Memorandum

To: Massachusetts Residential Program Administrators and Energy Efficiency Advisory Council Consultants

From: Guidehouse

Date: January 27, 2026

Re: MA2504-B-EWxBMS: Pre-Electrification and Pre-Weatherization Barrier Mitigation Study Findings Memo

1. Introduction

The goal of the Pre-Electrification and Pre-Weatherization Barrier Mitigation Study is to inform the types and frequency of pre-electrification and pre-weatherization barriers across moderate-income and market-rate households[1] and determine opportunities to improve barrier mitigation. Pre-electrification and pre-weatherization barriers are obstacles customers face prior to installing weatherization or electrification measures in their home.

Table 1 presents the types of pre-electrification and pre-weatherization barriers that customers commonly encounter. These barriers vary in severity, with relatively minor and inexpensive issues considered soft barriers, and costly problems that might pose significant health and safety (H&S) risks considered hard barriers. Soft barriers typically include limited storage, inaccessible areas, recessed lighting, or minor home repairs. Whereas hard barriers often include knob-and-tube (K&T) wiring, combustion safety, electrical hazards, mold, vermiculite, electrical panel upgrade, and structural issues. Customers may also face multiple barriers in a home. Furthermore, homes must be properly weatherized prior to electrification, thus any pre-weatherization barriers in a home seeking electrification also prevent electrification.

Table 1. Types of Pre-Weatherization and Pre-Electrification Barriers

Pre-Weatherization Barriers	Pre-Electrification Barriers
• Asbestos • Combustion safety (e.g., unvented combustion applications or elevated carbon monoxide gas detected in heating system exhaust) • Electrical hazards • K&T wiring • Mold • Moisture or water damage • Recessed lights • Structural issues (e.g., roof or foundation problems) • Vermiculite insulation • Other customer-related barriers (storage issues, inaccessible areas)	• Inaccessible or unsafe electrical infrastructure • Insufficient electrical panel capacity • K&T wiring • Lack of ventilation • Limited space for new equipment (e.g., heat pumps, water heaters) • Structural limitations affecting electrification equipment installation • Unsafe or outdated electrical systems • Other customer-related barriers (storage issues, inaccessible areas)

Source: Guidehouse analysis

[1] The team ultimately decided to not focus on low-income customers for this study due to the lack of electronic data available regarding barriers.

The Residential Turnkey Solutions (RTS) initiative offers incentives to both moderate-income and market-rate households for installing weatherization and electrification measures. Prior to installing weatherization or electrification measures, the customer receives a home energy assessment (HEA) conducted by a Lead Vendor (LV)[2] or Home Performance Contractor (HPC). During the HEA or decarbonization consultation, the LV or HPC identifies if there are any barriers to the installation of weatherization or electrification measures. If a barrier is identified, the LV or HPC discloses the barrier to the customer and can conduct a further inspection, covered up to $250 for market-rate customers and offered at no-cost for moderate-income customers, to assess whether the barrier requires remedial services or can be deemed safe, inactive, etc. The customer also has the option of using their own contractor to inspect the barrier and continue to move forward with identified weatherization or electrification opportunities.

If a barrier must be remediated, market-rate customers have the option to either remediate the barrier themselves with their own contractor or use one recommended through the program. If market-rate customers are pursuing electrification measures, they may also be eligible for financing these remediation services through the HEAT Loan.[3] Moderate-income customers receiving enhanced incentives and turnkey remediation services must receive those services through the LV (including from their HPC under the management of the LV).

To gain a deeper understanding of these barriers, including the types, processes behind barrier identification, associated costs and timeline of barrier remediation, and customer motivators for remediating barriers, the team explored the following study objectives and research activities as identified in Table 2.

During the data analysis task, the team observed that the LV data primarily focused on pre-weatherization barriers, largely due to limited tracking of pre-electrification barriers in the data set. In 2024, the RTS initiative implemented updates to its barrier data collection process and expected improvements in documenting pre-electrification barriers to be observed starting in 2025. Section 4.3 offers more detailed findings related to pre-electrification barriers.

[2] Participating LVs include CLEAResult, RISE Engineering, Center for EcoTechnology, and Abode Energy Management. However, Abode Energy Management only performs oversight of the HPCs and does not conduct HEAs.

[3] The Sponsors of Mass Save® offer the HEAT Loan program, providing eligible participants with 0% financing for up to $25,000 toward qualifying energy-efficiency upgrades, including but not limited to pre-weatherization barriers, weatherization, and heat pump projects.

Table 2. Study Objectives and Research Activities

Study Objective	Description	Related Research Activities
Barrier Characterization	Identify and understand the different types of barriers, their frequency, and how they differ across variables (such as building type, renter versus owner, geographic distribution, dwelling type, income level, and heating fuel type).	• Data Analysis (Section 3.1) • LV and Contractor Interviews (Section 3.3)
Barrier Mitigation	Examine the factors driving barrier mitigation efforts and the reasons some barriers remain unmitigated in homes.	• LV and Contractor Interviews (Section 3.3) • Participant Survey (Section 3.4)
Barrier Savings Potential	Analyze if there is a higher energy savings potential for homes that encounter and address pre-electrification and pre-weatherization barriers.	• Building Simulation (Section 3.2)
Barrier Mitigation Performance	Evaluate how the expanded RTS initiative may enhance barrier mitigation efforts, especially for moderate-income customers.	• Participant Survey (Section 3.4.1) • Participant Interviews (Section 3.4.2)

Source: Guidehouse analysis

2. Key Findings

Table 3 presents the key takeaways from the study in relation to the study objectives.

Table 3. Key Findings

Barrier Characterization
• **Older homes (1940s or older) have the most recorded barriers** with K&T wiring, asbestos, and vermiculite being the most prevalent. • **Designated equity communities (DECs), the Cape, Western Mass, and industrial cities/mill towns often have more barriers than other areas**. In particular, Bristol County, in the southeast region of Massachusetts, has the highest prevalence of recorded barriers with 14% of homes having K&T wiring recorded as a barrier. • **Double decker and triple decker homes frequently have multiple barriers identified** and show a particularly high prevalence of asbestos compared with other dwelling types.
Barrier Mitigation
• **The primary motivator for remediating barriers is to qualify for weatherization and electrification upgrades.** Other motivators include addressing an H&S concern and reducing energy bills. • According to LVs and contractors[4] and the data analysis results, **barrier remediation rates are relatively low, with approximately 20%-30% of customers remediating barriers.** • **K&T wiring, vermiculite, and combustion safety, including heating system replacements, are the most time-intensive barriers ranging from several weeks to months for remediation**. These remediation barriers are being remediated only approximately 10%-20% of the time. • **While having a barrier tends to influence participants not to move forward with upgrades, it is not always the primary factor.** Confusion in the program process and uncertainty about how to proceed also impact customers' decisions to move forward with barrier mitigation. • **Cost is the driving factor for participants not remediating barriers, with barriers at higher costs being less likely to be remediated**. Among barrier types, structural barriers have the highest average mitigation cost at $19,606, followed by vermiculite at $10,023, and K&T wiring at $9,421. Survey respondents who opted not to remediate barriers reported they are willing and able to pay approximately $2,000, highlighting a gap between actual costs and perceived affordability.

[4] Contractors included both HPCs and Independent Installation Contractors.

Barrier Savings Potential

- **Homes with pre-electrification and pre-weatherization barriers achieve, on average, 26% greater energy savings compared with reference homes.** This savings gap is even more pronounced for older homes, rising to 40% for those built in the 1940s–1960s and reaching 115% for pre-1940s homes, largely due to their higher energy intensity and lower insulation levels.
- **Building vintage is the strongest predictor of energy savings potential,** with older homes, especially those built before 1940, showing higher average savings when weatherization barriers are present. While the presence of barriers contributes to savings, the age of the building itself is a more reliable indicator.
- **Wall insulation upgrades deliver the highest energy savings potential per unit of weatherization,** with approximately 6% savings for single-family detached homes. When wall insulation is combined with air sealing, the savings increase to 11%, and applying all measures together (wall, attic, foundation insulation, and air sealing) results in up to 19% energy savings.

Barrier Mitigation Performance

- **Improving barrier tracking is essential for barrier mitigation effectiveness.** This includes identifying high-priority barriers across LVs, categorizing soft and hard barriers, documenting both the location of the barrier and the measure it prevents from being installed, and improving recording of K&T sign-off.[5]
- **Streamlining customer processes and improving communication are critical for barrier mitigation success.** LVs and contractors emphasized the need to reduce lag times, enhance workflow efficiency, and increase transparency in customer approval processes.
- **Program administration and incentive structures remain a source of participant concern.** Some participants reported issues with incentive adequacy, rebate eligibility, contractor responsiveness, and incomplete work, as well as confusion and burdensome program administration.
- **Participants highly value contractors' professionalism and program support.** Positive feedback highlighted smooth program administration, essential support, and notable improvements in home comfort.

Source: Guidehouse analysis

[5] K&T sign-off means that the K&T wiring was found inactive and only required the electrification to verify that the K&T wiring was inactive and not in need of further remediation.

