population as they agreed to participate in a lengthy and potentially longitudinal survey. As a result, they may not represent the typical customer. However, they do portray a spectrum of program engagement, including a subset of motivated customers who have maximized their opportunities with Mass Save offerings.

The team used the findings from the data analysis to identify four customer groups of interest and completed 26 in-depth interviews. These discussions with customers provided information about interactions with Mass Save, explored decision-making around home upgrades, and revealed limitations to and opportunities for future participation.

[2] This latter dataset did not provide useful for this analysis, and is therefore not discussed within this report

Study Considerations

- **This study is not program-specific and focuses on adding broader opportunities across the residential portfolio.**
- **Our findings draw upon data available at the time of the study launch between 2013 and 2022.** As the PAs continue to evolve and optimize their programs, some recent changes (e.g., modifications to fossil-fuel equipment rebates, removal of lighting, and emphasizing electrification) are not reflected in our study window. Our findings should be considered in that context and applied prospectively.
- **IE respondent data from RBUECS Phase 7 was limited, which also limited the number of IE participants.** The smaller sample narrowed what could be meaningfully reported as distinct findings from this specific group. While most findings appear to apply to both market rate and IE participants, the small sample size of IE participants limits our confidence in specific results applied to that group without further study.
- **The information provided in the body of this report is limited to key findings.** The appendixes provide additional documentation and results that may be of interest to the reader.

Findings

The research identified the following findings and opportunities:

Participants in audit-based programs have higher reported energy savings than those who participate only in the Retail rebate program.[3] Those who only participated in the Retail rebate program throughout the ten-year window of the study generated only half the total savings on average as those that participated in RCD multiple times.[4]

Customers with repeat engagements can result in impacts that are larger than simply duplicating the savings of a single interaction. About a third of Market Rate customers who engaged early in the study window had only one touchpoint (period of interaction[5]) in Mass Save programs (RCD or Retail). Unsurprisingly, these customers had the lowest average energy savings (about 3 MMBtu for Retail and 6 MMBtu for RCD). However, the average savings increase substantially with each touchpoint, with the highest group (RCD → RCD → Retail) reporting 33 MMBtu per participant—more than five times that of the average single RCD touchpoint.

[3] We note that there was a significant shift in the rebates available for heat pumps beginning in 2022 and we would expect to see increased savings from heat pump rebates beginning in that year. Looking at retail-only participants, there is not a noticeable change in total savings per year (when averaged over customers). However, this data reflects only the first year of the three-year cycle.

[4] We note that retail lighting is not well-captured in this study as it was a midstream measure and not included in the dataset the team analyzed. Where lighting is reflected here, it is largely direct-installed during an RCD or IE visit.

[5] For this analysis of savings, the team included measures installed within one year of the audit as resulting from the audit. We describe this approach in more detail in section 2.1.3.

Repeat participants and more engaged customers had an understanding of energy efficiency and programs; customers that participated only once lacked this perspective, suggesting opportunities for customer education and engagement. Repeat participants had a better understanding of how the program functioned and was funded, the measures offered, and their own eligibility than did single touchpoint participants. Conversely, single touchpoint participants did not fully understand the benefits they received from participation and/or additional program opportunities available to them. Further, some customers who had an HEA did not realize they would be eligible for another assessment if a few years had passed, which could reveal additional home improvement opportunities.

Positive customer experience generates repeat participation and referrals. Of the 7 repeat participants we spoke with, all described excellent initial program experiences, leading to repeat participation and even referring members of their community to participate. Single touchpoint participants did not describe such a positive initial experience, with several noting challenges with scheduling or coordination that made them hesitate to participate again. Similarly, one nonparticipant had such difficulty coordinating with their PAs that they did not complete the HEA While intuitive, this finding highlights the importance of continuing to maintain focus on customer experience and assessing that experience through continuous improvement channels. Positive experiences can create an engaged participant, while a negative experience can deter future participation.

There were few discernable trends in savings by demographics (income, education, language spoken at home), or home characteristics other than homeownership and the age of home. Homes that were over 100 years old or less than 20 years old reported slightly lower energy savings than those between those groups. Additionally, renters reported lower average total savings than homeowners, likely due to the smaller home sizes and fewer higher impact measures installed. The few interviews with renters revealed commonly known challenges to expanding their participation, including the need for property owner approval to make any major changes.

Regardless of their level of prior engagement, economic concerns weigh on customers' minds and may be an increasing factor in future decision-making related to home improvements. Economic uncertainty was top of mind for many customers. These customers reported hesitation about replacing functioning equipment and voiced concerns about the upfront cost of home upgrades.

Income-Eligible (IE) and Residential Coordinated Delivery (RCD) programs are serving their intended populations. Few customers flagged as IE participated in RCD, and those who did reported a change in income status as the reason.

Opportunities

We found that higher engagement through repeat touchpoints with Mass Save programs combined with a positive experience drives higher savings. We also learned that customers who engage with assessment programs generate greater savings than those that only participate through retail channels. Finally, we heard that a lack of understanding and financial challenges are issues that can lessen participation.

With this in mind, we offer the following considerations:

- Target low participation customers (e.g. those who have had one assessment or instance of participating in the RCD or IE programs[6] or a single Retail engagement) to encourage additional participation. Consider messaging to acknowledge past participation and benefits that customers could receive through participation in Mass Save program offerings. Contact RCD customers to acknowledge their past audit, remind them of measures not yet installed from their recommendation, and proactively tell them about new opportunities/measures to invite them back.

Why don't customers install all recommended measures?

We did not have information about the measures that were recommended during an initial visit. Thus, it is unclear whether customers opted not to install all recommended measures at that time, or if additional opportunities emerged during subsequent HEA visits. Additional research may be beneficial to understand how participants make decisions about which recommended measures to install and whether improved communication at the initial visit could result in more installations initially.

- Recognize the potential impact and slowdown of energy efficiency improvements due to economic concerns. Identify opportunities to support customers and communicate program benefits in a way that is meaningful and impactful for them personally. This could include more specific communication on the financial value of energy savings as well as monetizing the full benefits over time for customers in a way that resonates with them, including the incentive value, direct energy savings, and other potential non-energy benefits.

- Recognize the fluidity in income and potential that customers can flow in and out of IE eligibility. Integrate within program implementation checkpoints to assess IE eligibility.

- Create a referral program where previous participants can serve as advocates or program ambassadors and refer others to participate. This effort could also include marketing material such as customer testimonials or case studies. [7]

[6] Although the IE program is comprehensive, the sample and dataset here show that some repeat IE program homeowners receive major savings measures such as HVAC or weatherization. Since we do not have assessment results, it is unclear whether they were offered upgrades in earlier touchpoints but declined or had other barriers that were mitigated by the subsequent touchpoints. However, our sample has only a small number (35) of these repeat IE homeowners.

[7] While designing such a referral program or approach is beyond the scope of this study, considerations would need to include the benefit of providing monetary versus other forms of incentives, as a financial incentive might dilute the social value of the referrals.

1. Introduction

1.1 Background

As part of the 2022–2024 Three-Year Energy Efficiency Plan, the Guidehouse Inc. (Guidehouse) team (including ILLUME Advising), in collaboration with the Massachusetts Program Administrators (PAs) and Energy Efficiency Advisory Council consultants (EEAC), scoped targeted, market-opportunity studies that complement prior nonparticipant research[8]. The first of these focused on non- or low-participating owners and managers of smaller (5–20 unit) multifamily properties. The findings of this study were delivered to the PAs on March 31, 2025 in *MA23R61-B-MOMF Massachusetts Multifamily Market Opportunity Study: Interview Findings Memo of Small Multifamily Property Owners*. The second study focused on "understanding opportunities for greater single-family participation," the subject of this report.

Single-family buildings that have already participated in offerings through the Sponsors of Mass Save® are a potentially cost-effective group to engage, given previous participation and changing program opportunities, and serve as a potentially useful lever for the PAs to help achieve energy-savings and decarbonization goals. As eligible measures change (e.g., changes in lighting baselines), these re-engagements with customers that have already experienced positive benefits from Mass Save offerings become more useful for programs to consider. In this study, the Guidehouse team explored opportunities for additional savings among previously participating single-family (including duplex to 4-unit) buildings.

In past studies, including the Residential Nonparticipant Market Characterization and Barriers Study, a program participant is clearly defined as a building that participated in any Mass Save offering. But considering only this factor ignores the spectrum of customer engagement across the Mass Save programs and the depth of participation and, relatedly, savings over time.

For example, a customer that receives a Home Energy Assessment (HEA) and no-cost direct install measures is classified the same as another customer who completed a total-home retrofit with insulation, heating system upgrades, and air and duct sealing. Although both are participants, the latter receives greater program impacts. By contrast, the former could still have additional opportunities for energy-saving improvements in their home. Similarly, a customer who receives a rebate on a

What about nonparticipants?

The PAs have completed several recent studies of residential nonparticipation. These include the Residential Nonparticipant Market Characterization and Barriers Study (2020), the Small Multifamily Barriers Study (2022), and the Multifamily Market Opportunity Study (2025). Collectively, these studies provided the PAs with meaningful insight into nonparticipation, as well as opportunities to encourage participation. To supplement these nonparticipant-focused studies and offer a complementary perspective, the PAs directed the Guidehouse Team to focus this study on realizing the remaining savings potential for customers that previously engaged with Mass Save offerings. Capturing the previously identified but unrealized savings in these homes, as well as new opportunities resulting from new and evolving measure offerings, alongside engaging nonparticipants is essential for the PAs to meet their energy and GHG targets during the 2025–2027 three-year cycle.

[8] Residential Nonparticipant Market Characterization and Barriers Study (MA-19R04-A-NP): https://ma-eeac.org/wp-content/uploads/MA19R04-A-NP-Nonpart-MarketBarriersStudy_Final.pdf

single appliance through the Retail program is considered an equal participant, although there may be opportunities for other improvements to save energy in their home through other Mass Save offerings.

We note that the outset that this research effort was focused on expanding the depth of services provided to participating customers. Another critical path for the PAs to expand overall savings and program efficacy will be to extend the reach of the program, by expanding the program to serve underserved or currently unengaged participants.

The research presented in this report is exploratory, intended to investigate the opportunities to serve residential customers that were prior participants. Unlike a comprehensive evaluation, it is not focused on program-specific implementation feedback—for example, recommendations provided by a process evaluation—and attempts to address broader opportunities across the residential portfolio through exploratory data mining and follow-up interviews.

1.2 Study Overview

As noted, this study sought to better understand opportunities that increase savings among single-family customers. The approach used a combination of quantitative data (e.g., program tracking data, survey responses) and qualitative data (i.e., interviews) to address the research questions, which are detailed in Sections 2 and 3.

This study is unique in that it pulled together different datasets to synthesize participants' characteristics, their depth of savings, and their storylines and trends across time and within subgroups. The team then used that information to follow up with exploratory research to better understand those customers, their experiences, and opportunities to serve them and increase savings.

Our study mined and combined the following datasets:

- The primary dataset for analysis is the Residential Building Use and Equipment Characterization Study[9] (RBUECS) survey respondents. This survey was fielded by Guidehouse in 2022.

Why did the study only focus on RBUECS respondents?

The study focused on RBUECS respondents to leverage insights from the survey blended with participation data. Gaining these personal insights does introduce a recognized bias, however. This group may be more engaged compared to the general population as they agreed to participate in a lengthy and potentially longitudinal survey. As a result, they may not represent the typical customer. However, they do portray a spectrum of program engagement, including a subset of motivated customers who have maximized their opportunities with Mass Save.

[9] https://ma-eeac.org/wp-content/uploads/Residential-Building-Use-and-Equipment-Characterization-Study-Comprehensive-Report-2023-12-22.pdf

- The Data Management Team used account numbers for these customers to provide tracking data across all Mass Save residential program offerings from 2013–2022.[10]

- The Data Management Team also provided low-income rate flags derived from billing data from all PAs from 2017–2024.

The study also reviewed on-site data collected by Guidehouse as part the RBUECS to determine if the existing equipment data would provide additional insight into opportunities. That data analysis did not yield significant findings so is not included in this report.

With measure-level detail across many programs, we characterized the frequency and depth of customer engagement. Combining the RBUECS survey responses with the tracking dataset, we explored how participation and savings varied with demographics and building characteristics. The combination of income data in the RBUECS and rate flags allowed us to further explore program participation during years of income-eligibility. The full details of these three datasets and our cross-program participation analysis is presented in Section 2 and in the related appendices.

Based on the data analysis, the team identified and targeted four groups of interest for interviews. These span the spectrum of participation, from customers with little to no engagement to those that have participated in Mass Save offerings multiple times over the previous decade. We conducted 26 in-depth interviews of customers drawn from these sample pools. Details of the research questions we explored and our findings from the discussions are found in Section 3.

[10] At the time this study was initiated, 2022 RBUECS Phase 7 results and 2022 participant data were the most recent available.

2. Data Analysis

The overarching goal in the initial data analysis phase of our study was to identify patterns in the spectrum of engagement of RBUECS respondents by combining their program participation with insight from the survey. We recognized this group likely differs from the general service population as they have agreed to participate in a lengthy and potentially longitudinal survey. As a result, we first wanted to understand the demographics of participants—those who appear in our ten-year tracking dataset—and their homes.

The initial analysis provided insight into program participation and patterns and participant characteristics. This led to additional analyses intended to shape the sampling strategy and research for interviews, which more directly provided findings for identifying further participation opportunities.

We approached this task primarily to address the following questions:

- Are there patterns in customer demographics or building characteristics that correlate or predict levels of participation?
- What is the frequency and depth of participation throughout the ten-year span of our study dataset?
- Are there distinct customer segments based on participation?
- Do patterns of participation among IE customers differ from Market Rate? And do those differences point to additional opportunities for that population?

In this section, we highlight the most relevant findings that drove our research and informed the target group selection for in-depth interviews (Section 3). In Appendix A, we include deeper dives into some of the analysis as well as other interesting insights that arose from combining these unique datasets but were less related to our primary goals.

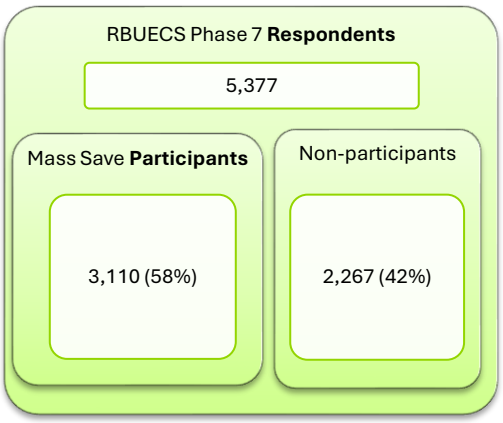
We start by describing the datasets in detail, including high-level statistics, limitations, and biases (Sections 2.1.1 and 2.1.2), and introduce “touchpoints”, which help us organize engagement paths for customers (Section 2.1.3). We then delve into four main analysis methods throughout Section 2.2.

Patterns that emerge from the demographics and building characteristics analysis (Section 2.2.1) confirm the quality of the datasets and some expected participation details of Mass Save programs throughout the ten-year window of the study. But deeper insights come from the customer path analysis (Section 2.2.2) that segments participants into different groups of engagement. We developed our interview strategy primarily based on findings in this method. Finally, we touch on the interaction of low-income customers with IE offerings in Section 2.2.3 and provide some highlights from examining the measure composition in Section 2.2.4.

2.1 Description of Data

2.1.1 Characteristics

RBUECS Phase 7 included 5,545 useable responses. All but a small fraction (168; 3%) could be mapped to surrogate PA account numbers. This sample of 5,377 formed the baseline population for our study, referred to as the **respondent** group hereafter.



We requested respondents' measure-level tracking data starting in 2013 from all residential programs. At the time of our request (early 2024), PY2023 data was still being verified and was unavailable, resulting in a dataset that spanned 2013–2022 and contained 27,334 measures. Most respondents (3,110; 58%) had at least one measure recorded in the tracking data. This group is referred to as **participants** hereafter. Since we are interested in individual customer engagement with Mass Save programs and tracking data is directly keyed to their account, measures are associated with a customer's dwelling space. This may be the whole or part of a building for owners (e.g. single-family vs. duplex) or a more limited living space for renters.