3. Methodology

The following section outlines the methodological approaches used in this study. HEA data was requested for program years 2023-2024 from the four LVs: Abode Energy Management (Abode), CLEAResult, Center for Ecotechnology (CET), and RISE Engineering (RISE). Data across the LVs was cleaned for consistency. The processed data was then used as an input to run building simulation models to assess whether there is a higher energy savings potential in homes that experience pre-weatherization and pre-electrification barriers. The four LVs were interviewed to gain insights into the costs and processes involved in barrier mitigation. From the data provided by the LVs, the participant contact information was used to survey 195 customers to ask them about their barrier mitigation experience and interview 17 customers to understand drivers for mitigating barriers.

3.1 Data Cleaning and Analysis

The following sections summarize the data cleaning and analysis performed with the LV data received from the data request. Details on the data request can be found in 5.3Appendix A.

3.1.1 Data Cleaning

The data team cleaned and consolidated the data across the four LVs. The LV data was broken out to three data tables: the HEA table, the installed measures table, and the recommended measures table. Additional information was occasionally stored in supplemental workbooks. To make the data consistent for the downstream analysis tasks, the team went through the following steps:

1. **Mapping File Creation:**
   The team developed a mapping file to align data fields across different LV datasets, ensuring a consistent naming structure. This mapping file also allowed the team to identify gaps in data collected between the different LVs.

2. **Data Consolidation:**
   Data from multiple LVs were combined into a unified structure. This structure included data frames for:

   - HEA and building characteristics
   - Installed measures
   - Recommended measures

3. **Unique Identifier Standardization:**
   Unique identifier columns were cleaned for consistency within each LV dataset to enable accurate joins across fields. An example inconsistency was identifier columns with leading zeros included in one data table and not included in an accompanying table.

4. **Naming Convention Normalization:**
   LV-specific mapping files were developed to recategorize each measure into one of the study's focus areas. This normalization was done to create consistent grouping variables

across the data from the vendors to facilitate data analysis and data visualization. For example, the various insulation types and thicknesses were all classified as weatherization measures at a specific location (attic, wall, or foundation).

5. **Insulation R-Value Calculation:**
   Free-form insulation entries were processed into a standardized format to identify the insulation type and insulation thickness. The team used the cleaned data to validate R-values or calculate R-values when they were missing from the LV file.

6. **Survey Task Cleaning**:
   For the survey task, the data team dropped incomplete or irrelevant entries from the sample. Refer to Section 3.4.1 for more detail on the survey task data cleaning.

3.1.2 Data Analysis and Assumptions

After the data was cleaned and wrangled, the data team worked with three main datasets. First, the data team worked with the HEA information, which contained information about the customer, the home characteristics, and the barriers found in the home (if applicable). The other two data frames included the measures that were installed at the HEA and the measures that were recommended but not installed.

For the installed measures and recommended measures[6] data frames, the data team built out custom mapping files to categorize each measure into a measure category. For this study, the measure categories of interest were weatherization and electrification measures. The data team categorized measures such as heat pumps and induction stoves as electrification measures and insulation and air sealing measures as weatherization measures.

For each of the homes that participated in an HEA, the data team tagged them as having a barrier identified or not. Then the data team merged the installed measures and recommended measures data frames based on the cleaned project identifier. The team classified sites that had a barrier identified but still had weatherization or electrification measures installed as "barrier mitigated," sites that had a barrier identified and weatherization or electrification measures recommended but not installed as "unmitigated," and sites with a barrier identified but having a mix of measures installed and recommended but not installed as "unclear." Section 4.1 presents the results of this analysis.

After establishing the classifications, the data team summarized the building characteristics of the homes based on multiple variables available in the data. The main crosstabs of interest were building age, building type, renter versus owner status, region, and income level of participant. The data team provided these crosstabs to the building simulation team as inputs to run the energy savings models.

[6] Recommended measures refers to energy efficiency measures that were recommended during the HEA but were not installed in the home.

3.1.3 Barrier Types and Definitions

The data team reviewed the barrier descriptions across the four LVs and consolidated the barriers into the following nine barrier types as identified in Table 4. The LV data contained limited tracking of pre-electrification barriers and primarily focused on pre-weatherization barriers. However, since a home must be properly weatherized prior to electrification, a pre-weatherization barrier may prevent electrification from moving forward as well if weatherization of the home is needed.

Table 4. Barrier Types and Definitions from LV Data

Barrier Name	Definition
Asbestos	Asbestos identified in the home that may be disturbed by a weatherization or electrification measure.
Combustion Safety	Includes detected elevated levels of carbon monoxide (CO) gas in the exhaust of a heating system or water heating system, unvented combustion appliance in living space, and under certain conditions, combustion appliances spill dangerous exhaust gases.
Electrical Hazard	A hazardous condition identified in the home that might cause electrical shock or hazard.
K&T Wiring	K&T wiring identified in the home.
Mold and Moisture	Mold, mildew, or moisture found in the home.
Other – H&S	Other barriers identified that are related to H&S including lack of ventilation in the home (which may be related to dryer, attic, or bath fan ventilation), pest infestation, lead paint, and inoperable heating system.
Other - Non-H&S	Other barriers identified not related to H&S including recessed lighting, lack of storage, inaccessible areas, general repairs, landscaping restrictions, nailed wall panels, weak plaster, and Homasote ceilings.
Structural	Structural issues identified in the home.
Vermiculite	Vermiculite insulation identified in the home, which may contain asbestos.

Source: Evaluation team data analysis

3.1.4 Data Challenges

The data consolidation process required extensive mapping due to the receipt of multiple files from various LVs, each using different naming conventions and tracking systems. This lack of standardization led to significant inconsistencies across datasets. The data team discovered that LVs recorded fields lacked standardization and failed to use uniform unique identifiers, which made it difficult to reliably link HEA data with installed and recommended measures. Additionally, various LVs flagged barriers inconsistently and provided limited information about barrier locations

within homes or the specific measures affected, which complicated efforts to accurately assess mitigation.

Several datasets contained ambiguous or free-form entries, particularly within building characteristic fields, which introduced confusion and reduced data reliability. LVs inconsistently reported insulation R-values with unclear definitions for zero values, and the team found instances of post-installation R-values being inexplicably lower than pre-installation values. Missing data and frequent use of "N/A" further complicated the analysis.

To calculate ACH50, the team used square footage and assumed an 8-foot ceiling height due to the absence of ceiling height data. The team identified unclear target values for air sealing measures, with many entries referencing a generic target of 62.5 CFM per hour without further context.

3.2 Building Simulation

The team used the National Renewable Energy Laboratory (NREL) ResStock tool to model the average weatherization savings for buildings of various vintages across the Commonwealth of Massachusetts.

3.2.1 Baseline Calculation

The team filtered the ResStock building model population for Massachusetts to build a custom sample of homes suitable for weatherization. Next, the team leveraged the data analysis to define the typical baseline performance of homes participating in the weatherization program, which resulted in filtering ResStock to be defined as homes with attic insulation less than R-30 and wall insulation less than R-13. Based on the filtering criteria, the custom sample trended toward higher counts of older homes than the typically defined population distribution of homes in Massachusetts, as seen in Table 5. The team limited the ResStock analysis to 100 samples to allow full customization of upgrade scenarios.

Table 5. ResStock Models Building Vintage Distribution

Building Type	<1940	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s	Total
Single-Family Detached*	25	0	10	6	3	3	0	0	0	47
Single-Family Attached**	45	0	0	0	0	1	0	0	0	46
Multifamily***	5	0	0	0	3	0	0	0	0	8

*Single-family detached home refers to a residential building that stands alone and is designed to house one family.
**Single-family attached home refers to a residential building with two to four separate units, where the units share one or more walls but are otherwise distinct.
***Multifamily homes refer to a residential building with five or more separate units.

Source: ResStock Building Model Population

3.2.2 Weatherization Packages

The team used the data analysis task to develop measure performance criteria for the weatherization packages as Table 6 shows. The team undertook this step to ensure that the weatherization packages accurately represent the actual performance of measures implemented through the program, particularly for air sealing measures where reductions in air changes per hour (ACH) can be difficult to estimate. Using these criteria, the team developed four weatherization measures to determine the weatherization package that yields the highest savings. The weatherization packages include air sealing and attic insulation, air sealing and foundation insulation, air sealing and wall insulation, and all of the aforementioned measures combined.

Table 6. Measure Performance Criteria

Measure	Performance Criteria
Air Sealing	21% ACH reduction for single-family detached homes 25% ACH reduction for single-family attached homes 17% ACH reduction for multifamily homes
Attic Insulation	R-45 for single-family detached homes R-49 for single-family attached homes
Foundation Insulation	R-17 for all homes with foundation walls
Wall Insulation	R-15 for all building types

Note: For modeling, foundation insulation is defined as wall insulation for unconditioned/unfinished basements and is only applied to select units with these characteristics. Attic insulation is defined as attic ceiling insulation and not roof insulation.

Source: Evaluation team data analysis

3.2.3 Calculation of Savings

Once the baseline population and weatherization packages were defined, the team used the ResStock models to determine the building energy consumption for both the pre- and post-retrofit. First, the team ran the baseline ResStock models to calculate the pre-retrofit building energy consumption, followed by applying the weatherization packages to the baseline ResStock models to estimate the post-retrofit energy consumption. Using the ResStock results, the team calculated energy savings for the modeled buildings in terms of total MMBtu savings, including electric, natural gas, and delivered fuel savings.

To apply the weatherization savings estimates for homes with and without barriers, the team leveraged the LV data from the data analysis and looked at the distribution of homes by building vintage of sites with and without barriers that had recommended or installed weatherization measures, as Table 7 shows. Section 4.2 presents the results of the savings calculation.

Table 7. Weatherization Barrier Distribution by Building Vintage and Home Type

Vintage	Single-Family Detached		Single-Family Attached		Multifamily	
	Sites with Barriers - Percentage by Decade (n=4,391)	Sites without Barriers - Percentage by Decade (n = 16,266)	Sites with Barriers - Percentage by Decade (n=1,835)	Sites without Barriers - Percentage by Decade (n=7,336)	Sites with Barriers - Percentage by Decade (n=24)	Sites without Barriers - Percentage by Decade (n = 113)
Pre 1940s	39.1%	24.4%	74.9%	45.3%	83.3%	45.1%
1940s	6.8%	6.0%	3.5%	4.5%	0.0%	2.7%
1950s	13.6%	15.7%	3.9%	11.1%	0.0%	2.7%
1960s	10.4%	12.0%	5.7%	9.6%	4.2%	6.2%
1970s	10.1%	9.5%	3.1%	5.4%	4.2%	6.2%
1980s	7.8%	10.0%	4.1%	7.9%	8.3%	25.7%
1990s	6.0%	8.6%	2.2%	6.6%	0.0%	2.7%
2000s	4.6%	6.2%	1.8%	5.4%	0.0%	7.1%
2010s	0.5%	1.3%	0.3%	1.0%	0.0%	1.8%
2020s	1.1%	6.3%	0.4%	3.1%	0.0%	0.0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Evaluation team data analysis

3.3 Lead Vendor and Contractor Interviews

The team interviewed four LVs, two HPCs, and two independent installation contractors (IICs) in June and July 2025. The team determined the HPCs based on recommendations from the LV interviews and the IICs based on recommendations from both the LV and HPC interviews. The LVs and HPCs perform the HEA and, for moderate-income customers, helped facilitate the process of barrier mitigation. The two IICs selected for interview included an electrician who performs K&T sign-off and a vermiculite and asbestos remediation contractor. The team conducted interviews to understand the process and identification of barriers, how non-energy impacts are used as a selling point with customers, barrier characterization and mitigation cost, and program feedback and to identify additional obstacles contractors might face when remediating these barriers. Section 4.3 provides results from the interview analysis.

3.4 Participant Survey and Interviews

The team surveyed and interviewed participants to understand why they decide to mitigate or not mitigate barriers, understand the costs of barrier mitigation, and determine the amount participants are willing to pay for barrier mitigation. Section 4.3 provides results from the participant survey analysis and interviews.

3.4.1 Participant Survey

The team delivered the participant survey in an online format to market-rate and moderate-income participants who received an HEA in 2024 through the Residential Coordinated Delivery (RCD) program and had a barrier identified. The team offered the survey in English, Spanish, and Portuguese, and respondents received a $25 e-gift card for completing the survey.[7]

The team developed the sample design based on the information received during the data request using the cleaned 2024 RCD data. The team performed additional cleaning and filtering steps to develop the sample frame:

- **Overlapping emails:** Some participants appear multiple times in the LV data. In these instances, the team removed the duplicate entries from the sample.
- **Pre-electrification and pre-weatherization barrier identification:** The team developed categorizations across the different LVs of the barrier types and flagged participants who had barriers identified.[8]
- **Barrier mitigated:** Participants had all the recommended weatherization and electrification measures installed.
- **Barrier not mitigated:** Participants did not have any of the recommended weatherization or electrification measures installed.
- **Barrier unclear mitigation:** Participants had some but not all recommended weatherization or electrification measures installed. The team included this characterization in the barrier mitigated status.
- **Participants without barriers:** The team removed participants who did not experience pre-electrification or pre-weatherization barriers from the sample.

[7] All survey responses were completed in English except for two survey respondents that completed the survey in Spanish.

[8] One of the LV's audit data identified whether a participant's K&T wiring barrier was found inactive. Participants whose only identified barrier was inactive were excluded from the survey, as the issue was considered easily resolved. However, participants who had inactive K&T wiring but had multiple barriers were retained in the survey sample.

Table 8 presents the participant survey sample frame and the estimated number of survey responses stratified by barrier mitigation status and income category. The team differentiated between Estimated Number of Survey Responses and Estimated Usable Survey Responses, assuming 10% of the survey responses will be unusable. During survey fielding, the team encountered a high screen out rate of survey respondents. This occurred when individuals who were flagged as having a barrier in the tracking data reported that they were unaware of any such barrier, resulting in their exclusion from the survey sample, as Table 9 shows. Due to the large screen out rate, the team decided to perform additional sampling to participants to improve the survey response rate as indicated in the column Number of Additional Emails Sampled for Outreach of Table 8.

Table 8. Participant Survey Sample Frame and Expected Number of Usable Survey Responses

Barrier Mitigation Status	Income Category	Number of Emails in Population	Number of Emails Sampled for Outreach	Number of Additional Emails Sampled for Outreach	Estimated Number of Survey Responses	Estimated Usable Survey Responses
Mitigated	MIQ	69	69	0	10	9
	MR	2,556	513	1,450	77	70
Not Mitigated	MIQ	223	187	37	28	25
	MR	4,670	660	1,450	99	90
Total	**-**	**7,720**	**1,429**	**2,936**	**214**	**194**

Source: Evaluation team data analysis

Table 9 shows the participant survey completes. Overall, the team surveyed eight moderate-income and 187 market-rate participants who received an HEA and experienced pre-electrification and pre-weatherization barriers. Survey respondents included customers who remediated barriers and subsequently completed either weatherization upgrades, electrification upgrades, or both, as well as those who chose not to remediate barriers and participated in an HEA without pursuing upgrades.

Table 9. Participant Survey Completes by Barrier Mitigation Status and Income Category

Barrier Type	Barrier Mitigation	Income Category	Total Completed Responses	Total Usable Survey Responses	Percentage of Total Completes	Total Number of Screen Outs
Weatherization	Mitigated	MIQ	6	6	3%	1
Weatherization	Mitigated	MR	88	88	45%	81
Electrification	Mitigated	MIQ	0	0	0%	0
Electrification	Mitigated	MR	4	4	2%	3
Both	Mitigated	MIQ	2	2	1%	0
Both	Mitigated	MR	72	71	37%	2
Weatherization	Not Mitigated	MIQ	0	0	0%	4
Weatherization	Not Mitigated	MR	9	9	5%	20
Electrification	Not Mitigated	MIQ	0	0	0%	1
Electrification	Not Mitigated	MR	0	0	0%	7
Both	Not Mitigated	MIQ	0	0	0%	0
Both	Not Mitigated	MR	14	14	7%	11
Total	**-**	**-**	**195**	**194**	**100%**	**130**

Note: “Both” refers to barriers affecting weatherization and electrification.

Source: Evaluation team survey analysis

3.4.2 Participant Interviews

The team performed 17 participant interviews to gain deeper insights into their experiences with identifying and remediating barriers, motivations for remediating, reasons for not moving forward, payment and financing strategies, and satisfaction with program support. To select interview participants, the team performed additional outreach to survey respondents and asked if they were interested in participating in an interview. The team then reviewed their survey response to determine whether the participant had to pay over $1,000 for barrier remediation or was a moderate-income customer.[9] Table 10 shows that the interviewees were geographically representative across the Commonwealth. The interviews took approximately 15-20 minutes to complete, and interviewees received a $100 incentive for their time.

Table 10. Participant Interviews Regional Distribution

County	Number of Interviewees
Middlesex	3
Barnstable	2
Essex	2
Plymouth	2
Suffolk	2
Worcester	2
Bristol	1
Hampden	1
Hampshire	1
Norfolk	1
Total	**17**

Source: Evaluation team interview analysis

4. Results

This section summarizes key findings related to barrier categorization trends, potential energy savings for homes with barriers, and the processes, frequency, and drivers of barrier remediation.