Although most respondents provided self-reported income in RBUECS Phase 7 that can identify their eligibility for certain programs, this information was only valid for the year the survey was administered (2022). To verify the accuracy of the self-reported income, as well as explore the relationship between income-eligibility and Mass Save participation with more parity, we leveraged a billing rate-code analysis effort by the Data Management Team. They supplied us with the historical low-income rate flag for nearly all respondents (4990; 93%) that spanned 2017–2024. Both the RBUECS income data and this additional dataset are referenced within this report. We used the RBUECS data for the demographics and measure analysis to integrate moderate income level respondents and primarily used the billing rate data for the program pathway analysis, which did not break out moderate income (Section 2.2.3).

2.1.2 Limitations and Potential Biases

As with many studies that span years of program offerings and a diverse population, we acknowledge some limitations in the datasets and our customer base. Here we note several of the most important considerations but provide additional details about the data organization and limitations in Appendix A.

1. Income-eligible respondents in the RBUECS dataset are underrepresented relative to the general customer base identified through other market studies. This leads to a smaller IE participant pool for us to explore as well.

2. RBUECS participants may be generally more engaged already by agreeing to participate in the longitudinal study. Metrics we explore here may be biased toward higher savings and program involvement.

3. Program names, offerings, and how measure-level data was captured have evolved over the multiple three-year planning periods covered in our ten-year tracking dataset. The team had to make some educated assumptions in the data (see Appendix A). At the highest level, we use the naming of the 2022–2024 Three Year Plan: Residential Coordinated Delivery (RCD), Residential Retail (Retail), and Income-Eligible Coordinated Delivery (IE) for simplification throughout this report. We note that the shift toward electrification in the 2022-2024 plan is not well represented in our dataset with only 2022 present.

4. We found that audits were not consistently recorded in the program tracking data for some coordinated-delivery participants, even though audits are typically the entry point of those pathways. In particular, program years between 2013–2016 have no audits recorded. In 2017 and 2018, audits began to appear in the tracking dataset, but they were not consistent[11]. In addition, some vendor contracts only require record retention for seven years. Beyond that, vendors may not keep the data, adding to the challenge of exploring historical participation. In general, these details limited our ability to identify participants who received an audit but no other measures. Examining just 2019–2022, about 4% (47) of audit-based touchpoints resulted in no other tracked measures.

5. Program-tracking date information is limited with 79% of coordinated-delivery measures lacking a value for the installation date and 67% of retail measures lacking a rebate-paid date. In these cases, only the year of the measure record is present.

6. Our study window includes the COVID-19 pandemic. We understand that there were program shifts in 2020 and 2021 related to the response to the COVID-19 pandemic that may have impacted program participation and engagement. However, based on this dataset and with the analysis used here, we don't see effects from the COVID-19 pandemic that play a major role in our findings. There are two possible small signals of its effect that we note here: (1) The lowest average savings for a first touchpoint is in 2021 (Table 2-5). (2) There is a small increase in the percentage of LI discounted flags in 2021-2023 that returns to pre-COVID levels by 2024 (Figure D-1). These small signals do not broadly impact the analysis in a way that decreases the confidence or significance of our findings.

2.1.3 Touchpoints

We organize our discussion of Mass Save engagement by identifying "touchpoints" that create customer paths (see Section 2.2.1.3) over the ten years of program tracking data. Touchpoints attempt to capture measures from a significant engagement with a program. For RCD and IE, a

[11] DNV confirmed that audits have not been consistently included in PA program tracking data since it traditionally focused on measures that contribute savings. From 2013-2018, audit data for both RCD and IE had periodically been requested from lead vendors on an *ad hoc* basis for specific study needs but was not consistently added. Starting in 2019, audit-related fees have been added to program tracking data.

touchpoint consists of an HEA and the "bundle" of measures that follows from recommendations and/or increased awareness within the touchpoint or following year.

For recent years (2017 and later), an HEA in the tracking dataset marks the presence of an RCD or IE touchpoint. When audits are not reliably recorded, the timing and grouping of multiple measure installations from the same program provide a clear marker of a touchpoint. In these cases, we first identify groups of RCD or IE measures received during the same year. With the expectation that these programs start with an HEA visit, we created a new "potential audit" measure in that program year as a touchpoint marker.

We then created a "bundle" of measures comprising the audit and any other measures installed at the premise up to a year after the audit touchpoint. Rebated, direct install, or post-audit contracted retail measures[12] in the tracking data for a customer during this period are added to the bundle with the assumption that the audit provided an explicit recommendation or influenced the customer's decision to purchase that equipment.[13] Isolated groups of Retail measures that remain and are more than a year from any previous audit create Retail (only) touchpoints.

2.2 Data Analysis Findings

2.2.1 Demographics and Building Characteristics

Our first set of analyses focused on the demographics and building characteristics of participants and the relationships of those characteristics with measures of program engagement.

2.2.1.1 Overview of Program Participants

Below are notable characteristics related to participants in the dataset. Appendix B provides additional detail on participant characteristics.

- Most of the participants (defined at the dwelling-unit occupant level) in the data live in traditional single-family homes (78%) and own (95%) their residence. However, our participant fractions are higher than the statewide averages[14] of 60% and 70%, respectively.

- Only 11% self-identify as low-income (less than 60% of State Median Income (SMI)), which is lower than the statewide average[14] of 30%.

[12] The tracking data the team analyzed did not include midstream measures; it only included those measures that were directly tracked to customers (marketplace/rebate, direct install, or post-audit contracted). There is some upstream tagging on HVAC, Hot Water, and Lighting related measures from the Retail channel starting ~2018. These may be present in prior years and just not labeled as such.

[13] We established this timeframe based on conversations with PAs, understanding that the programs attribute savings to the audit from measures installed within one year of an audit.

[14] Statewide demographics are compiled from the *American Community Survey* (2023) to align with RBUECS Phase 7 (2022).

- A considerable portion of RBUECS survey respondents declined to respond to the income questions (29%). The data indicates that most of these customers are not low income as the historical discounted rate dataset shows that few (9%) customers who chose not to report their income in the survey are income-eligible. A wide range of demographic categories and participation statistics corroborates that this group aligns most closely with those *not* income-eligible.

- Those without a college degree are not well represented among our participants (21%) compared to the statewide average[14] (48%).

- About 70% of the participants reported that they moved in during 2013 (the first year of our study) or earlier. Most of our sample population were established in their home throughout the full span of the study window.

Table 2-1 compares income groups across home size, ownership, and whether they participated in an IE program anytime within the study ten-year window. The low-income group shows evidence for smaller homes and a higher percentage of renters whereas the "prefer not to answer" group matches most closely to the "not income eligible" group[15]. The marginal IE participation of moderate-income customers (as defined by their 2022 survey response) is likely due to their income status changing throughout the ten-year period of our tracking data. Section 2.2.3 traces historical participation and income-eligibility, which confirms customers participate in the IE program in a year where they are also on a low-income discounted billing rate.

Table 2-1. Characteristics by Self-reported Income Group (2022)

Income Group	*n* (%)	Median Home Size [sq ft]	Own	Rent	Participated in IE
Low (< 60% of SMI)	335 (11%)	1,400	82%	18%	33%
Moderate (60%–80% of SMI)	239 (8%)	1,600	96%	4%	15%
Not Income Eligible	1,620 (52%)	1,800	97%	3%	1%
Prefer not to answer	915 (29%)	1,901	96%	4%	4%

2.2.1.2 Savings Distributions

The team combined RBUECS demographic and home characteristic information with various elements from the program tracking data to explore trends in savings by customer and home characteristics. We calculated total gross savings per customer aggregated over the ten-year

[15] We acknowledge that the not-income-eligible group includes a wide range of income levels. For the analysis here, we keep these customers as a single group that aligns with program eligibility.

tracking dataset and across fuels with savings converted to MMBtu.[16] We highlight findings in this section that show some correlation with a few characteristics. These include:

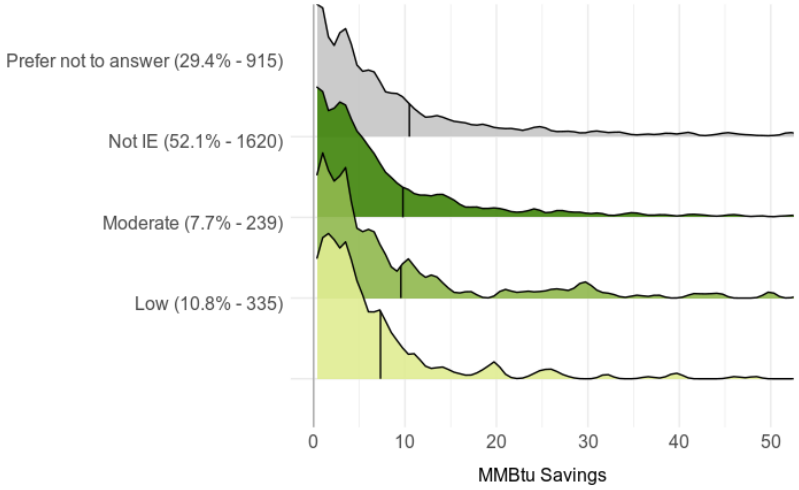
- The distribution of total savings during the ten-year study period is fairly similar across income categories. Average total savings for low-income households are slightly lower than other categories potentially due to having a higher fraction of renters and having a portion of the improvements addressed by community action program (CAP) funds and not represented in the PA data. Low-income households may also be smaller on average and provide fewer locations for measure installation; however, the IE program uses deemed savings, which do not vary by home size.

- Homeowners realize total savings about twice as high as renters, on average.

- Older (over 100 years) and newer (less than 20 years) homes generate slightly less savings than those of moderate age.

Not all variables result in significant differences between customer categories. Of note, the distributions of savings across language groups (predominance of spoken English) are very similar, with little substantial differences in shape or average savings. This consistency suggests that language spoken at home does not appear to be a strong differentiator in energy savings outcomes. Exploration of this and other variables is documented in Appendix C.1. We also explored the geographical distribution of participation and savings but found engagement metrics relatively uniform across the state. Details of that effort can be found in Appendix C.2.

Figure 2-1. Savings Distribution by Income Group



The distribution of energy savings by income group (Figure 2-1) is shown as the overlapping ridgeline plots. The height of each line above its baseline represents the fraction of customers who saved the energy amount traced by the x-axis. Each plot is "normalized" to the same physical height so we can compare group distributions of very different sample sizes. The vertical line in each plot marks the average savings of that population.

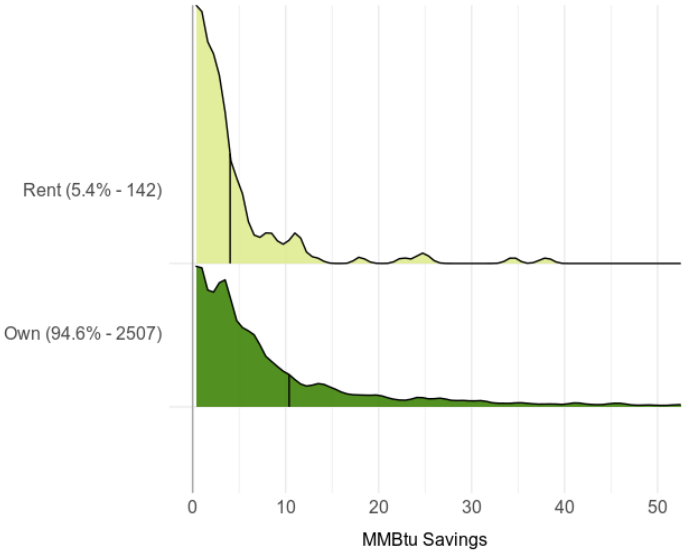
The average total savings show a slight correlation with income category, with the low-income group having the lowest average savings. However, the overall distribution of savings looks very similar across all groups, suggesting a similar pattern of participation. The difference in the average

[16] The team used gross savings numbers provided by the data management vendor, DNV. We did not have access to evaluated savings. For this analysis, we are using gross savings largely as a proxy for level of relative customer engagement.

total savings appears to be a combination of a higher proportion of renters among low-income participants and a slightly lower fraction of high-savings measures in their equipment distributions (see Section 2.2.1.3). As Table 2-1 highlights, the low-income participants in our study are about four times more likely to be renting than other groups. But only about 10% of the gap in the mean savings between low-income and not-IE participants in Figure 2-1 is attributable to ownership status (Figure 2-2). The remainder appears to be due to differences in specific equipment participation (see Sections 2.2.1.3 and 2.2.2) and could be further reduced by measures funded through the Federal Weatherization Assistance Program (WAP) that are not represented in our PA-funded program data.

In all groups, the majority of participants have saved around 5 MMBtu or less over the ten-year period of our study. As will be shown in more detail below (Section 2.2.2), those that participated in IE or RCD realized higher average savings (~7 MMBtu) over this period. Year-to-year average savings is explored in Section 2.2.4, where we find some scatter, but no appreciable trends. Similar to the characteristics presented in Table 2-1 above, those that preferred not to answer the income question appear to be most similar to those who are not income-eligible.

Figure 2-2. Savings Distribution by Home Ownership



Homeowners demonstrate higher average energy savings compared to renters, as shown in Figure 2-2. This result aligns with our expectation that homeowners typically have more space as well as more control or incentive to implement building-wide measures, which tend to save more energy. This facet was confirmed in interviews. Related to this reasoning, we find the overall program participation rate among RBUECS respondents who are renters is only 22% compared to 65% for those who are homeowners. As a result, renters comprise only 5% of the overall participant population in our study.

We also looked for relationships between reported home characteristics and savings. In Figure 2-3, each dot is placed by the year a home was built and its total energy savings. Although there is considerable scatter, the line illustrates the average energy savings trend across different home ages with the shaded areas indicating confidence intervals around the average. The lower density of high-savings points combined with the trend line reveal a slight decline in the average savings at older and newer home sites.

Figure 2-3. Savings Distribution by House Age

These variations may reflect two opposing dynamics: (1) older homes may be less likely to receive certain upgrades due to structural or barrier limitations; and (2) newer homes may already incorporate energy-efficient features, leaving less opportunity for additional savings. When choosing participants for our interviews (Section 3), we focused on customers in moderate-aged homes—older than 11 years—who were likely to have more opportunities for saving. This choice minimized the effect of home characteristics on our research into customers' decisions and their relative level of participation.