4.1 Barrier Categorization Trends

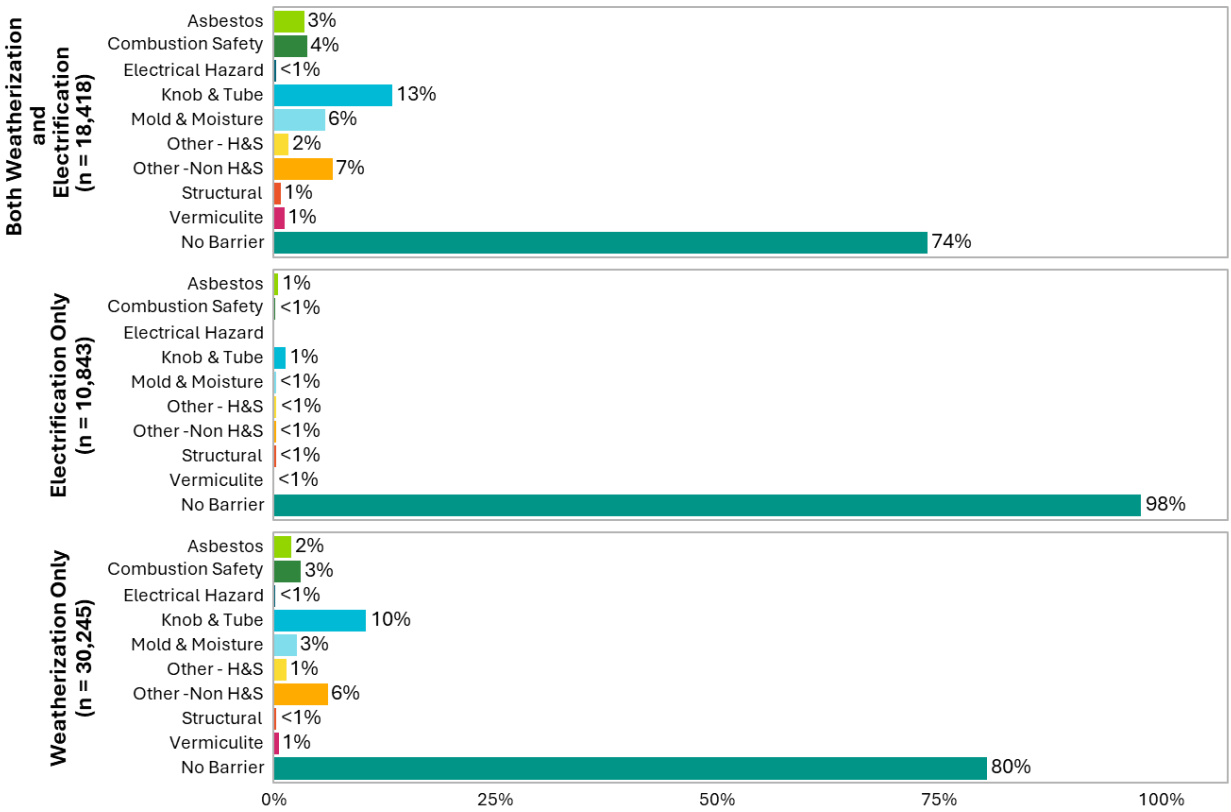
The team created data visualizations and summaries to uncover trends related to barrier types, building characteristics, income levels, and other available demographics.

[9] As Table 9 shows, the low response rate among moderate-income customers in the participant survey resulted in the team being able to interview only one moderate-income customer.

4.1.1 By Measure Type

As Section 3.1.2 notes, the team reviewed the LV recommended or installed measure data and categorized each as weatherization or electrification measures. The data did not explicitly indicate whether each barrier was linked to a specific measure; therefore, cases where both measures were listed concurrently were consolidated into a single category. Furthermore, as weatherization is a necessary step prior to electrification, any barrier effectively prevents the installation of both measures. Figure 1 illustrates that homes often require weatherization before electrification and approximately 26% of those homes experience barriers.

Figure 1. Barrier Categorization by Measure Type



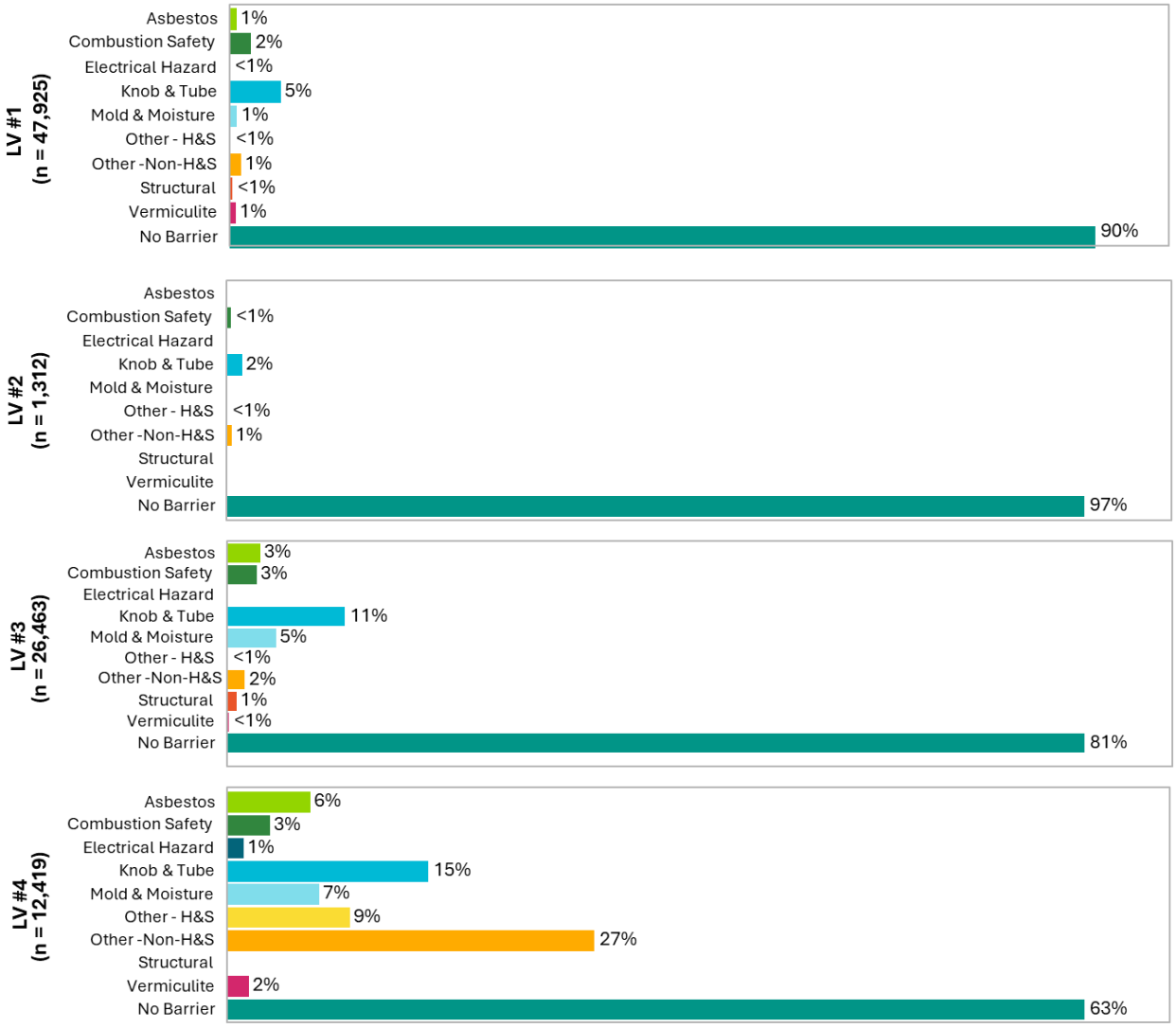
Note: Homes may have multiple barriers causing the total percentage to be greater than 100%.

Source: Evaluation team data analysis

4.1.2 By Lead Vendor

The team explored how the LVs are tracking and documenting barriers. As Figure 2 shows, LVs vary in how they track barriers. The barrier tracked the most frequently among all LVs is K&T wiring. However, based on the data received, LV #4 is the only LV that calls out whether the K&T wiring required sign-off or not. Among all the LVs, LV #4 tracks the barriers the most comprehensively by documenting both hard and soft barriers as evident with the higher percentage of Other Non-H&S and Other-H&S barriers.

Figure 2. Barrier Categorization by LV



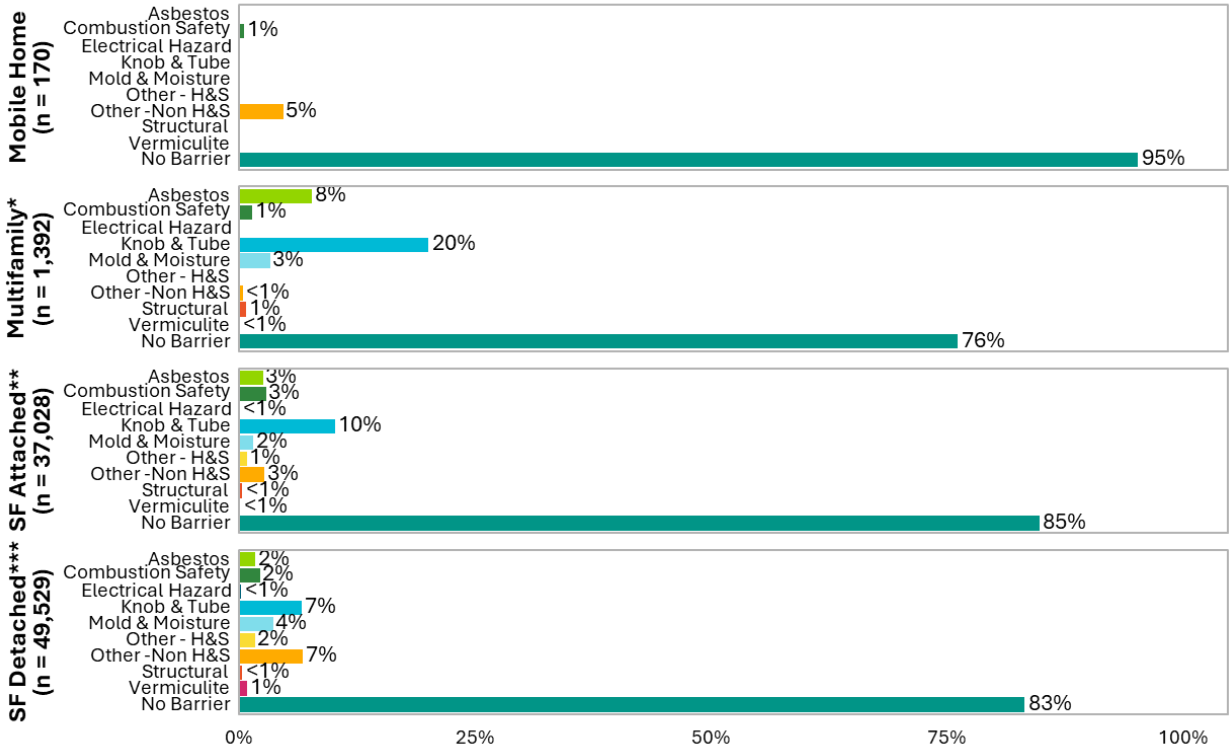
Note: Homes may have multiple barriers causing the total percentage to be greater than 100%.