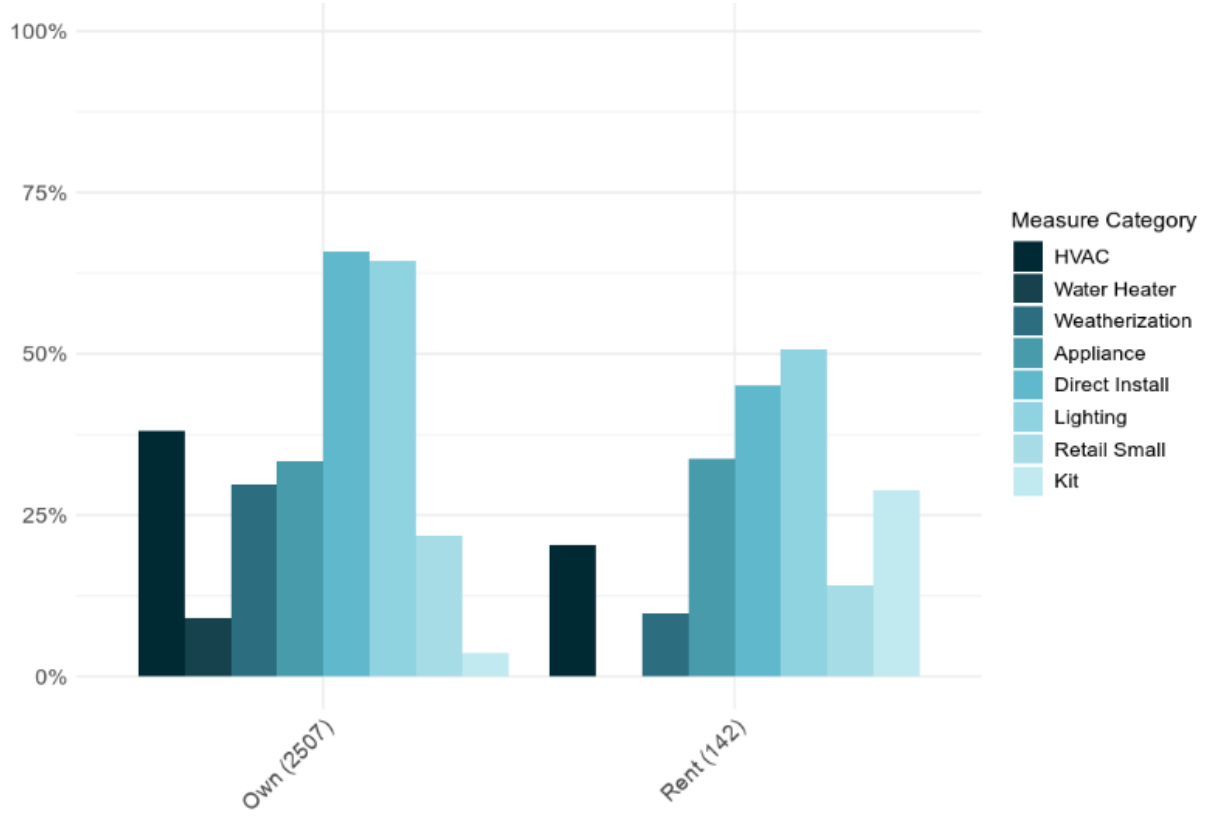
2.2.1.3 Equipment Distributions

We grouped measures into broad categories to examine differences in program engagement among various customer segments (see Appendix A for details). The "Direct Install" and "Retail Small" categories include smaller-savings measures such as thermostats, aerators, showerheads, and advanced power strips that are received through a coordinated-delivery or retail channel, respectively. Below we highlight findings by homeownership status (rent/own) and income level.

Owners are more likely to receive major measures (HVAC[17], water heating, weatherization) than renters (Figure 2-4). Renters are more likely to receive lower-savings kit measures, which typically have lower ISR (and thus savings) compared to the same direct-install measures replaced for homeowners during an assessment. These differences likely help explain the trend in total savings seen in Figure 2-2.

[17] For HVAC measures from 2016 – 2022, thermostat data is differentiated from other HVAC equipment in the data, allowing the team to separate thermostats from other, more substantial HVAC measures. For the period between 2013 and 2015, this data is unavailable. For 2016 – 2022, major equipment is distinguished from thermostats or controls. For this analysis, thermostats or controls were categorized as either retail small or direct install, depending on the channel through which they were provided.

Figure 2-4. Measures Received by Homeownership Status[18]



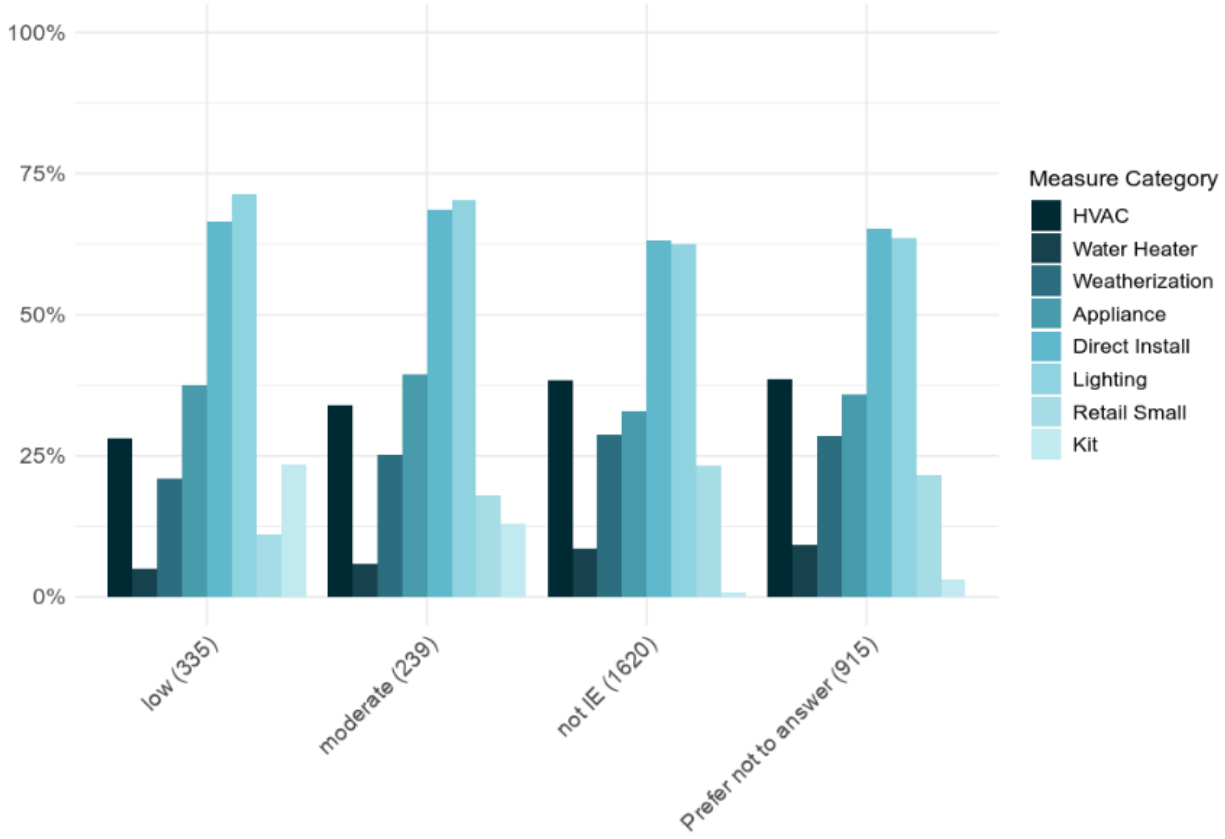
Similarly, we find that customers that are classified as low-income are less likely to receive major measures compared with those who have higher incomes, although the differences are not as drastic as homeownership (
Figure **2-5**). This lower proportion also likely contributes to the slightly lower average total savings for low-income customers shown in Figure 2-1[19]. Our data also do not reflect the installations and savings from measures installed through Federal Weatherization Assistance Program funds[20] administered by CAPs; however, based on the expectation that only about 10% of IE program participants receive this funding in support of these measures, we do not believe this is a primary driver of the lower savings.

[18] We lack home ownership status for approximately 15% of the sample. This graph represents the remaining 85%.

[19] Those who chose "prefer not to answer" for the income question appear more similar to the “not IE” group than the other income groups.

[20] Due to federal regulations on participation data, the evaluation team was not able to identify what measures may have been installed in customer homes through federal WAP funding, thus impacting our overall calculations of savings for income eligible customers. However, since only around 10% of IE program participants are served using WAP funding, this is likely a small impact on overall savings.

Figure 2-5. Measures Received by Income Level



2.2.2 Path Analysis

The previous section highlights trends in savings by participant demographics and housing characteristics. In addition, we conducted a path analysis to explore how participants interacted with the program over time and related savings. This method focused on the frequency and depth of customers' engagement and whether those interactions occurred within the same program or across different program types. We found this analysis to be more revealing around savings opportunities than the demographic analysis.

As noted above in Section 2.1.3, we organized the program tracking data into "touchpoints" for each participant, which we separated into respective programs: RCD, IE, or Retail (only). Participants with multiple RCD or IE touchpoints tend to achieve significantly higher energy savings than Retail only customers.

Table 2-2 illustrates program pathways for Market Rate customers who interacted with the Mass Save programs in 2013 or 2014. Each row shows their engagement journey through the 2013-2022 study window. Shaded groups highlight participants who engaged one, two or three times over the ten-year period with the chronological order of specific programs shown in the first three columns. The number of participants for each journey path and their average total savings from the ten-year

period are given in the final two columns. Percentages in the *n* column are the fraction of those that took that row's particular path out of the total number of participants in the subsample (573).

We used a subset of customers for this table to reduce the risk of skewing results due to limited time for a customer to participate in Mass Save offerings. For example, a participant who entered the program in 2022 may appear to have only a single touchpoint simply because not enough time has passed to observe additional participation. By focusing on those with earlier entry years, we ensure that participants had sufficient time to engage with the program multiple times, allowing for a more accurate comparison of energy savings across different engagement pathways.

Table 2-2. Energy Savings by Number of Touchpoints and Programs

Touchpoint #1 (2013 or 2014)	Touchpoint #2	Touchpoint #3	*n* (%)	Avg. Total MMBtu*
Retail			69 (12%)	2.9
RCD			115 (20.1%)	6.1
Retail	Retail		41 (7.2%)	6.1
RCD	Retail		51 (8.9%)	11.2
Retail	RCD		39 (6.8%)	12.2
RCD	RCD		62 (10.8%)	16.6
Retail	Retail	Retail	34 (5.9%)	15.9
Retail	Retail	RCD	14 (2.4%)	16.3
Retail	RCD	Retail	21 (3.7%)	16.8
RCD	Retail	Retail	32 (5.6%)	20.3
Retail	RCD	RCD	29 (5.1%)	21.3
RCD	Retail	RCD	15 (2.6%)	22.9
RCD	RCD	Retail	29 (5.1%)	33.2
RCD	RCD	RCD	21 (3.7%)	31.8

* Total Savings over 2013–2022

The main insights from this table are:

- RCD touchpoints result in higher savings compared to Retail program touchpoints. While not shown in this table, the result is similar for IE participants.
- Customers with multiple RCD touchpoints in this subsample achieve more savings—in some cases, more than double or triple the savings of those with only a single touchpoint.
- This trend does not appear to be driven by changes in Mass Save offerings over time. The average energy savings of a customers' first RCD touchpoint remains fairly consistent across all years of the study (see

- Two measure classes deserve special note.
- As noted in Appendix A, HVAC entries in the tracking data for 2013–2015 do not have sufficient information to discriminate between HVAC heating/cooling equipment and related smaller-savings supporting measures like thermostats. The percentages for those years are artificially inflated.
- Prior to 2022, lighting was one of the most common measures included as a direct install and contributed significant savings, typically 25–45% of first-touchpoint savings and 15–35% of subsequent touchpoint savings. The shift away from lighting starting in the 2022–2024 three-year plan results in the sharp drop in its inclusion in a measure bundle. The number and savings of lighting measures is 20% that of 2021.
- Table 2-5 below), suggesting that the frequency of participation beyond program evolution contributes to the increased savings per touchpoint for multiple-touchpoint customers.

The team further analyzed whether energy savings varied by touchpoint order. Specifically, we examined whether participants with multiple touchpoints achieved most of their energy savings during the initial touchpoints—potentially skewing overall insights. However, the analysis shows that energy savings were relatively consistent across both initial and subsequent touchpoints, suggesting that continued engagement with the program contributes meaningfully to savings over time. In order to understand the experience and perspectives of repeat participants, we targeted those who participated in three coordinated-delivery program touchpoints as one of our key sample groups for in-depth interviews (Section 3.2).

Table 2-3 focuses on the significant fraction of participants (69%) from our whole sample that have had only one touchpoint (RCD, IE, or Retail only) with the Mass Save programs recorded over the complete (2013–2022) study window. As in the subsample analysis above (Table 2-2), the single-touchpoint Retail group represents the lowest average total savings group in our pathway analysis. Participants with one coordinated-delivery touchpoint form another of our key groups for in-depth interviews in Section 3.2 . They are a large base of customers with potential savings opportunity as shown in Table 2-2.

Table 2-3. Participants With One Touchpoint by Program (Out of 3,110 Participants)

Single Touchpoint	*n* (%)	Avg. Total MMBtu
RCD	1,542 (49.6%)	7.6
Retail	498 (16.0%)	3.1
IE	119 (3.8%)	6.9
All	**2,159 (69.4%)**	**6.5**

2.2.3 Income-Eligible Analysis

In this section, we focus specifically on the income-eligible group to better understand their engagement with the program. Our initial analysis relied on the self-reported income responses

from RBUECS Phase 7. However, using this component alone had two drawbacks. First, the Phase 7 answers capture a customer's eligibility at the time the survey was fielded in 2022. It does not reveal past changes in status, which then no longer align with our ten-year program tracking data. Second, 28% of respondents prefer not to answer this question, leaving them out of further analysis for income-eligibility trends with participation. We therefore requested and integrated discount rate data to provide more objective (and comprehensive) data to indicate income eligibility status.

After integrating the historical discounted rate data with our path analysis, we explored the correspondence of income-eligibility and program touchpoints during overlapping years of the two datasets (2017–2022).

Before delving into the findings, it is important to recognize that the RBUECS data underrepresents IE eligible customers, limiting the analysis. Of the RBUECS Phase 7 respondents, 17% were flagged as low income for some period between 2017 and 2024. In comparison, prior market characterization studies (including Residential Nonparticipant Market Characterization and Barriers Study and Moderate Income Market Characterization Study) found IE customers are around 30% of the population. This is a notable difference.

During this exploration, we found:

- Slightly over half (54%) participated in Mass Save, which was slightly lower than respondents not flagged as low income (62%).
- The majority of customers (greater than 90%) who participated in the IE program were on a discounted rate that same year indicating that the IE program is appropriately serving LI customers.
- Relatedly, LI-flagged participants made up only a small percentage of the RCD program population, indicating that the program is primarily serving Market-Rate customers.
- About 30% of the time, customers flagged as LI in a year received an audit through RCD. For perspective, the combined tracking and discounted rate dataset included 185 out of 2,206 customers who had a touchpoint flagged as LI. These customers—predominantly homeowners—used RCD 68 times when LI-flagged out of the 2,599 total number of RCD touchpoints. A few in this group live in multiunit buildings that are eligible for the Mixed Income Protocol, which blends funding and implementation from IECD and RCD; however, most of this group own single-family homes. This group was included for targeted interviews, discussed in the next section.

We provide details of this exploration in Appendix D.

2.2.4 Bundle Analysis

Why don't customers install all recommended measures?

We also explored the distribution of measures in coordinated delivery touchpoint bundles to further identify patterns in participation. Key takeaways include:

- Overall, there are no significant differences among the types of measures installed from a customers' first touchpoint to later engagements. There is a slight decrease in savings, which is likely in response to a slight decrease in some major-savings measures being installed (HVAC and weatherization, in particular).

We did not have information about the measures that were recommended during an initial visit. Thus, it is not clear whether customers opted not to install all recommended measures at that time, or if additional opportunities emerged during subsequent HEA visits. Additional research may be beneficial to understand how participants make decisions about which recommended measures to install and whether improved communication at the initial visit could result in more installations initially.

- Similarly, the measure groups and savings that make up participants' first touchpoints remain fairly consistent over the ten-year period of the study.

Table 2-4 shows detail available in this analysis from an aggregated sample of all coordinated-delivery (both RCD and IE) touchpoints. As noted earlier, many participants have only one touchpoint, which is reflected in the sharp decrease in participants from the first to second touchpoints.

Table 2-4. Touchpoint Measure Bundle Characteristics

TP Rank	*n*	Average MMBtu Savings	Measure Class Present							DI or Lighting Only
			HVAC	Wx	DWH	Appliance	Lighting	DI	DI or Lighting	
1st	2,213	7.62	24%	31%	4%	14%	83%	81%	93%	45%
2nd	552	6.63	21%	28%	6%	18%	65%	76%	84%	41%
3rd	73	5.78	21%	18%	4%	18%	62%	81%	88%	51%

On average, there is a slight decline in average MMBtu for the second and third touchpoints, but there is not a steep drop off. The decrease in savings is likely driven by a similar decrease in the measure classes that typically deliver the highest savings, here HVAC and weatherization (Wx). This behavior may be due to increasing saturation of energy efficient measures in the homes of multiple-touchpoint participants.

Savings trends were consistent over time. Table 2-5 shows the first touchpoint of all participants, grouped by year of the initial touchpoint. The average savings for a first touchpoint remains fairly consistent from year to year despite changes in program offerings and savings claimed for measures over time. The rows in the table are grouped by Mass Save three-year planning periods.

Two measure classes deserve special note.

- As noted in Appendix A, HVAC entries in the tracking data for 2013–2015 do not have sufficient information to discriminate between HVAC heating/cooling equipment and related smaller-savings supporting measures like thermostats. The percentages for those years are artificially inflated.

- Prior to 2022, lighting was one of the most common measures included as a direct install and contributed significant savings, typically 25–45% of first-touchpoint savings and 15–35% of subsequent touchpoint savings. The shift away from lighting starting in the 2022–2024 three-year plan results in the sharp drop in its inclusion in a measure bundle. The number and savings of lighting measures is 20% that of 2021.

Table 2-5. First Touchpoint Measure Bundle Characteristics

Year	TP Rank	*n*	Average MMBtu Savings	Measure Class Present							DI or Lighting Only
				HVAC	Wx	DWH	Appliance	Lighting	DI	DI or Lighting	
2013	1st	255	7.98	35%	50%	4%	17%	80%	61%	86%	29%
2014	1st	277	6.77	37%	27%	4%	7%	86%	71%	91%	44%
2015	1st	277	8.30	35%	33%	5%	8%	90%	87%	95%	43%
2016	1st	272	8.01	13%	25%	3%	10%	88%	88%	96%	59%
2017	1st	202	7.83	20%	22%	4%	25%	93%	88%	98%	46%
2018	1st	266	7.86	20%	20%	3%	17%	88%	91%	97%	54%
2019	1st	206	8.04	13%	33%	5%	21%	85%	85%	96%	47%
2020	1st	159	8.18	17%	42%	3%	12%	81%	84%	91%	42%
2021	1st	188	5.54	23%	32%	5%	15%	79%	82%	92%	42%
2022	1st	111	7.15	13%	32%	3%	11%	40%	70%	78%	42%

The touchpoint bundle analysis can also be used to compare customer segments. In Table 2-6, we compare the typical makeup of a measure bundle for different groups of customers participating in different programs. The first column shows the low-income status during the year when the customer participated in the given program (second column). Note that some customers change rate categories over time. They may have interacted with both IE and RCD in our study window and appear in multiple rows with different touchpoints.

The bolded row highlights customers participating in RCD during a year that they have LI rate status and are presumably eligible for IE. We do not find bundle measures to be substantially different from non-LI customers who participate in RCD (third row). There are some small differences between the first two rows (LI-flagged participants), which may reflect differences in incentives, measures offered between RCD and IE, and the influence of CAP-funded measures, which are not included in our PA-based tracking dataset.

Table 2-6. Touchpoint Bundle Characteristics by LI Status and Program

Status	Program	*n*	Avg. MMBtu	HVAC	WX	DWH	Appliance	Lighting	DI
LI	**RCD**	**66**	**6.39**	**15%**	**21%**	**5%**	**20%**	**73%**	**85%**
LI	IE	142	5.88	19%	16%	1%	51%	85%	73%
Not-LI	RCD	1408	7.12	20%	30%	5%	15%	75%	83%

3. Customer Interviews

With the data analysis in hand, our team sought to address the key research question for this study: **What additional opportunities exist for Mass Save to better serve single-family property occupants with opportunities for additional savings?** We did so through conducting interviews with customers in May – June 2025. Through the data analysis, we identified specific customer groups with experiences we wanted to understand in more depth through interviews. We recruited and conducted 26 interviews across four groups of customers identified below who were respondents to the RBUECS Phase 7 survey:

- Participants with multiple program touchpoints (3+) to understand what engaged these customers, resulting in higher savings
- Participants with a single program touchpoint to understand the impetus for their participation, additional opportunities for participation and savings, and reasons they may opt to participate in additional offerings. *This was a priority group to address the central research question on opportunities to expand engagement with participants*.
- Nonparticipants, to understand awareness of Mass Save in general
- Participants identified as being income eligible (IE) that participated in a market rate RCD program to understand why IE eligible customers may opt to participate in a program outside of IE

In the following sections, we outline the focus of this phase of our study (Section 3.1), detail the target customer groups (Section 3.2), and discuss the interviews and findings (Section 3.3).

3.1 Overview

The research team conducted in-depth interviews (IDIs) with single-family property occupants (including both owners and renters as well as those living in duplex to 4-unit building types) who had a spectrum of engagement with Mass Save.

The research team used these interviews to (1) validate patterns in the data that gave insight into participation; (2) explore whether single-family participants were aware of additional opportunities available through Mass Save; and (3) understand customers' decision-making around participation. These interviews also helped the team gain greater insight into motivators and experiences for subgroups of customers.

The interviews explored the following broad topics including:

- Understanding participants' experience(s) of the Mass Save initiatives.
- Capturing participants' awareness of other available residential measures offered by the Sponsors of Mass Save.
- Exploring factors that might impact participation in additional Mass Save program pathways.

- Inquiring why some customers completed multiple touchpoints versus some who participated with only one touchpoint.
- Understanding why IE customers who appeared to be eligible for IE programs participated in RCD when eligible for the IE program.[21]
- Investigating why our sample of customers who responded to an extensive and longitudinal survey sponsored through Mass Save had not participated in any program initiatives.

The interview guide included modules crafted to the specific situations identified in the sampling plan (detailed in Section 3.2). This approach enabled the interviews to provide insight into how customers understood and moved through different initiatives in the program and where there may be opportunities to increase participation and leverage previous participation. The data we received did not include any information about recommendations that were provided to customers, only about the measures they received. The team did explore how customers made choices about what measures to install from among those recommended, however, especially for participants with touchpoints nearly a decade previous, interview respondents did not always share details of what recommendations they chose not to move forward with. More information and the detailed research questions can be found in Appendix E.

3.2 Sample Groups

Below defines the four subgroups targeted for this study:

1. **Participants with at least three coordinated delivery (not retail-only) touchpoints:** This frequency in a 10-year period suggests a high level of engagement and awareness of the potential benefits of participation in a Mass Save offering. Their experience with the program and decision-making provide insight into increasing opportunities from other groups.
2. **Participants with a single RCD or IE touchpoint:** Participants in this group received one RCD or IE assessment, with no additional instances of participation recorded in the tracking data. Interviews from this group provide key data as we explore methods to increase engagement among customers who have limited experience with Mass Save offerings.
3. **IE customers who participated in RCD:** As discussed in Section 2.2.3, based on our available datasets there appeared to be a group of customers who were income-eligible in a year they participated in RCD. We verified that the customer was IE eligible in the year of participation and, if so why they participated RCD rather than the no-cost IE program.
4. **Nonparticipants:** The final group consists of RBUECS respondents who are not present in our program tracking dataset.

Table 3-1 summarizes the sample pool size and final number of interviews from each of our target groups. Figure 3-1 shows the geographical distribution of the interviewees by zip code, showing a

[21] This could happen within program guidelines in specific situations, for example, if the customer lived in a mixed-income small multifamily dwelling where fewer than half of residents were income eligible.

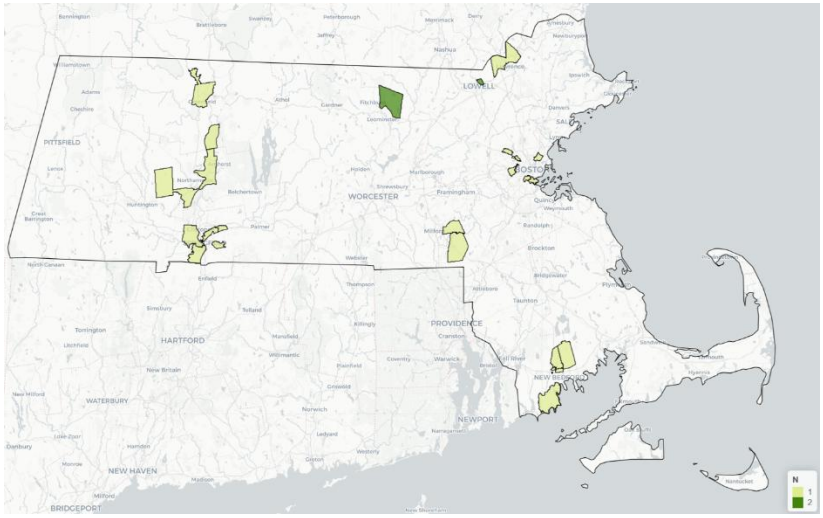
distribution from across the state. We note that there are small sample sizes for each of the four groups. The interviews were qualitative and our findings are directional.

Table 3-1. IDI Sample Groups

Group	Sample from	Number in Sample	Interviews Conducted
1	Participants with three touchpoints (RCD and/or IE)	73	7
2	Participants with one touchpoint (RCD and/or IE)	1661	12
3	IE customers who participated in RCD	32	2
4	Nonparticipants	2267	5

Notes: One participant with one touchpoint only participated in retail only. One nonparticipant participated in an HEA 18 years ago.

Figure 3-1. Geographical Distribution of Interviewees by Zip Code



3.3 Interview Findings

This section highlights the interviews findings from single-family residential customers. We begin by noting that, as we found in the data analysis above, repeat participation, especially in the RCD pathway, leads to increased overall savings. Additionally, the data analysis did not reveal any significant differences in the demographic or home characteristics of those the program is serving. Thus, we cannot identify specific opportunities for additional savings by looking at the data alone. Given these findings from the data analysis, this suggests that variations in savings and any additional opportunities for savings may lie with the specific customer and participant experience, including differences between homeowners and renters.

Whereas the data analysis showed no discernable differences in participation trends by selected demographics or home characteristics, interviews revealed that customers' experiences and

awareness of the program varied greatly. Participants with multiple touchpoints were more likely to both have a clear understanding of the program, in terms of both eligibility and how it was funded and were more likely to have had positive previous experiences. By contrast, single touchpoint participants often did not have as clear an understanding of the program mechanics and many had previously had a limited or sub-par participation experience, which impacted their likelihood to participate again. While these sample sizes were small, the differences were notable and can provide directional insight to program teams.

In the section below, we provide additional details on these findings and note considerations in terms of program opportunities. At a high level, the distinction between repeat participants and single participants suggests that to encourage repeat participation and thus additional savings, the program may want to 1) focus on identifying opportunities to move customers from awareness to understanding and participation, especially around repeat participation, and 2) recognize the importance of customer experience on their decisions to continue participation and develop or enhance feedback loops to enable continuous improvement.

3.3.1 High touchpoint and single-touchpoint participants differ in terms of program understanding

3.3.1.1 High touchpoint and repeat program participants knew they were paying for the programs via their electric and gas bill, so they took advantage of the offerings. By contrast, less engaged respondents had lower awareness and understanding of the program.

Although all interview respondents were aware of the programs offered by the Program Administrators through the Mass Save brand to varying extents, high touchpoint participants were very aware of not only the available offerings, but how the programs were financed through customer bills. They knew they were already paying into the program and believed it was worth participating to reap the benefits of the program. In contrast, single touchpoint participants and nonparticipants were less sure about the details of Mass Save programs, and particularly the multiple actors involved in implementing programs, including the Sponsors of Mass Save (i.e., the program administrators), contractors (home energy audit and installation contractors), and, for the Income-Eligible program, community action (CAP) agencies.

"I think it's a great program. It really helps you save energy. They don't just say it, they actually do it. I mean, we're living proof. Ever since they insulated this house [12 years ago, via an IE program], it's like night and day. The heat now really kicks on, and the house stays so warm. [The program is] really worth it." – ***One-touchpoint participant, owned single-family detached home.***

The several high touchpoint participants we spoke with were very engaged with the program offerings and updates. They did their own research on the Mass Save website to understand how the program works and what energy efficiency measures were available to them. These participants actively pursued communicating with a contractor or PA to receive multiple home energy audits (HEAs) and measures throughout the years after they realized the ongoing return on investment based on their energy efficiency home improvements.

By contrast, less engaged respondents often lacked awareness, information, or clarity around Mass Save offerings, including eligibility. Nonparticipants and single touchpoint participants were often less clear on what offerings they could participate in, what measures they might be eligible for, or how the funding for Mass Save programs worked. Several customers noted that they did not realize they might be eligible to participate in additional Mass Save offerings beyond those they had already participated in, or that they were not aware of specific measure- or program types mentioned. Several participants who had received an HEA thought they were only eligible to receive a single HEA, or were unaware they could receive rebates for other measures beyond the HEA. Thus, even a customer who received an HEA more than 20 years previously had not participated again because they believed they were ineligible for further participation.

"It was a good experience. It was a positive experience, because [our family] benefited from it was great we didn't get taken advantage of. It was trustworthy, and they helped us out, the way it should be. I feel confident having Mass Save come back and do another assessment. I didn't know that it was every 3 years, but now I know every 3 years we can get an assessment done." ***One touchpoint participant, owned single-family detached home.***

Several participants expressed interest in participating again after the interview. While these interviews were not intended to be a marketing exercise, it suggests that there is additional opportunity to clarify the program opportunities and eligibility for customers given that a significant portion of the people we spoke with had a misunderstanding or misperception of the program or eligibility requirements.

This misunderstanding was, in some cases, exacerbated by interactions with PA or implementation staff. For example, one nonparticipant we spoke with was served by a separate gas and electric PA. This individual was interested in participating in the RCD or IE program. The gas PA referred the customer to the electric PA, and then was redirected to the gas PA to schedule an HEA. This individual became confused and frustrated and eventually gave up on pursuing an HEA altogether.

3.3.1.2 Repeat participation was associated with positive program perceptions, while poor or mediocre program experience in the past could inhibit repeat participation.

Overall, most interviewed participants in the Mass Save programs found the program to be beneficial and helpful to them and their home. The more programs a participant participated in, the more enthusiastic/positive their perception of Mass Save was. For those who participated less, the perception of Mass Save tended to be less favorable. From another standpoint, the larger a project was that had a favorable outcome (especially for IE customers who received substantive home improvements), the more positive the response. The positive sentiment persists with customers, even if they have a mixed experience through their participation in various programs, indicating the impact of those positive experiences. For example, two participants had poor experiences with the online marketplace were unwilling to purchase from that retail platform again, but had participated in other programs and found them helpful.

Five customers noted that they were disinclined to participate in the program again after poor experiences in an initial program participation. Specifically, three customers shared challenges

with signing up and scheduling an HEA, finding a contractor, and, for IE participants, coordinating with a CAP agency. Similarly, some customers also said they were not regularly informed about the steps after an HEA. They felt they did not get timely updates on who to expect, or what company installation contractors worked for or when they would be performing the work. In some cases, they were not clear on follow-up and next steps in the process. Customers emphasized that it would be reassuring to them to have a clear 'paper trail' and expectations about what to expect. They wanted to be able to actively communicate with the contractor, and refer back to the contractor who completed the HEA or service/installation for follow up on issues of installation/service.

A few of these customers said that the lack of clarity around the process and challenges with navigating the program made them disinclined to participate again. This suggests that a lack of communication and timely updates may deter customers from participating in programs that require multiple steps and active communication with a contractor.

3.3.2 Program Awareness

3.3.2.1 High touchpoint participants talked to others about the benefits and value of participating in the programs.

High touchpoint participants found word-of-mouth was more powerful coming from other customers than Mass Save or PAs directly. They mentioned that hearing from people who had participated in the program and their experiences was most beneficial in them participating and then subsequently telling others to participate in Mass Save programs.

Some of these participants told other people about the program and the value in participating based on their own experiences. And a few helped friends, family, or neighbors navigate the program. That is, not only were they sharing about the program, but they also actively supported their community to participate in the offerings. Two high touchpoint participants suggested a referral program with a small incentive (e.g., gift card, bill credit) for those referred who eventually used Mass Save programs.