Source: Evaluation team data analysis

4.1.3 Home Type

As Figure 3 shows, multifamily properties that receive an HEA exhibit a higher incidence of recorded barriers compared with single-family or mobile homes. In multifamily homes, the most prevalent recorded barriers included K&T wiring and asbestos. For single-family attached and single-family detached homes, there are similar trends in the frequency of recorded barriers with some variances in the specific barrier types.

Figure 3. Barrier Categorization by Home Type



Note: Homes may have multiple barriers causing the total percentage to be greater than 100%.

*Multifamily home refers to a residential building with five or more separate units.

** Single-family attached home refers to a residential building with two to four separate units, where the units share one or more walls but are otherwise distinct.

***Single-family detached home refers to a residential building that stands alone and is designed to house one family.

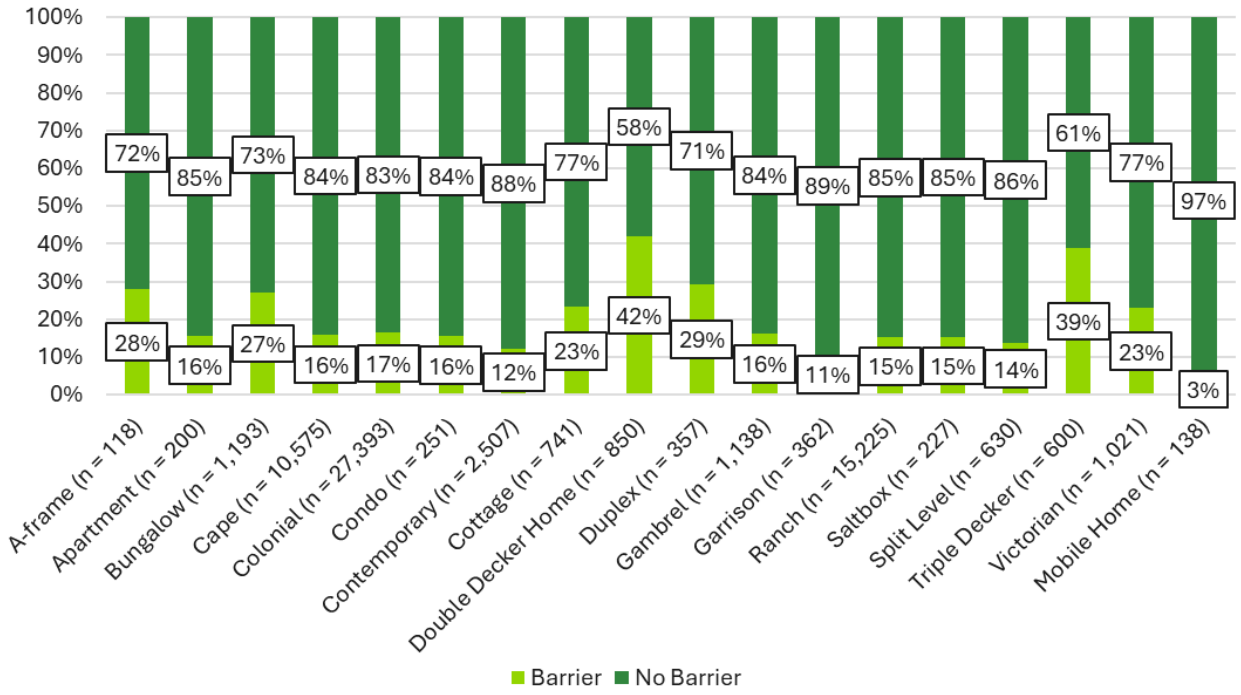
Source: Evaluation team data analysis

4.1.4 Dwelling Type

The team explored whether certain dwelling types have a higher frequency of recorded barriers. Figure 4 illustrates that double decker, triple decker, a-frame, and bungalows have the highest incidence of recorded barriers. Double decker and triple decker homes, in particular, frequently have multiple identified barriers. Notably, double decker and triple decker homes have a high prevalence of K&T wiring (39% and 38%, respectively) and asbestos (18% and 19%, respectively).

Contractors noted that bungalows, cape style, triple decker, and older Victorian and colonial dwelling types are where they typically see the most barriers. There are similar trends seen in Figure 4 based on these dwelling types.

Figure 4. Barrier Categorization by Dwelling Type



Source: Evaluation team data analysis

4.1.5 Designated Equity Communities and Environmental Justice Communities

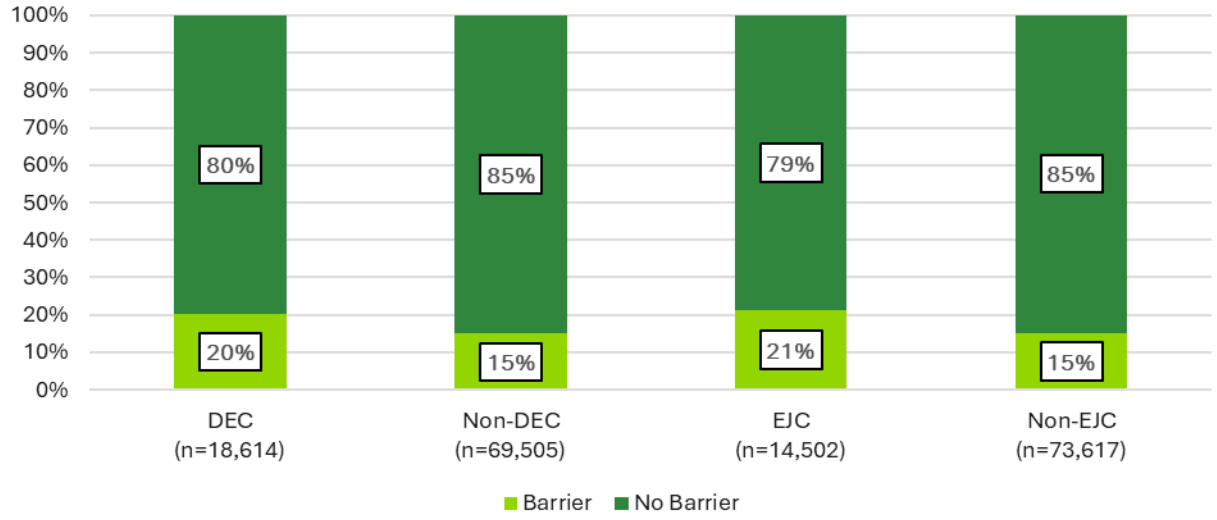
Figure 5 shows the presence of barriers in DECs[10] and environmental justice communities (EJCs).[11] Both DECs and EJCs have a higher prevalence of barriers compared with non-DECs and non-EJCs, with 20% of DEC homes and 21% of EJC homes having recorded barriers compared with 15% in non-DECs and non-EJCs. As DEC and EJC designations are not mutually exclusive, some degree of overlap is anticipated. DECs with a high prevalence of barriers included Fall River, Fitchburg, and New Bedford. In these communities, 53% of homes in Fall River had recorded barriers, 44% in Fitchburg, and 31% in New Bedford.

Contractors identified industrial cities, mill towns, and DECs as regions with a high prevalence of barriers. They also report that homes in the Cape region often experience mold as a barrier.

[10] The team reviewed the Massachusetts 2025-2027 Energy Efficiency and Decarbonization Plan to determine the DECs. Criteria for DECs included communities in which more than 35% of the population are renters, there were greater than 8,000 renters and more than 50% of the population are low- or moderate-income. This resulted in the selection of 21 communities as called out in the 2025-2027 Plan.

[11] An EJC in Massachusetts is defined as a neighborhood where residents meet one or more criteria including low income (≤65% of the statewide median), minority population (≥40%), limited English proficiency (≥25% of households), or a combination of minority status and income thresholds. These designations aim to identify areas that may face disproportionate environmental burdens.