"I spread the word about Mass Save. I have two friends: one is my neighbor, she used Mass Save; the other [friend lives nearby], and she used Mass Save because of me. I love to use Mass Save. But I heard that a lot of people do not believe in this program. They say, 'Oh, no, they're going to come and try to sell something to you.' [I explained that] no, [there are] a lot of benefits that you can ask for [through Mass Save], and that's how I convinced both friends to use Mass Save because they didn't know anything about Mass Save." ***– High-touchpoint participant, owned single-family detached home.***

3.3.2.2 Participants primarily used the website to look up Mass Save information and heard about the program through bill inserts and more local means.

Interview participants mentioned they primarily used the Mass Save website to look up information on programs offered by the PAs.[22] Also, a few mentioned they learned about Mass Save offerings through their bill inserts. However, very few interview participants mentioned they looked at videos on the website about measures or possible upgrades. They shared that the videos are not easily locatable on the Mass Save website, and the Mass Save YouTube channel does not have any recent videos about residential offerings. While not a central research question, in discussions with the PAs, they wanted the study to investigate the extent to which participants referred to videos available on the website.

3.3.3 Influential Factors for Future Participation

3.3.3.1 Economic uncertainty and rising costs mean that balancing the cost of energy-efficient equipment or upgrades with future savings is top of mind for customers.

While participants are always interested in the return on investment for any measures they install in their homes, economic uncertainty makes these calculations even more top-of-mind. Participants mentioned energy efficient home improvements costs could be substantial, and they were thankful for the low or no-cost measures available through the program. Due to increasing costs of home improvements and upgrades, tariffs on energy-efficient equipment manufactured overseas, higher energy costs,[23] and stubborn inflation happening at the time of this study (Spring/Summer 2025), customers expressed concerns about spending money and making home improvements and equipment replacements unless they see a real and urgent need.

Several customers expressed a preference to replace heating/cooling equipment or appliances upon failure. They did not see the value of replacing fully functioning equipment and did not move forward with recommended upgrades. Although these customers might be interested in energy efficient upgrades, the upfront cost was a concern for them as the rebate through Mass Save would not fully cover the cost of the new equipment or upgrade. These customers were skeptical that they would see a return on investment in terms of savings on their utility bills. We note that HEAT loans made it possible for some customers to participate and install new heating and cooling equipment in their home.

"Our home's heating bills were through the roof this year, and part of it was Mass Save. I mean they do take a percentage off on our bill that it says goes to Mass Save. I honestly forget how much it is."
- Nonparticipant, owner of a townhome

"I think [the programs offered by the Sponsors of Mass Save are] great, if you use the programs that are available. I'm very happy that they're all being offered. I'm not happy with my electric bill. It seems like the last year or 2 that [my bills are] going crazy and especially this year, and I don't know

[22] We note that the program's outreach methods have advanced considerably in recent years, including through the introduction of the Community First Partnership program and increased Home Performance Contractor activity.

[23] Media attention in the first half of 2025 on high energy costs (and Mass Save as part of that), may have resulted in higher customer awareness of Mass Save funding from energy bills than in other years and research efforts.

the reasons exactly, but I mean everybody's complaining about their electric and gas bills being so high. I can pay them, but I can still see that they're substantially higher than they were in the past… I know the program like Mass Save is funded through our utility bills, particularly electric I believe. So hopefully, we're getting a good bang for the buck for what we're paying for the program." ***–High touchpoint, owner of single-family home and second home.***

"I'm the type of person that [if my equipment] is not broken, I don't want to fix it. Even if my hot water tank is 10 years old, and they only last 10 years. I'm just going to ride it out until it's actually broken. I wasn't really interested in upgrading anything just yet. I think my furnace had another 10-year life on it, but I wanted [the HEA assessors] out to see what they had to say. The HEA contractor was super nice. He was like, this is a combo heat and hot water, if you went with this type of work we could eliminate your chimney because we don't need to exhaust anything, and you'd have a real clean energy, and I'm pretty sure he said it would maybe reduce my costs in electricity and hot water use. But he said it was like $20,000 to do… I was like, I'm not really looking to spend $20,000 right now. The insulation cost was much lower. I think I ended up paying either $1,500 or it was half might have been $800. So that to me was a cost analysis. But at that point in time, I didn't need the hot water tank or a new furnace, and it was not like I wanted to upgrade. If I had a lot of money just lying around maybe I would go through with it, but it wasn't really necessary so I didn't I didn't go through with that recommendation. I'm not really looking to spend $20,000 right now." ***One-touchpoint customer, owned single-family home and investment property home.***

Opportunities:

We found that more touchpoints, higher engagement, and positive experience drive higher savings. We also learned that assessment customers had greater savings potential. Finally, we know that understanding and finances are an issue. With this in mind, we offer the following considerations:

- Target low participation customers (e.g. those who have had one assessment or instance of participating in the RCD or IE programs or a single retail rebate) to encourage additional participation. Consider targeting messaging to acknowledge past participation and benefits that customers could receive through participation in Mass Save program offerings. Recontact past assessment-only customers to remind them of the continued opportunities for home improvement.

- Recognize the potential impact and slowdown of energy efficiency improvements due to economic concerns. Identify opportunities to support customers and communicate program benefits in a way that is meaningful and impactful for them personally. This could include more specific communication on the financial value of energy savings and electrification as well as monetizing the full benefits over time for customers in a way that resonates with them, including the incentive value, tax credits, direct energy savings, and other potential non-energy benefits.

- Recognize the fluidity in income and potential that customers can flow in and out of IE eligibility. Integrate within program implementation check-points to assess IE eligibility.

- Create a referral program, targeting high participating customers to serve as program ambassadors. For example, previous participants (especially repeat participants) could serve as advocates or program ambassadors and refer others to participate. This effort could also include marketing material such as customer testimonials or case studies. [24]

[24] While designing such a referral program or approach is beyond the scope of this study, considerations would need to include the benefit of providing monetary versus other forms of incentives, as a financial incentive might dilute the social value of the referrals.

Appendix A. Data Organization, Limitations, and Assumptions

Cleaning and categorizing tracking data from multiple PAs and over ten years was challenging. Program offerings and data reporting expectations have evolved over the multiple three-year planning periods covered in our tracking dataset. Several important considerations are noted below:

- The three measure-based core initiatives for existing buildings have changed names over the span of our tracking dataset. In this report we use the naming of the 2022–2024 Three Year Plan: Residential Coordinated Delivery (RCD), Residential Retail , and Income-Eligible Coordinated Delivery (IECD or IE) for simplification. Table A-1 shows this mapping for measures throughout our program tracking dataset.

Table A-1. Core Initiative Naming Consolidation

Mass Save Core Initiative	Years	Study Designation
Low-Income Single Family Retrofit	2013–2018	IECD
Low-Income Multi-Family Retrofit[1]	2013–2018	IECD
Income Eligible Coordinated Delivery	**2019–2022**	**IECD**
Residential Home Energy Services	2013–2018	RCD
Residential Multi-Family Retrofit[1]	2013–2018	RCD
Residential Coordinated Delivery	**2019–2022**	**RCD**
Residential Heating & Water Heating	2013–2015	Retail
Residential Consumer Products	2013–2018	Retail
Residential Heating & Cooling Equipment	2013–2018	Retail
Residential Lighting	2014–2018	Retail
Residential Retail	**2019–2022**	**Retail**

[1]Only 5% of study participants live in buildings with 5+ units. Most (72%) are owners (e.g., condos).

- Although a Home Energy Audit (HEA) is an important initial step in delivering RCD or IECD measures, they are not explicitly present in the program tracking for years 2013–2016 and are incomplete in 2017 and 2018. Section 2.1.3 describes our workaround for these missing marker measures.

- Savings and category breakdowns for measures are much more thorough starting around 2018. Earlier years may only denote a broad category for measures. We standardized measures into several high-level groupings for most of our analysis: HVAC, Water Heater, Weatherization, Appliance, Direct Install, Retail Small, and Lighting. Direct Install and

Retail Small capture smaller-savings measures typically installed during an HEA visit or through the Retail channel (e.g., thermostats, aerators, power strips, etc.).

  - In some cases, broad measure categories without much detail could still be categorized by incentive or savings stratification. For example, 2013–2015 "Hot Water"-labeled measures had no other measure-level detail but were able to be split into water heaters and small-savings water-based measures (e.g., aerators and showerheads).

  - HVAC measures from those years proved exceptionally difficult to categorize. Using more recent tracking data as guidance, we found this broad group included high-savings measures (central heating and cooling units), moderate-savings measures (AC window units), and a highly variable-savings collection of thermostats. With no additional measure-level detail, we could not discern a clean split in incentives and/or savings that provided more clarity to the 2013–2015 HVAC measures.

- Our division of respondents into participants and non-participants applies to the years 2013–2022 for the downstream programs we are studying here. Customers who have participated outside of this date range or through mid- or upstream offerings may still be classified as non-participants in our analysis.

Appendix B. Program Participant Detail

In Table B-, we summarize the home building type by income group of Mass Save participants in our sample. Single-family homes are the predominant housing type across all income groups, especially among those who self-report as “Moderate" (81%) or "Not IE" (81%). A lower fraction of participants in the low-income group (64%) live in single-family units.

Table B-1. House Type by Self-Reported Income (% of Income Group)

Building Type	Low	Moderate	Not IE	Prefer not to answer
Apartment/condo in a 2–4-unit building	6%	4%	4%	5%
Apartment/condo in a 5+ unit building	7%	3%	4%	6%
Duplex	12%	4%	5%	6%
Mobile home or trailer	3%	1%	0%	0%
Single family	64%	81%	81%	78%
Townhouse or row house	5%	4%	4%	4%
Triple decker	3%	2%	2%	2%

Table B- shows ownership by house type. Participants who own their home tend to live in single-family units, while participants who rent live in a more distributed set of building types (i.e., multi-unit buildings, duplexes, and townhouses).

Table B-2. House Type by Homeownership Status

Building Type	Participants		Statewide[25]	
	Own	Rent	Own	Rent
Apartment/condo in a 2–4-unit building	4%	17%	10%	37%
Apartment/condo in a 5+ unit building	4%	24%	6%	49%
Mobile home or trailer	0%	0%	1%	0%
Single family	82%	18%	76%	9%
Duplex	5%	20%	6%	5%
Townhouse or row house	4%	6%		
Triple decker	1%	15%		

[25] Statewide demographics are compiled from the *American Community Survey* (2023) to align with RBUECS Phase 7 (2022).

Appendix C. Additional Program Tracking and Survey Analysis

This appendix supplements Section 2 with additional exploration of the program tracking and RBUECS survey datasets. While the results of these efforts were informative, they ended up not essential to our primary research goals. Appendix C.1 presents more savings and equipment comparisons with demographic characteristics similar to Sections 2.2.1.2 and 2.2.1.3. In Appendix C.2, we explore a number of geographical distributions from the datasets. Finally, Appendices C.3 and C.4 describe a few additional analysis methodologies we explored to look for patterns in participation.

C.1 Energy Savings and Equipment Distributions

Figure C-1 shows the distribution of energy savings by language spoken at home. The distributions across all language groups are very similar, with little substantial differences in shape or average savings. This consistency suggests that language spoken at home does not appear to be a strong differentiator in energy savings outcomes. Participants, regardless of language, are achieving comparable levels of energy savings.

Figure C-1. Savings Distribution by Language Spoken at Home

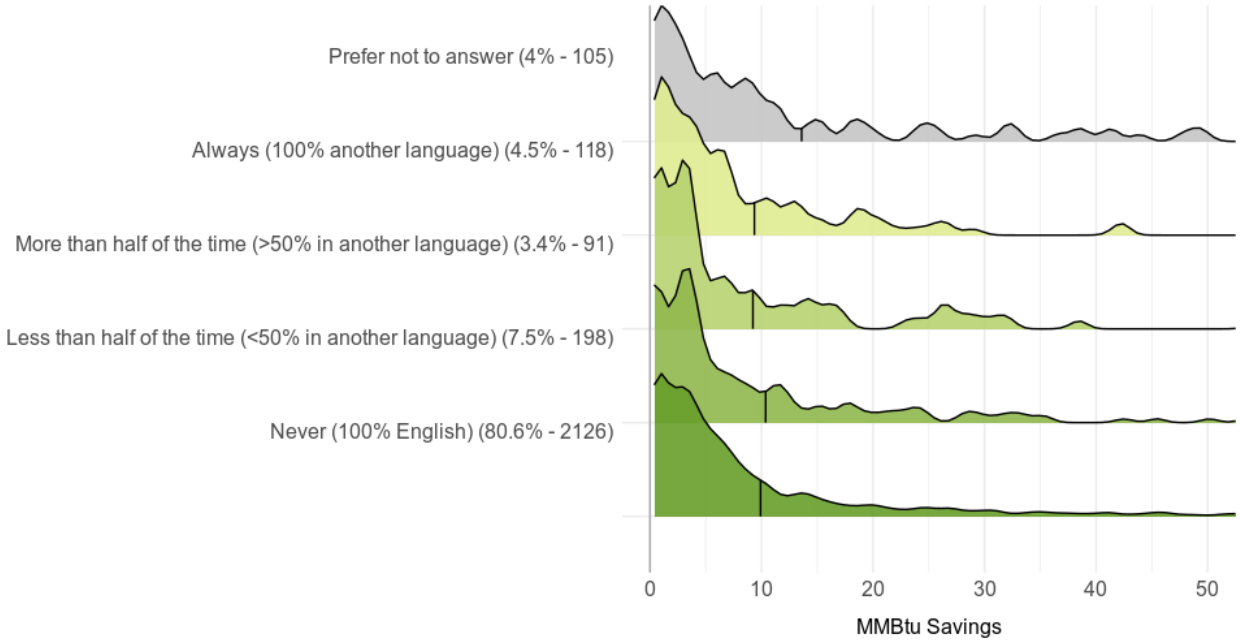


Figure C-2 displays the distribution of energy savings by highest level of education. While most groups show similar savings distributions, participants with less than a high school education exhibit noticeably lower average savings. However, this group represents a very small sample size (*n* = 14), which limits the strength of any conclusions. In general, those without a college degree (21%) are not fully represented in our participant group compared to the statewide average (48%). As mentioned throughout Section 2, those who preferred not to disclose their education level

appear more similar to participants with higher levels of education, consistent with earlier patterns observed in income-related analysis.

Figure C-2. Savings Distribution by Educational Attainment

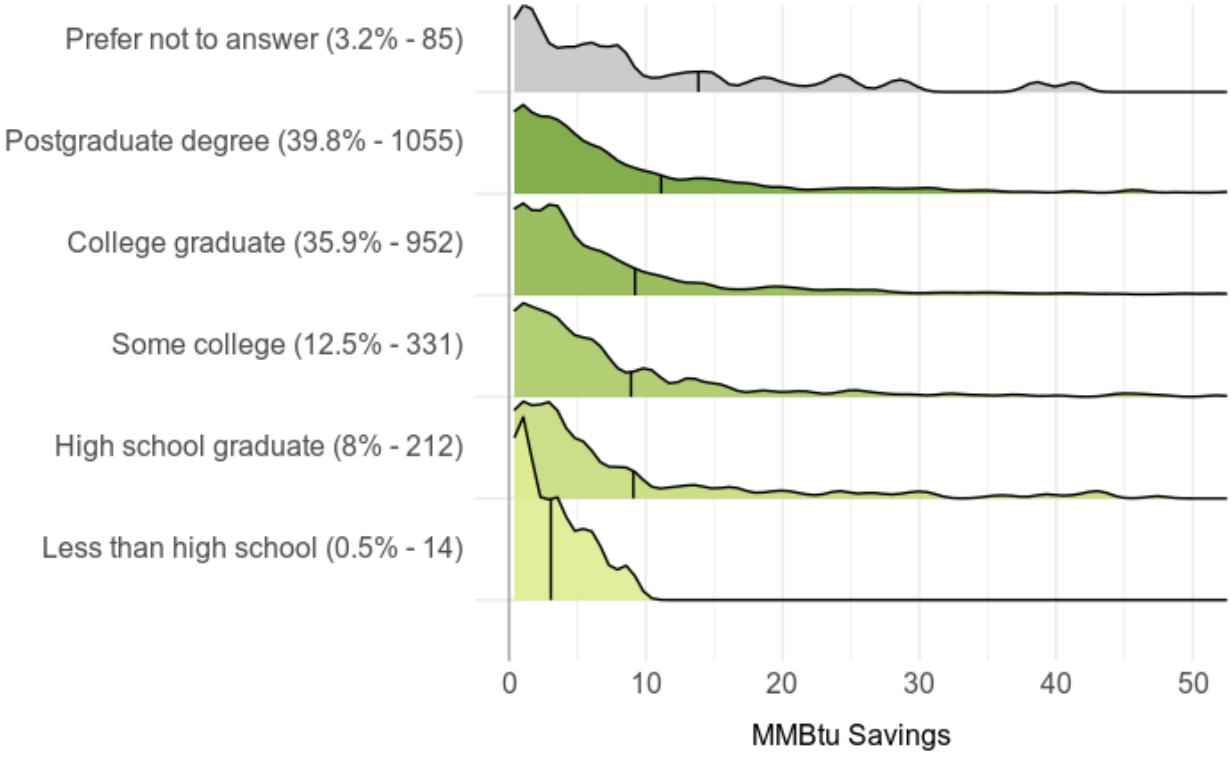
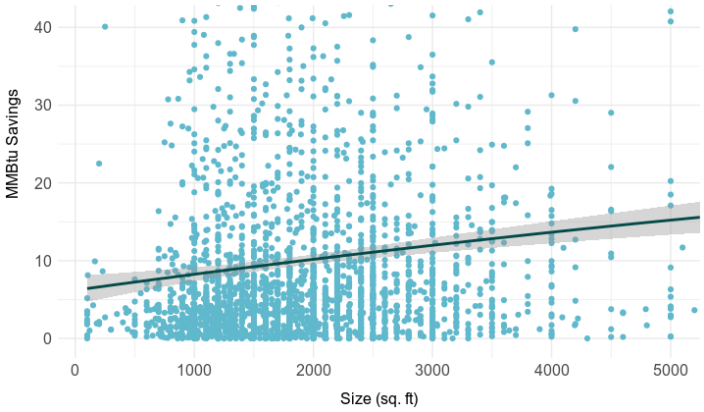


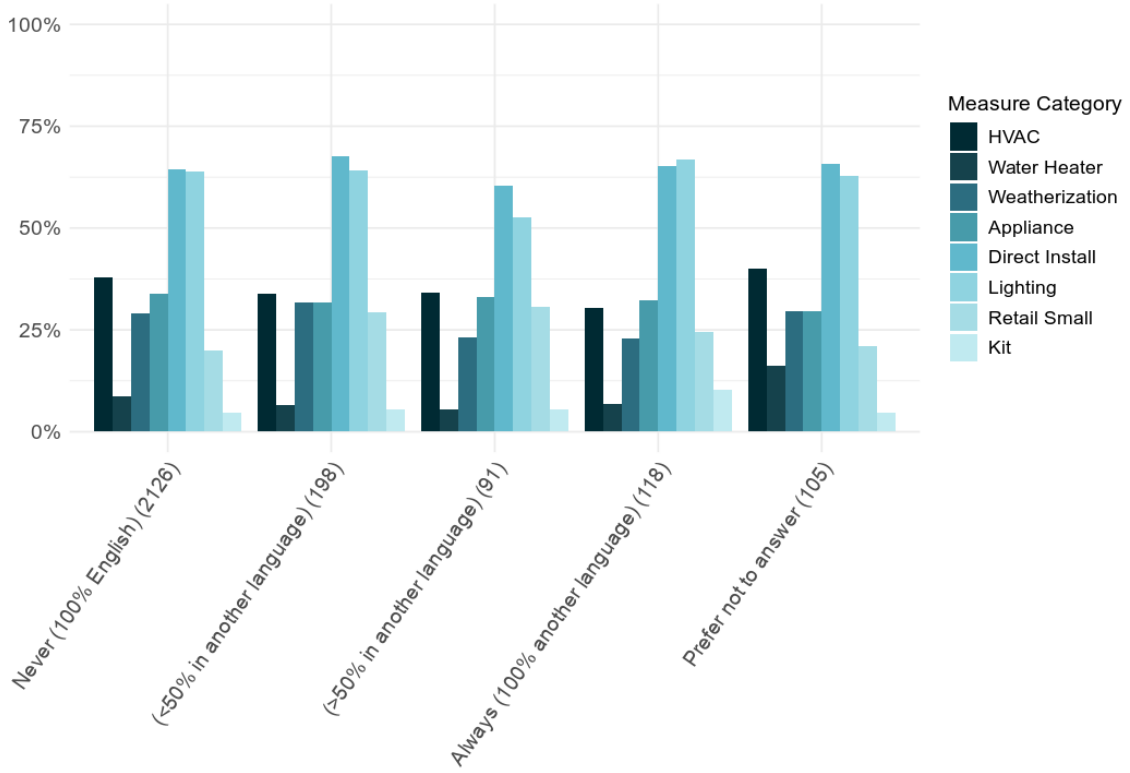
Figure C-3. Savings Distribution by House Size



Savings can be plotted against home size in square feet to produce Figure C-3. The line traces the average energy savings as a function of square feet with the shaded areas reflecting confidence intervals. As with home age, there is considerable scatter in this plot. However, we find that larger homes generally achieve higher energy savings. This pattern may be driven by the fact that savings are measured in absolute terms, so larger homes naturally have more potential for reductions (e.g., more installation locations for measures, more area for weatherization, etc.) and owners of those homes are more likely to be able to afford to make upgrades. However, the increase in savings is not *directly* proportional to the increase in house size. Larger homes do not appear to enable commensurate savings opportunities.

Figure C-4 presents the percentage of participants within each language-spoken-at-home group who received at least one item from each measure category through the program. The graph does not show any clear trends, indicating that households with less English spoken at home do not consistently receive more or fewer measure categories, regardless of whether those measures are associated with higher or lower energy saving.

Figure C-4. Measure Categories by Language Spoken (% of Language)



C.2 Geographical Analysis

The next section presents a geographical analysis of program engagement and survey respondents, mapped by zip code across the state of Massachusetts. This spatial view allowed us to uncover any regional patterns or variations in participation so we could explore how engagement is distributed across the state.

Figure C-5 maps the population distribution across the state by zip code. This view creates a baseline for other maps that may be influenced by higher population density.

Figure C-5. Total Population by Zip Code

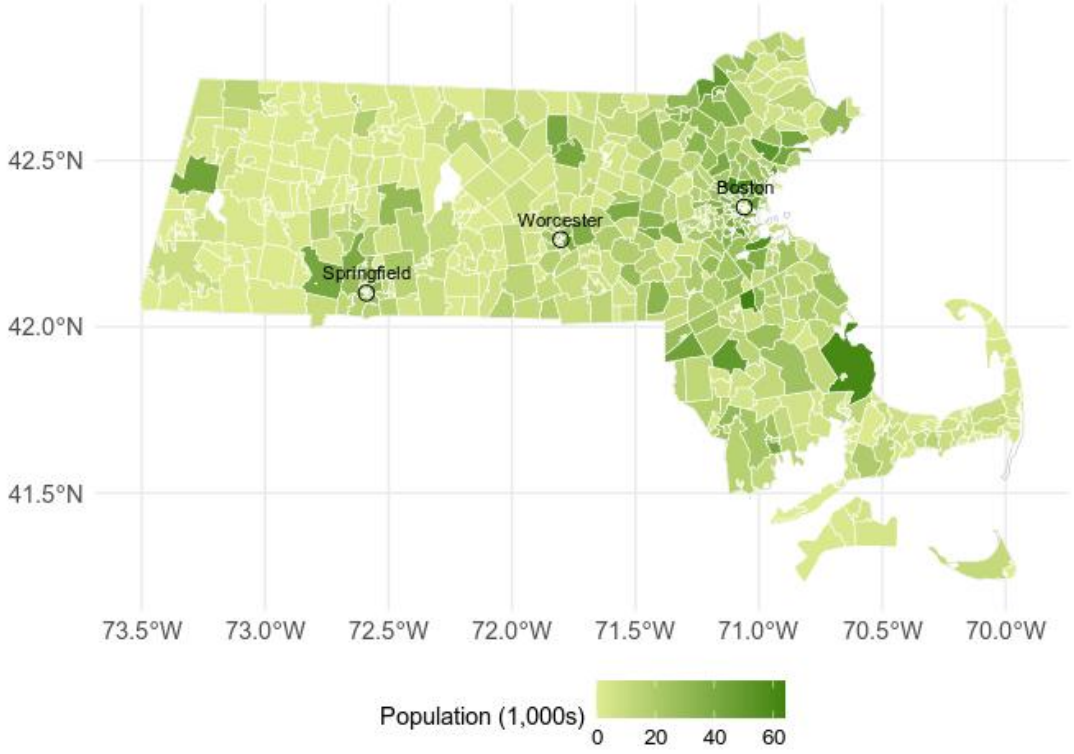


Figure C-6 presents the number of Phase 7 survey respondents by zip code, showing that they are generally distributed throughout the state.

Figure C-6. Total Phase 7 Survey Respondents by Zip Code

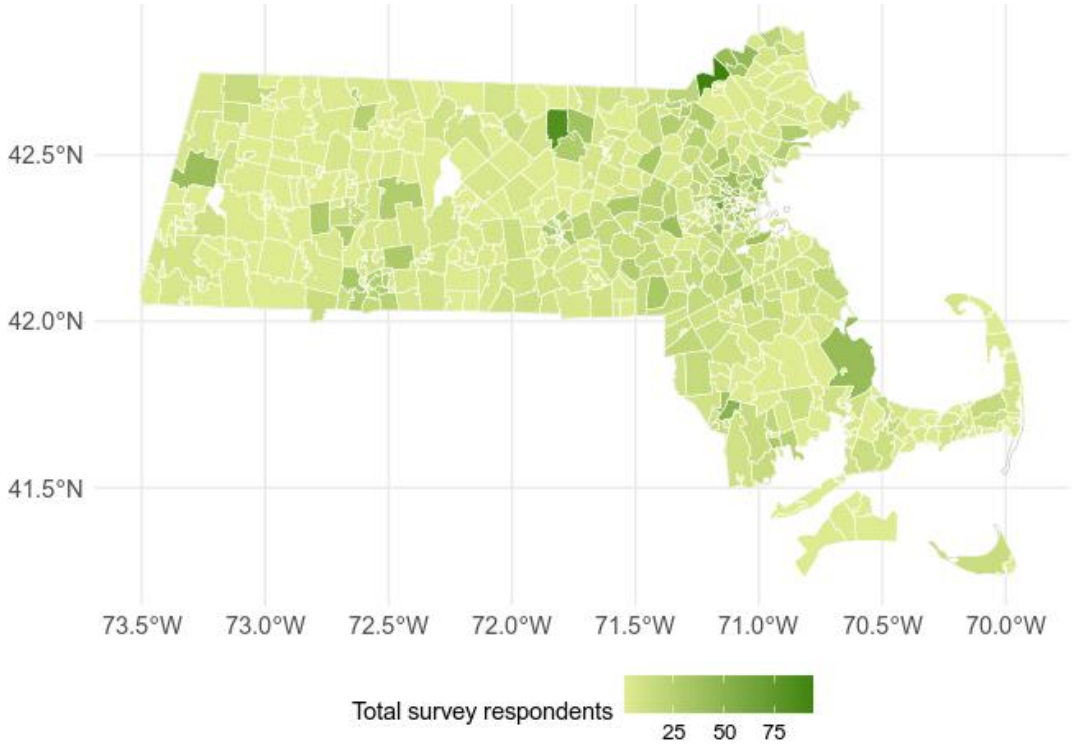


Figure C-7 presents the total Phase 7 survey respondents by zip code as a percentage of the population. Zip codes with fewer than 100 residents are excluded to avoid skewing the results, since even a single respondent in these areas would represent an unusually high percentage compared to more populated zip codes. Overall, the distribution appears well balanced across the state.

Figure C-7. Survey Respondents (% of Population).

Zip Codes with More Than 100 People.

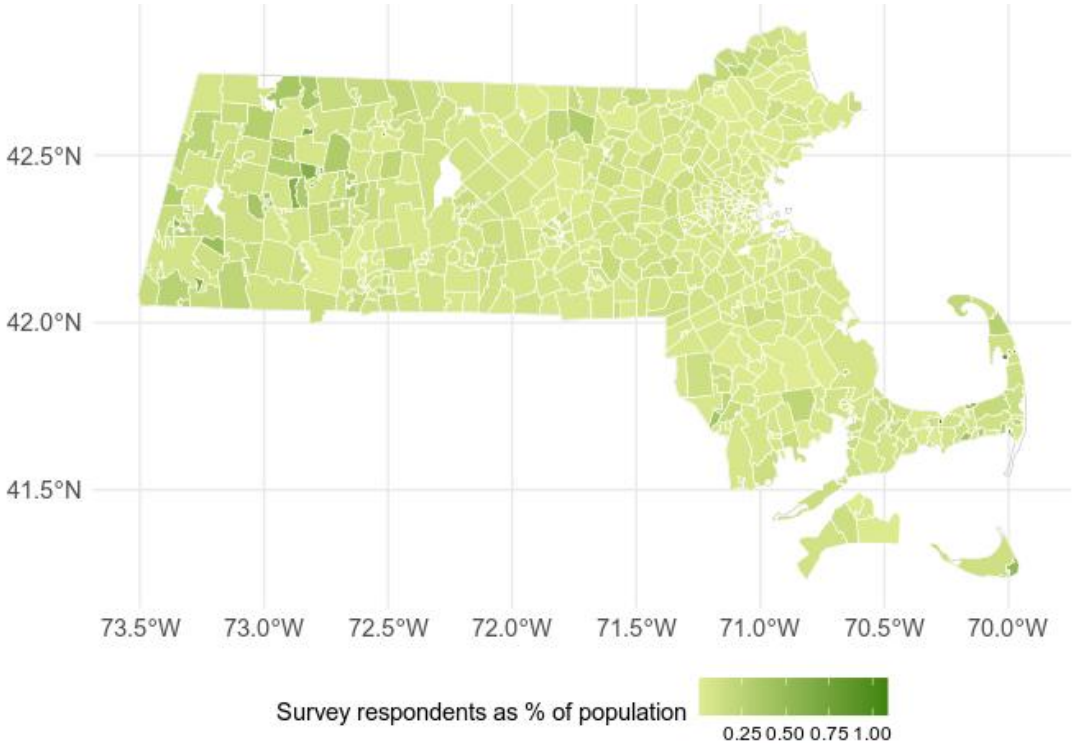


Figure C-8 shows program participants by zip code, demonstrating a well-balanced distribution across the state.