Figure 5. Barrier Categorization by DEC and EJC

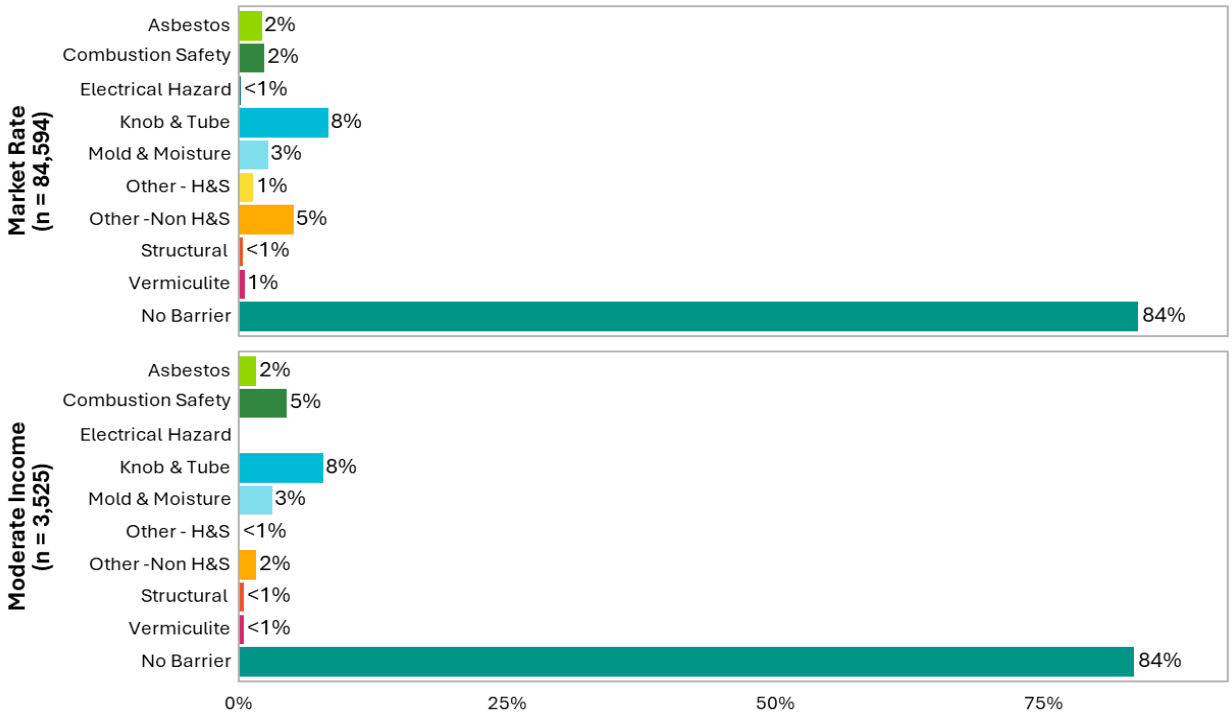


Source: Evaluation team data analysis

4.1.6 Income Type

Figure 6 shows the barrier types by moderate-income and market-rate customers. Both moderate-income and market-rate customers exhibit a similar prevalence of recorded barriers. LVs recorded combustion safety slightly more in moderate-income homes with 5% of homes having a recorded combustion safety barrier compared with 2% in market-rate homes.

Figure 6. Barrier Categorization by Income Type



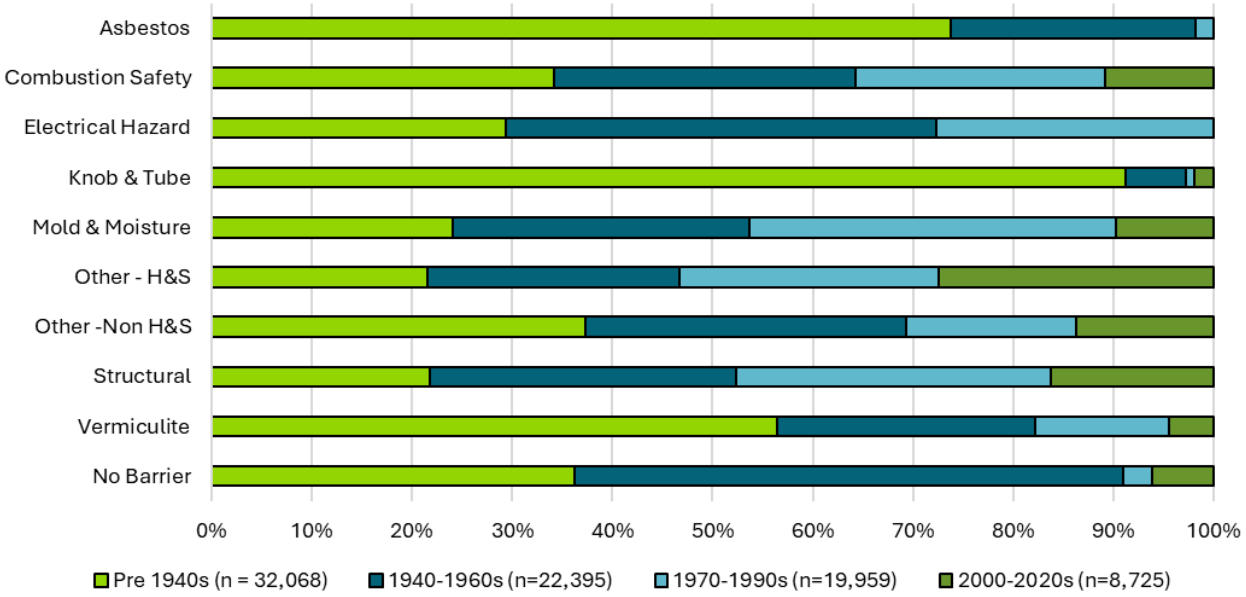
Note: Homes may have multiple barriers causing the total percentage to be greater than 100%.

Source: Evaluation team data analysis

4.1.7 Building Vintage

As anticipated, the team found that older homes have a higher prevalence of recorded barriers, as Figure 7 shows. In particular, homes built in the 1940s and earlier have the highest number of recorded barriers with the most prevalent being K&T wiring, asbestos, and vermiculite. Homes built between the 1940s and 1960s also have a high prevalence of barriers such as electrical hazards, structural, and combustion safety. Homes built between the 1970s and 1990s tend to experience recorded barriers of mold and moisture, other non-H&S, and structural. Newer homes built between the 2000s and 2020s experience barriers such as structural, other H&S, mold and moisture, and combustion safety. Overall, the pre-1940s homes experience the most recorded barriers compared with other decades.

Figure 7.Barrier Categorization by Building Vintage



Source: Evaluation team data analysis

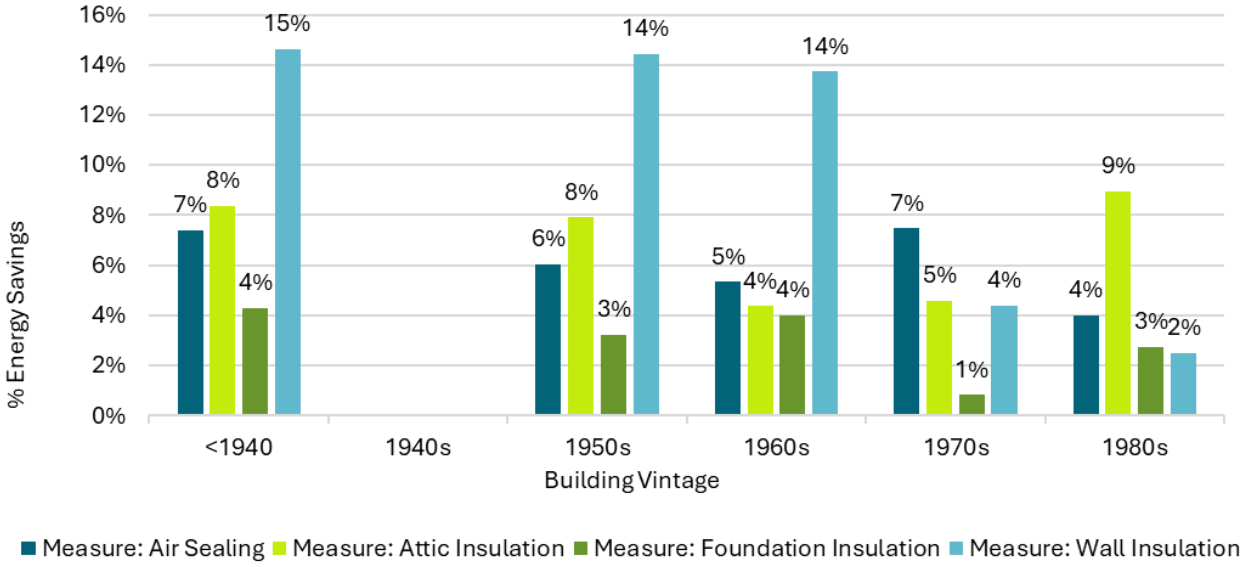
4.2 Potential Energy Savings

The team calculated potential energy savings for various weatherization measures by applying weatherization measures to the ResStock energy models. The baseline energy models include a wide range of building performance values for insulation and air sealing as defined by the ResStock building characterization. The team updated the existing baseline energy model performance within each model per the weatherization measures discussed in Section 3.2.