Figure C-8. Total Participants by Zip Code

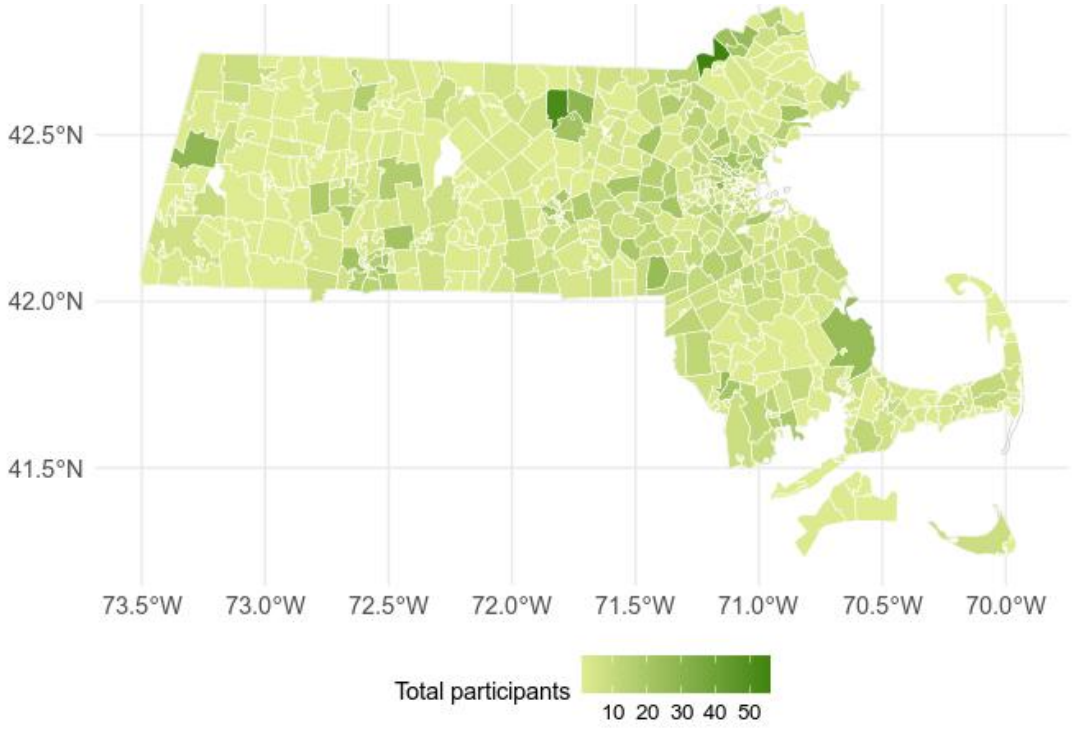
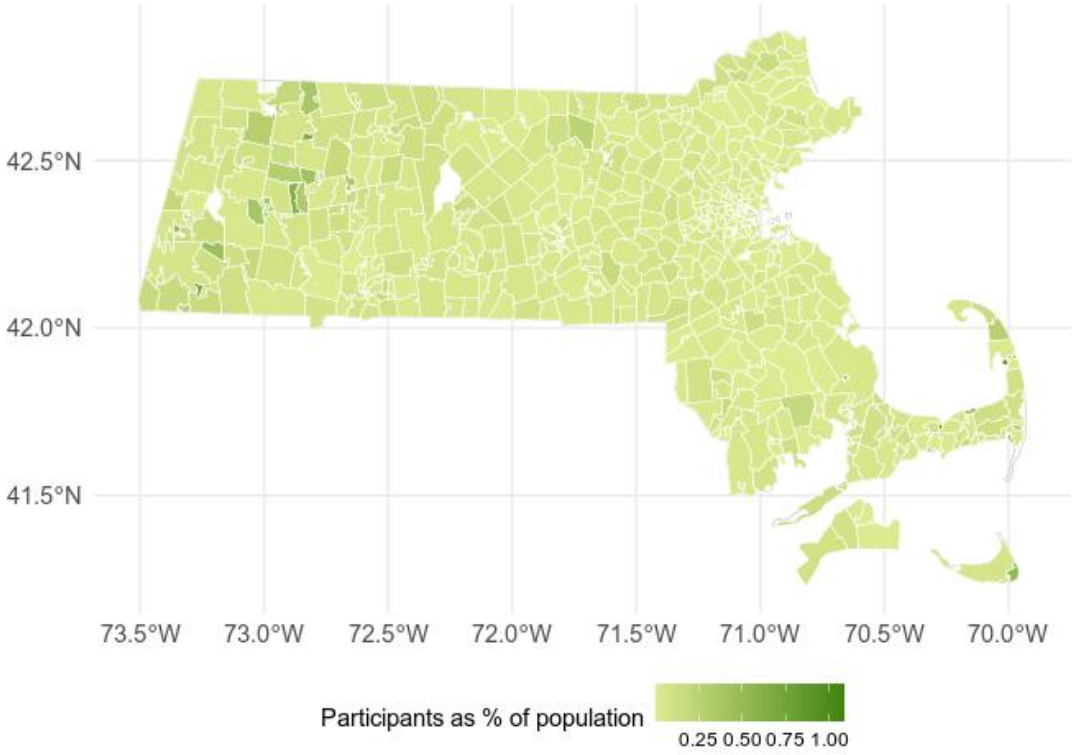


Figure C-9 presents program participants by zip code as a percentage of the population, excluding zip codes with fewer than 100 residents to prevent skewed results. This adjusted view continues to show a well-balanced distribution across the state.

Figure C-9. Total Participants by Zip Code (% Of Population).

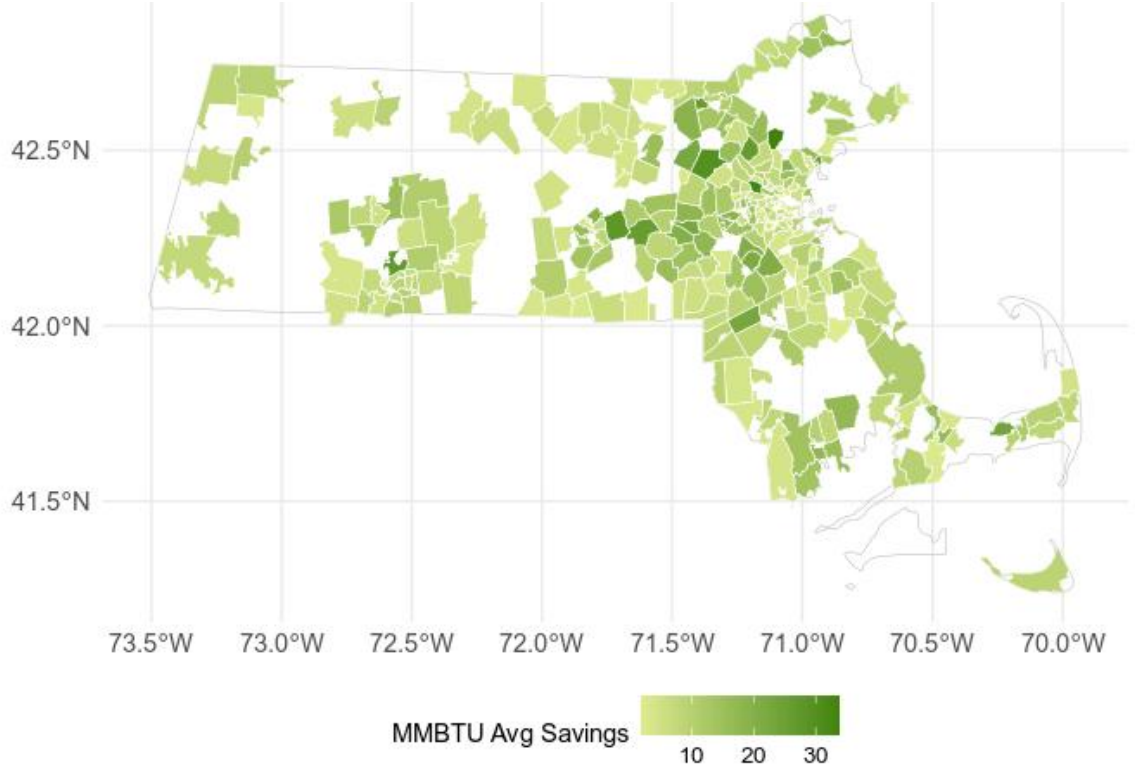
Zip Codes with More Than 100 People.



In Figure C-10, we examine energy savings from program measures by zip code across the state. To reduce the influence of outliers, we filtered for zip codes with more than three participants. The analysis reveals no clear geographical patterns in energy savings derived from program measures.

Figure C-10. Average Energy Savings by Zip Code.

Zip Codes with More Than 3 Participants.



C.3 Correlation Analysis

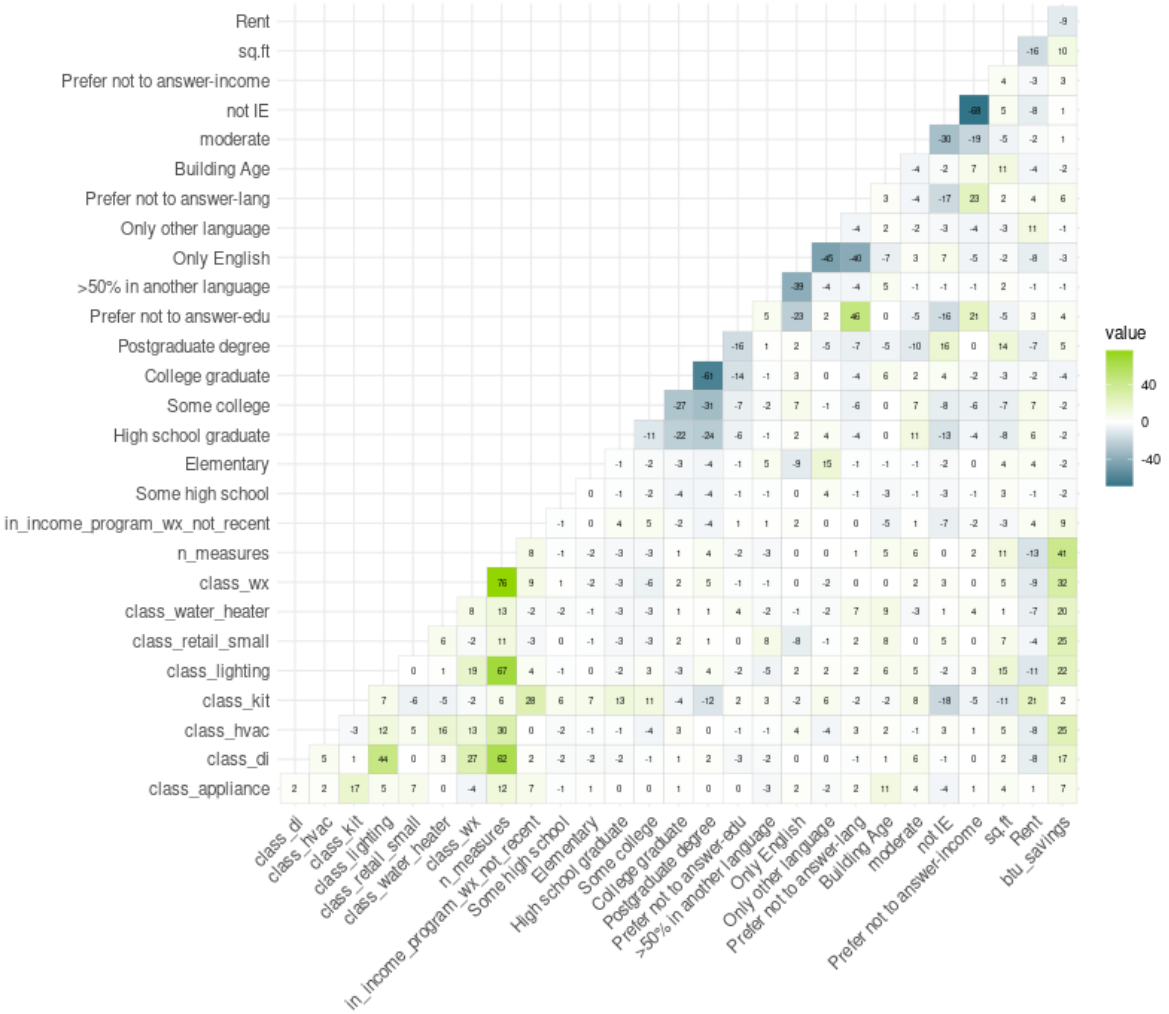
In addition to the simple two-variable distribution analyses presented in earlier sections, we cast a wide net by constructing a pairwise correlation analysis to examine all relationships between demographic variables, housing characteristics, and program engagement. Positive correlations indicate that as one variable increases, the other also tends to increase, suggesting a reinforcing relationship. Negative correlations reflect that a variable decreases as the other increases, indicating a potential inverse relationship. Values range from 100 to -100, with endpoints indicating perfect correlation or inverse correlation, respectively.

Some variables are categorical and mutually exclusive. For example, a participant with the highest level of education achieved being high school cannot simultaneously be in the "some college" category. This facet can result in negative correlations between the levels of such categories. Variables starting with "class_" correspond to the measure categories already discussed in Section 2.1.2.

Overall, the correlation analysis does not reveal strong or unexpected relationships that could inform clear opportunities for increasing participation. Most notable high or low correlations align with expectations based on how the categories are defined. Many findings are consistent with

patterns already observed in earlier sections. For example, participation in the Residential Coordinated Delivery (RCD) program is positively associated with audit success, and kit installations are more common among renters. Interestingly, there is a pattern where participants who selected "prefer not to answer" for one demographic category, such as language spoken at home, also tended to choose "prefer not to answer" for other categories, including education and income.

Figure C-11. Pairwise Correlation Analysis



C.4 Additional Analyses

In addition to the core analyses presented in this report, we also conducted a set of advanced statistical and machine learning analyses to explore deeper patterns in the data. These methods

were intended to supplement the exploratory findings by identifying hidden multivariable relationships or predictive factors related to program engagement. While we present only a high-level summary of these analyses here, it is important to note that numerous performance metrics and diagnostic results were considered internally to guide our interpretations. These details are not included in this appendix, but informed the conclusions presented below.

First, a Factorial Analysis of Mixed Data (FAMD) was performed to investigate whether multivariate combinations of demographic, housing, and program engagement variables reveal underlying structures or relationships not captured in simpler analyses. FAMD works by reducing the complexity of the dataset into new, similar variables or components that capture the most important variation in the data and can summarize multivariate relationships. These components allow us to visualize and interpret how different variables relate and identify clusters or groups of participants with similar profiles based on several variables. However, the results did not uncover meaningful new insights beyond what was already observed in more straightforward analyses.

Additionally, a machine learning model was developed to predict participation in higher-impact energy-saving measures. This approach aimed at identifying which characteristics or combinations of variables might be associated with more substantial participation. However, the model demonstrated poor performance, suggesting a lack of strong or consistent predictors in the available dataset. These findings reinforce the conclusions from earlier sections: while some trends exist, there are no singular or easily defined drivers of participation from demographic or building characteristics.

Appendix D. Low-income Status Trends and Alignment

In this section, we supplement the analysis of Section 2.2.3 with more detail of how low-income status based on discounted rates varies with year and how well flagging low-income status with rates compares to 2022 self-reported answers from RBUECS Phase 7 (Table D-1).

Table D-1. Income Categories from RBUECS Phase 7

Participation	n	Low 0-60% SMI	Moderate 60–80% SMI	Not IE	Prefer not to answer
Participants	3,110	**336 (11%)**	239 (8%)	1620 (52%)	915 (29%)
Non-participants	2,267	**406 (18%)**	208 (9%)	1071 (47%)	582 (26%)
All Respondents	5,377	**742 (14%)**	447 (8%)	2691 (50%)	1497 (28%)

To achieve better parity with our tracking data, we engaged the Data Management Team who provided historical low-income (LI) flags from billing rate code data for customers who responded to the RBUECS Phase 7 survey. Specifically, they provided rate code data for 4990/5377 (93%) respondents covering 2016–2024. Using this new dataset we were able to compare discounted rate flags for the same year a customer participated in the RBUECS survey (2022 for Phase 7) and also identify whether customers were on an income-eligible rate around the time of Mass Save participation as reflected in our tracking dataset.

Table D-2 shows the year-aggregated results from this new dataset, which can be compared to Table D-1. Approximately 17% of the RBUECS Phase 7 respondents received low-income discounted rates for some period between 2017–2024. Combined with our tracking dataset, we find a slightly lower fraction (14%) of these customers have participated in a Mass Save offering. These numbers are both 3% higher than the self-reported fractions above. However, the historical rate dataset includes a broad span of multiple years, whereas the survey only samples 2022.

Table D-2. Rate Data by Participation

Participation	*n*	LI[1]	Not LI
Participants	3,098	449 (14%)	2,649 (86%)
Non-participants	1,892	385 (20%)	1,507 (80%)
All Respondents	4,990	834 (17%)	4,156 (83%)

[1]LI means a discounted rate flag was present for a customer in any bill between 2017–2024.