Figure 8 and Figure 9 show the percentage energy savings per site[12] for the weatherization measures and measure packages for single-family detached homes. On average, the team found that older homes are less insulated and have a higher energy intensity. As a result, measure savings trend higher with older home vintages. Similarly, weatherization barriers are more common in older vintages, as discussed in Section 4.1.7. The typical site with weatherization barriers is therefore older on average than sites without barriers, yielding higher average savings potential for sites with weatherization barriers.

[12] Energy savings are in terms of total MMBtu savings, including electric, natural gas, and delivered fuel savings, and rolled up to represent overall home or site performance.

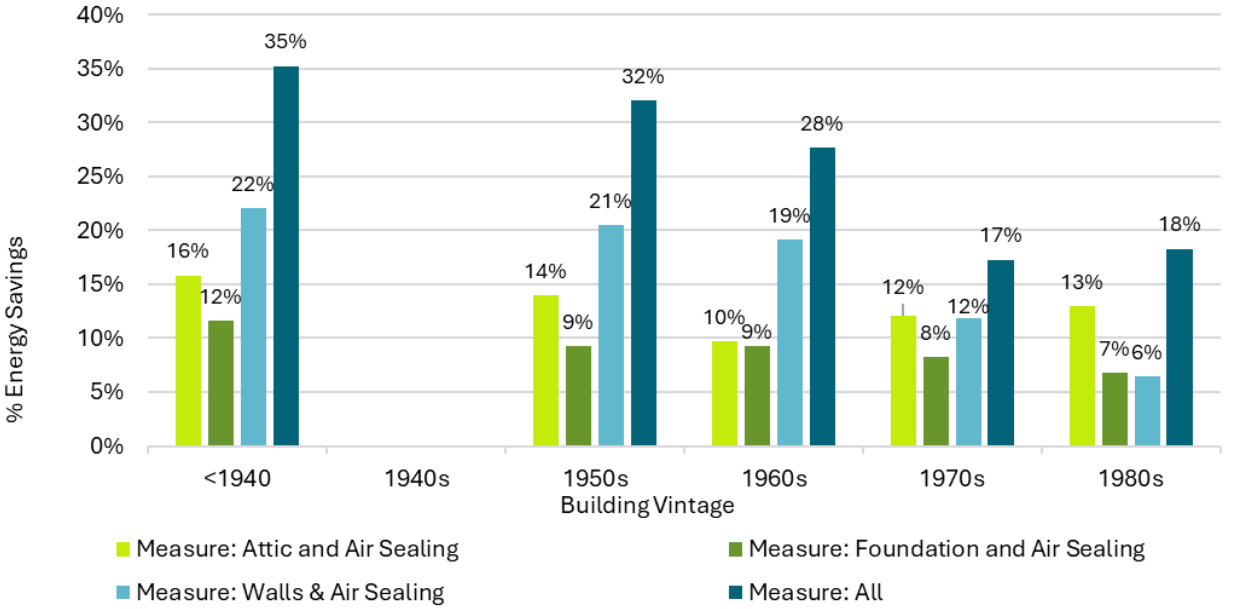
Figure 8. Average Energy Savings by Measure and Home Vintage for Single-Family Detached Homes



Note: The 1940s does not have any homes presented due to the ResStock baseline model distribution as identified in Table 5.

Source: Evaluation team building simulation analysis

Figure 9. Average Energy Savings by Measure and Home Vintage for Single Family Detached Homes, Continued

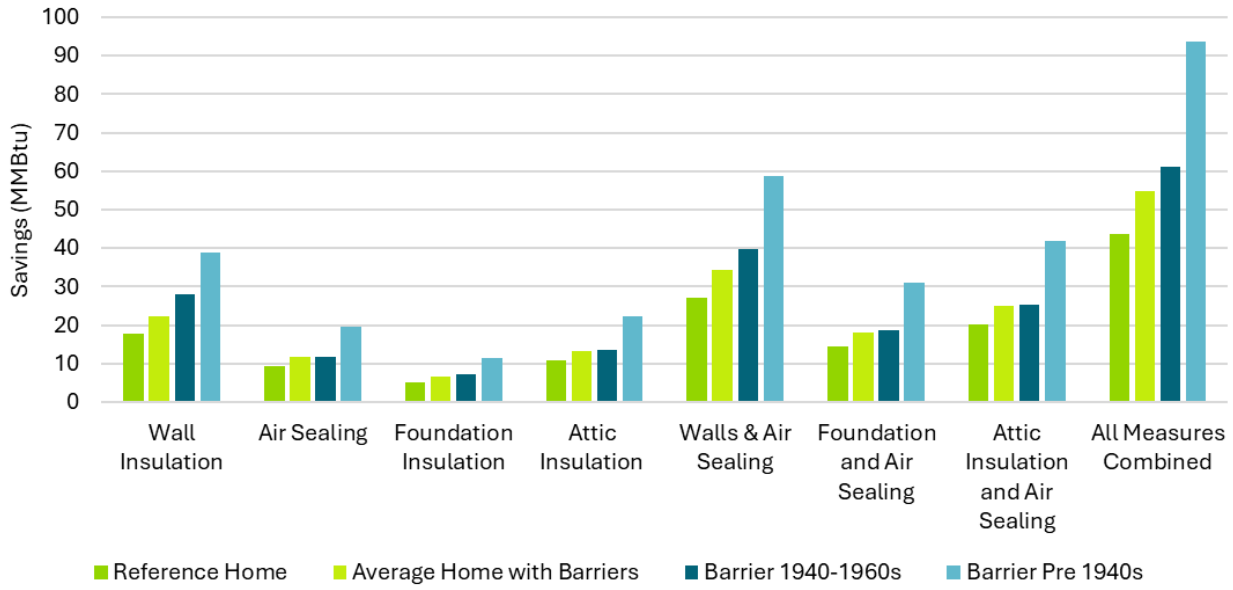


Note: The 1940s does not have any homes presented due to the ResStock baseline model distribution as identified in Table 5.

Source: Evaluation team building simulation analysis

The team also calculated energy savings for a reference home scenario. The team used LV data to summarize the distribution of homes by vintage that received any weatherization measure, as Table 7 shows. Savings weighted using this distribution are referred to as the reference home, which is meant to serve as a proxy for the savings used in the Massachusetts Technical Reference Manual (TRM) and Benefit Cost Ratio (BCR) model. Figure 10 shows the absolute savings between the reference home and homes with barriers. The team also included specific scenarios for older homes, pre-1940s to 1960s, to highlight the impact of building vintage.

Figure 10. Reference Home Savings Compared with Homes with Barriers



Note: The modeled reference home savings may be higher than what is seen in the TRM and BCR model as the savings are inclusive of the total site MMBtu savings. Additionally, the modeled measure performance may be higher than what is seen in the program (e.g., attic insulation reflects a fully insulated attic rather than the insulation of an attic hatch). It is generally advised to compare savings on a percentage basis as shown in Figure 8 and Figure 9.

Source: Evaluation team building simulation analysis

Table 11 highlights the potential percentage savings gap between homes with barriers and the reference home. On average, homes with barriers realize approximately 26% higher energy savings than reference homes. For homes of older building vintages, the percentage savings difference increases to 40% for homes built in the 1940s through 1960s and to 115% for pre-1940s homes. The pre-1940s has higher savings due to these homes having the highest energy intensity and least insulation compared with other building vintages.

Table 11. Percentage Savings Difference for Homes with Barriers to the Reference Home

Measure	Percentage Savings Difference to Reference Home		
	Average Home with Barriers	Barrier 1940-1960s	Barrier Pre-1940s
Wall Insulation	26%	58%	119%
Air Sealing	26%	26%	110%
Foundation Insulation	26%	38%	121%
Attic Insulation	24%	25%	107%
Walls & Air Sealing	26%	47%	116%
Foundation and Air Sealing	26%	30%	114%
Attic Insulation and Air Sealing	25%	26%	108%
All Measures Combined	26%	40%	115%

Source: Evaluation team building simulation analysis

4.3 Barrier Mitigation Process, Frequency, and Drivers

This section discusses the barrier mitigation process from the LV and contractor perspective, barrier remediation frequency, customer drivers for mitigating and not mitigating barriers, and the customers' ability to pay for barrier remediation.

4.3.1 Contractor Mitigation Identification and Processes

The following overview details how barriers are identified, communicated, and tracked throughout the HEA process. Drawing on the practices of both LVs and HPCs, it describes the customer intake journey, the systematic approach to uncovering barriers during assessments, the methods used to communicate findings to customers, and the evolving systems for tracking barrier data. Together, these insights provide a comprehensive look at the operational steps and data practices that underpin effective barrier mitigation.

4.3.1.1 Intake Process

Customers typically begin the intake process for residential weatherization and electrification programs either by receiving a referral to an LV or HPC or by proactively reaching out to express interest in program services. LVs respond to referrals or direct inquiries by scheduling an HEA, which usually involves an in-home visit lasting two or more hours to thoroughly evaluate the property for both weatherization and electrification opportunities. HPCs follow a similar intake approach, with customers entering the process through marketing, word of mouth, or referrals. LVs or HPCs generally complete the HEA within one to two weeks of intake, with most assessments

conducted with the customer present. During this stage, LVs or HPCs collect data to determine program eligibility and screen for participation.