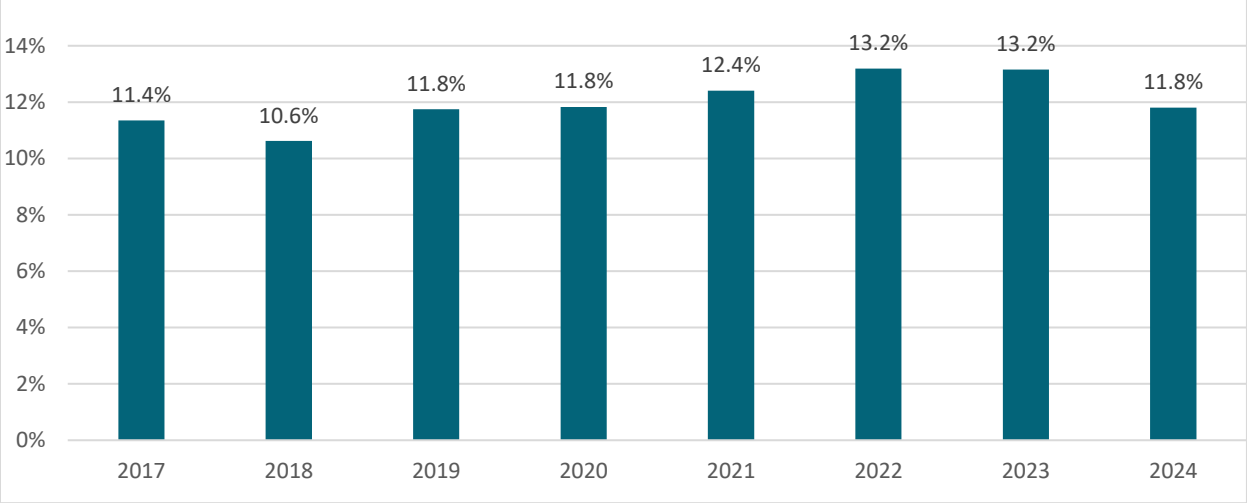
From the historical rate dataset, we found some slight variation in the fraction of Phase 7 respondents with discounted rates over the last eight years, with an average of ~12%. For reference, the Phase 7 survey was fielded in 2022. Table D-3 and Figure D-1 show some evidence of a post-COVID-19 bump, with the LI percentage returning to nominal levels in 2024 ($\sigma \approx 0.5\%$ for each year).

Table D-3. Variation In Rate-Based Low-Income Status by Year

Year	Respondents w/ rate data (n)	Not LI	LI	% LI
2017	3,991	3,538	453	11.35%
2018	4,032	3,604	428	10.62%
2019	4,543	4,009	534	11.75%
2020	4,935	4,351	584	11.83%
2021	4,930	4,318	612	12.41%
2022[1]	**4,897**	**4,251**	**646**	**13.19%**
2023[2]	4,766	4,139	627	13.16%
2024[2]	4,479	3,950	529	11.81%

[1]RBUECS Phase 7 was fielded in 2022.
[2]Program tracking data ends in 2022; however, rate data is available through 2024.

Figure D-1. Percent Low-Income Between 2017–2024



As part of our analysis, we evaluated the alignment between LI status flags derived from historical utility rate data and RBUECS self-reported income categories. This assessment was conducted using data only from Phase 6 (2021) and Phase 7 (2022) of the study as new customers comprise a significant fraction of each phase. In Table D-4, the self-reported categories are compared against LI status flags derived from the historical utility rate data for the corresponding years—2021 for Phase 6 and 2022 for Phase 7. We find that self-reported income is a reliable indicator for identifying income-eligible (IE) status with nearly 90% of customer cases showing consistency between the self-reported income data and the LI status flags assigned based on utility rates. This

high level of agreement supports the validity of using self-reported income as a proxy for determining eligibility in income-based utility programs.

Table D-4. Comparison of Self-reported and Rate-Based LI Indicators

LI Flags Agreement	*n* (Ph 6 - 2021)	*n* (Ph 7 - 2022)
FALSE	288 (13%)	548 (11%)
TRUE	1959 (87%)	4250 (89%)

Table D-5 shows the number of touchpoints for customers who had rate data in each year; the number of touchpoints that correspond with the presence of an LI discounted-rate flag; and the percentage of LI-related touchpoints out of all touchpoints for that year.

We find that both programs are serving their intended populations based on analysis combining the historical rates and tracking data for the RBUECS Phase 7 sample. For IE, nearly all participants had LI rate flags in the corresponding year. For Market Rate, LI-flagged participants make up only a small percentage of the overall program population.

Table D-5. IE and RCD Participation vs. Presence of LI Discounted Rate Flags

Year	*n* of Touchpoints with Rate Data	Not-LI Rate	LI Rate	% LI Touchpoints
IE				
2017	29	2	27	93%
2018	36	8	28	78%
2019	23	0	23	100%
2020	17	1	16	94%
2021	32	2	30	94%
2022	18	0	18	100%
Total	**155**	**13**	**142**	**95%**
RCD				
2017	240	230	10	4%
2018	310	298	12	4%
2019	280	269	11	4%
2020	240	233	7	3%
2021	264	247	17	6%
2022	209	200	9	4%
Total	**1,543**	**1,477**	**66**	**4%**

Table D-6 combines the fourth column of Table D-5 from both programs and gives us insight into which program LI-flagged customers have participated in. The majority of customers flagged with an LI discounted-rate received an audit and measures from the IE program, with an average of about 67%. With the historic discounted rate data, we are able to match LI-status and tracking data *by year*, revealing good program alignment with LI status in each corresponding year. Using only the self-reported LI status flag from RBUECS Phase 7, this rate drops to 36%. Customers who identify as income-eligible in 2022 but may not have been in the past participated in Market Rate programs (appropriately) when they were not income-eligible.

The LI customers who appear to participate in RCD translate to a small percentage of LI touchpoints in the RCD program overall (Table D-5). However, these customers may have been able to take advantage of additional savings through the IE program. This group makes up one of our target samples for in-depth interviews (Section 3.2).

Table D-6. LI Customer Program Participation by Year

Year	IE	RCD	% IE
2017	27	10	72.97
2018	28	12	70.00
2019	23	11	67.65
2020	16	7	69.57
2021	30	17	63.83
2022	18	9	66.67
Total	**142**	**66**	**68.27**

There is one key characteristic that appears to be different for these LI flagged customers, though. Table D-7 shows a breakdown of occupant status (own/rent) for the combinations of programs and LI status examined in this section. LI customers who participated in RCD are predominantly homeowners, similar to those who do *not* have an LI flag in the year they participated (last two rows). Some of these customers may participate in RCD due to real or perceived differences in measure offerings for homeowners. The correspondence of LI rate status and IE participation may also be due to bad or incomplete data. Our interviews with this target group revealed a mix of possible reasons that include misleading data and potential barriers (Section 3).

Table D-7. Program Participation by Occupant Status

Program	Status	Own/Rent	n	%
RCD	**LI**	**Own**	**56**	**96.6**
RCD	**LI**	**Rent**	**2**	**3.4**
IE	LI	Own	79	66.9
IE	LI	Rent	39	33.1
RCD	Not-LI	Own	1242	98.0
RCD	Not-LI	Rent	25	2.0

Appendix E. Detailed Interview Methodology and Findings

E.1 Research Questions and Participant Demographics

Table E-1 maps the primary and secondary research questions to general sections from the IDI guide. While we framed our interviews around covering all questions, conversations were fluid, and the language used for a question varied as the customer's energy-efficiency knowledge and experiences with Mass Save were revealed.

Table E-1. IDI Research Questions

Primary Research Questions	Interview Section
What are the experiences of single-family property occupants who participated in a past program by Mass Save?	Awareness and Past Participation
Are single-family property occupants aware of additional programs offered by Mass Save?	Awareness and Past Participation
How do single-family property occupants decide whether to participate in Mass Save (in general)?	Awareness and Past Participation
How open are single-family property occupants to participating in additional program measures by Mass Save?	Reasons for Participation
What would motivate single-family property occupants to participate in additional program measures by Mass Save?	Reasons for Participation
What are the priorities single-family property occupants have in deciding to participate in additional program measures by Mass Save?	Awareness and Past Participation
What barriers and concerns exist for single-family property occupants to participate in the program by Mass Save?	Barriers/Challenges/Concerns
To increase participation, what opportunities exist in increasing awareness and reducing barriers/concerns of single-family property occupants in participating in further program measures by Mass Save?	Opportunities
Secondary Research Questions	
What are the experiences of participants who participated in multiple touchpoints?	Reasons for Participation
What are the experiences of participants who participated only in one touchpoint?	Reasons for Participation
What are the experiences of IE participants who participated only in RCD?	Reasons for Participation
What are the experiences of participants who did not participate in any programs by Mass Save?	Reasons for Participation

In addition, the team sought to recruit customers from a mix of PA electric and gas providers. Although most participants used Eversource and National Grid for their electric and gas provider, we had two participants who used Unitil as their electric provider, and one participant who used

Unitil as their natural gas provider. Another participant used Berkshire Gas as their natural gas provider. Six out of the 26 participants (23%) did not use a gas provider, whether due to using an alternative fuel (e.g., oil) or not having gas service at their home.

E.2 Additional Findings

3.3.3.2 Some people are connected to the program through their local retail or other stores.

Some interview participants mentioned that they saw a table at their local big box home improvement retailer (i.e., Home Depot and Lowe's), who had someone sharing information about the home energy audits by Mass Save. For communication about the non-HEA program offerings, some mentioned they saw the appliance rebates and retail discounts mentioned on the big box retailer's website or in-store. One mentioned that the store employee was familiar with a heating/cooling rebate of smart thermostats and helped them navigate how to apply for that rebate. A few participants also mentioned that local events and city/municipal communication would be helpful to learn about the offerings of Mass Save as they regularly attend or engage with those events and materials.

"I see a lot of the time, but not every time, when I go to Home Depot they have vendors like the Mass Save assessment vendors… People go in and the [vendor at the table] just talks about Mass Save. I think that's pretty helpful… But it's gonna be tough to accommodate all the different people there and get everybody engaged on the same subject. Making [customers] feel that this program is trustworthy and the vendor is not a scammer. I think a lot of people think that these things are scams." ***– One-touchpoint participant, owned duplex.***

"Our town sends out [email] notices to anyone who's subscribed to get updated on things [about the town]… If the town were to send out a note about there's a new Mass Save program, [provides] some more information about it, and then leads to the Mass Save website, that would be really compelling and a good way for me to learn more about new things that are coming out with Mass Save." ***– One-touchpoint participant, owned single-family detached home.***

3.3.3.3 Although saving money/energy costs was a primary driver of participation in Mass Save, many participants also mentioned other non-monetary benefits to receiving Mass Save measures.

Interview participants mentioned that saving money was important and was a primary reason of participating in the program. Two ways of saving money were mentioned: (a) saving money on equipment and measures and (b) potential energy savings on their electric and gas utility bill. Participants appreciated the no-cost HEA and low/no cost upgrades like insulation. Additionally, IE participants mentioned receiving free appliances and heating/cooling equipment; otherwise they would have not been able to participate in the program due to high out-of-pocket costs.

Customers also mentioned getting measures such as insulation, weatherstripping, and heating/cooling upgrades led to their home being more comfortable, being less drafty in their home, providing cleaner air, and having the need to clean window air conditioners less often as non-monetary benefits of participating in these programs**.** For low-income participants of Mass Save, customers mentioned that they had older, less insulated homes that particularly benefitted from energy efficient upgrades; for this group in particular the increased comfort was a substantial benefit. Participants also appreciated HEA assessors suggested new ways to make their home more energy efficient that customers would not have otherwise thought about. Some participants also valued that they felt they were doing their part in energy efficiency, sustainability, and to better the environment.

"Because [Mass Save] makes you want to do your bit for the environment, and it makes financial sense. Those were the two drivers, and the [HEAT] loans kind of make it accessible… It's not just like you're doing this for the good of humanity. But it makes financial sense, too." ***– High-touchpoint participant, owned single-family home.***

3.3.3.4 As some participants moved residences or had intentions to in the future, they did or were willing to do another HEA or participate in a program offered by the PAs for their future home.

Repeat participants of Mass Save programs participated in an HEA after they moved to a different home. They found value in seeing what energy-efficient improvements could be made for their future home and potential to increase the value of their home. For a participant with a second home or investment home, they not only participated in the program for their primary home, but also for their additional home.

For renters or homes with a strict HOA, whether they participated in a Mass Save program or not, felt they were constrained in what they could do for their current rented home due to their landlord or HOA. However, they were willing to consider using Mass Save (like participating in an HEA) for a future home when they purchase.

"Speaking of future assessment, I just scheduled another one today for my new [home I recently bought] in a different town… I went to Home Depot nearby in that town… Mass Save was there to hand out flyers. I kept that flyer for almost half a year. Now it was the time [to schedule the HEA}, because I got the house ready… I want to have an HEA though [the home is newer at] 12-13 years old. Not sure if [the new home] has the most up to efficient lights and things like that. Because I've been through the Mass Save program and the assessment before [I wanted to] do another assessment and see if they can help me make that new place a little bit more efficient." **– *One-touchpoint participant, owned duplex.***

3.3.3.5 Personal safety and contractor work was a concern for some participants of select groups.

Safety and security was a concern for several interview respondents. These customers expressed concerns about unfamiliar people coming inside their home for a few hours to complete an HEA or installation. These concerns were primarily mentioned by older women who lived alone, older

adults or people living with chronic health conditions or disabilities or those who had family members with those characteristics. Some mentioned they only wanted people who worked for Mass Save, not an unknown company, in their home.

Participants also mentioned that contractor professionalism and company identification was important along with high quality work, not leaving a mess, and cleaning up after the project was done. Finally, participants mentioned some HEA assessors recommended only one contractor or noting that they had no decision making input into the contractor hired to complete an installation, and they would have appreciated the opportunity to chose their own contractor.

"I would want to make sure that the person that comes out works for Mass Save and is not a contractor that they contract to come to your house. I'm a little leery on that. Because I'm here by myself… I don't want a lot of people coming into my house, when they know that you're a woman older, living in a house alone. If somebody comes out here, I want them to work for Mass Save not a subcontractor that contracts with Mass Save…I want to know the people that they're sending out are trustworthy. Personal safety is what I'm concerned about. ***– IE in RCD participant, owned single-family detached home.***

3.3.3.6 While renters are very limited in what they can do, particularly larger and more expensive upgrades and services, the landlord/renter relationship matters greatly.

When we talked to renters of single-family units, many were interested in participating in Mass Save-brand programs but noted limitations because they did not own the property. For example, after an HEA was completed, even when renters wanted to make home improvements through the program, in some cases property owners did not want to move forward with making changes to the home.

From the property owner perspective, we interviewed one participant who had a primary home and investment (rental) property and participated in an HEA for both homes. This property owner explained his primary home took precedence, and upgrades to his investment property were less of a priority. He mentioned because he was not paying the utilities in the rental home, it was less of a concern to have energy efficient equipment in the rental home, but he was willing to do upgrades to the envelope of the rental home, such as insulation. The renter/landlord relationship could impact how renters engaged their landlords. For example, one renter shared that a previous landlord had kept the rent very low, because of this, the renter had covered some home maintenance on their own. Their current landlord would raise the rent yearly; as a result, the renter would call the landlord for any maintenance work that needed to be done. This illustrates the dynamic back-and-forth between renter and property owner. Some renters we spoke to said that their landlords were willing to replace and upgrade equipment with the renters' input. Small changes to the home were fine to do after getting landlord input, but larger changes the home were harder to convince the landlord unless there was a compelling reason to upgrade or purchase new equipment (e.g., failing or failed appliances and equipment).

"I don't know how many programs are applicable for renters, but I would guess with how the market is sort of shifting, unfortunately, more people are going to be forever renters. I think that if [Mass Save] could… look more deeply at how they can help renters lower utility bills with the assistance and help of the landlord but ultimately for the most benefit of the people that are renting from those people. So [providing] more renter-friendly programs." ***-One-touchpoint customer, rented duplex.***

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