4.3.1.2 Barrier Identification Process

Energy specialists identify barriers during the comprehensive HEA, which serves as the foundation for both weatherization and electrification projects. The HEA involves a detailed inspection of the home, during which the energy specialist looks for H&S issues that might include common barriers such as K&T wiring, vermiculite, mold, asbestos, and other structural or safety issues. Both LVs and HPCs use the HEA to systematically determine all opportunities and challenges to weatherization or electrification related to the property. They capture not only the presence of barriers but also their type, severity, and any factors that may influence remediation, such as the condition, vintage, or location in the home. While the energy specialist identifies the barrier, they do not inspect the barrier. An additional site visit is typically needed with the appropriate barrier remediation contractor for further inspection of the barrier and estimated cost of remediation.

4.3.1.3 Barrier Communicated to Customer

After the barrier is identified, the LV or HPC reviews the findings with the customer, explaining the specific barriers discovered, their implications for the project, and the steps required for remediation. This communication typically includes a written scope of work, called an action plan, that outlines the necessary measures and next steps for barrier inspection. For example, when K&T wiring is identified, the action plan specifies contacting an electrician to verify that the K&T wiring is not present or active. The process ensures transparency, helping customers understand both the challenges and the pathway to resolution.

LVs or HPCs also inform the customer about the sequence of steps, potential costs, and the roles of various parties (e.g., whether the vendor's contractor or the customer's own contractor will handle remediation). Within the RTS initiative for moderate-income customers, the LV or HPC serves as a project manager throughout the barrier remediation process coordinating directly with qualified barrier remediation contractors. Similarly, HPCs provide comprehensive end-to-end services including barrier remediation coordination, with some HPCs offering in-house barrier remediation such as mold. For market-rate customers who do not engage an HPC, the LV can provide a list of qualified barrier remediation contractors if the customer does not have a preferred contractor. However, in these cases, the customer is responsible for managing the coordination of the remediation process. Section 4.3.2.3 provides additional details on how survey respondents addressed barriers in their homes.

4.3.1.4 Barrier Tracking Process

LVs track barriers identified during the HEA in program data systems. All LVs maintain records of barriers, though there are differences in the types of barriers tracked and the methods used for tracking remediation. The tracking process is evolving with LVs actively working to improve their systems to support initiatives such as RTS. LVs use the data collected during the HEA to document the existence, type, and status of barriers, and in some cases, they log the time from audit to

completion. Some LVs are transitioning to new software platforms to improve consistency and detail in tracking, though challenges remain in standardizing definitions and ensuring all barriers, including smaller ones, are consistently recorded.

4.3.1.5 Non-Energy Impacts as a Selling Point

LVs and contractors use a customer-centric approach to communicate the value of weatherization and electrification programs, positioning non-energy impacts as a central selling point. Instead of relying solely on technical details or energy savings, they tailor their messaging to align with what each customer values most, such as comfort, cost savings, energy efficiency, or environmental benefits. This approach requires staff to use emotional intelligence and actively listen for customer pain points and motivations, allowing them to adapt their communication and solutions to each individual's priorities. As the market matures and more customers become aware of available programs, messaging continues to shift toward decarbonization action plans and meeting key customer needs such as lowering energy bills. The ability to customize engagement strategies and highlight the benefits that resonate most with each customer is seen as essential for increasing participation and driving successful outcomes in residential retrofit programs.

4.3.2 Barrier Mitigation Trends

The following section discusses the cost and timeline estimates from the LV, HPC, and IIC perspective as well as from the participant experience.

4.3.2.1 Contractor Timeline and Cost Estimates

During the contractor interviews, the team asked the contractors to identify barriers that are the most time and cost intensive, as Table 12 shows. LVs and HPCs noted K&T wiring and vermiculite as the most time-intensive and cost-intensive barriers, expressing that these barriers typically take up to 6 months for remediation and are very expensive. In particular, vermiculite requires multiple testing stages to ensure state building code compliance. For K&T wiring, the work can become very invasive if rewiring is required. Additionally, LVs and HPCs noted that combustion safety can be costly and time-consuming, especially if a heating system replacement is needed. From the IIC perspective, once they are contracted, the barrier remediation takes approximately one to two days for vermiculite removal and one to two days per circuit breaker for K&T wiring.

Table 12. Barrier Mitigation Timeline from LV, HPC, and Contractor Perspectives

Barrier Type	Lead Vendors	HPCs	Contractors
K&T Wiring	**Very time-intensive,** requiring quotes and invasive work, especially if rewiring is needed, **often taking weeks to months**	K&T wiring has the longest wait period and can take **up to 6 months** for remediation	**1-2 days** per circuit breaker

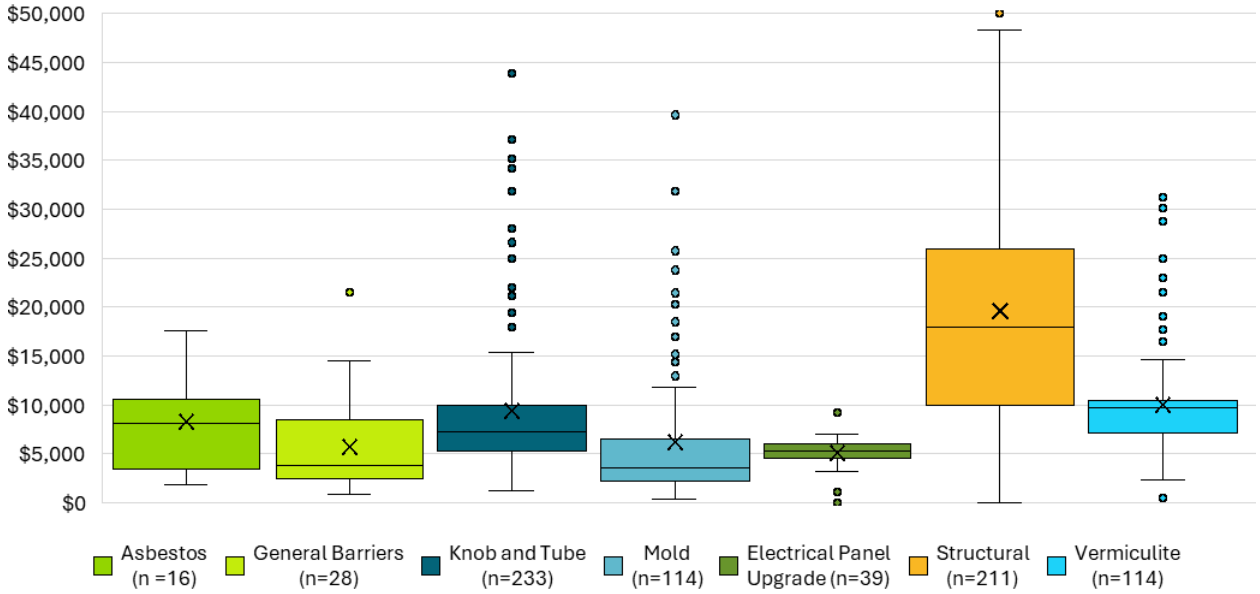
Barrier Type	Lead Vendors	HPCs	Contractors
Vermiculite	**Most time-intensive and very expensive,** requiring multiple testing stages and state building code compliance; remediation can take a month or more	Vermiculite is the longest and can last for **multiple months or even half a year** or more	**1-2 days for full removal**; 2 days for spaces greater than 900 square feet
Combustion Safety (including heating system replacements)	Replacing a heating system and combustion safety barriers is **costly and time-consuming** due to the need for quotes and upgrades	Did not specify	Does not track combustion safety remediation
Mold	**Generally quick** and less invasive	**1-2 days** with in-house mold remediation team for Endless Energy	Does not track mold remediation
Other Factors	Multiple barriers and high costs often cause participants to drop out; multifamily situations add complexity due to landlord/tenant coordination	Did not specify	Did not specify

Source: Evaluation team contractor interviews analysis

Contractors noted that the barrier type and severity often drive barrier remediation. Multiple barriers and high costs often cause participants to not move forward with remediation and therefore weatherization or electrification measures. For hard barriers, the LVs and HPCs estimated the barrier remediation frequency to be less than 20% of homes. However, for soft barriers, the majority of customers remediate them. For instance, K&T wiring may be found inactive. The IIC notes that in Middlesex County, 60%-70% of K&T wiring require only sign-off rather than remediation.

For cost estimates, LVs provided 2024 to 2025 RTS initiative data and 2023 to 2024 HEAT Loan data related to barrier mitigation, as Figure 11 shows. Structural barriers represent the highest average mitigation cost at $19,606, followed by vermiculite at $10,023, and K&T wiring at $9,421. The barrier mitigation cost data also highlights the significant variability in mitigation costs, driven by differences in barrier severity. For instance, mold remediation has an average cost of $6,200, yet some projects exceed $20,000, a trend that is similarly observed across other barrier types.

Figure 11. RTS Initiative 2024-2025 LV Cost Data and 2023-2024 HEAT Loan Barrier Mitigation Data



Note: The cost for remediating K&T wiring does not include K&T sign-off.

Source: Evaluation team LV cost data analysis

4.3.2.2 Participants Timeline and Costs

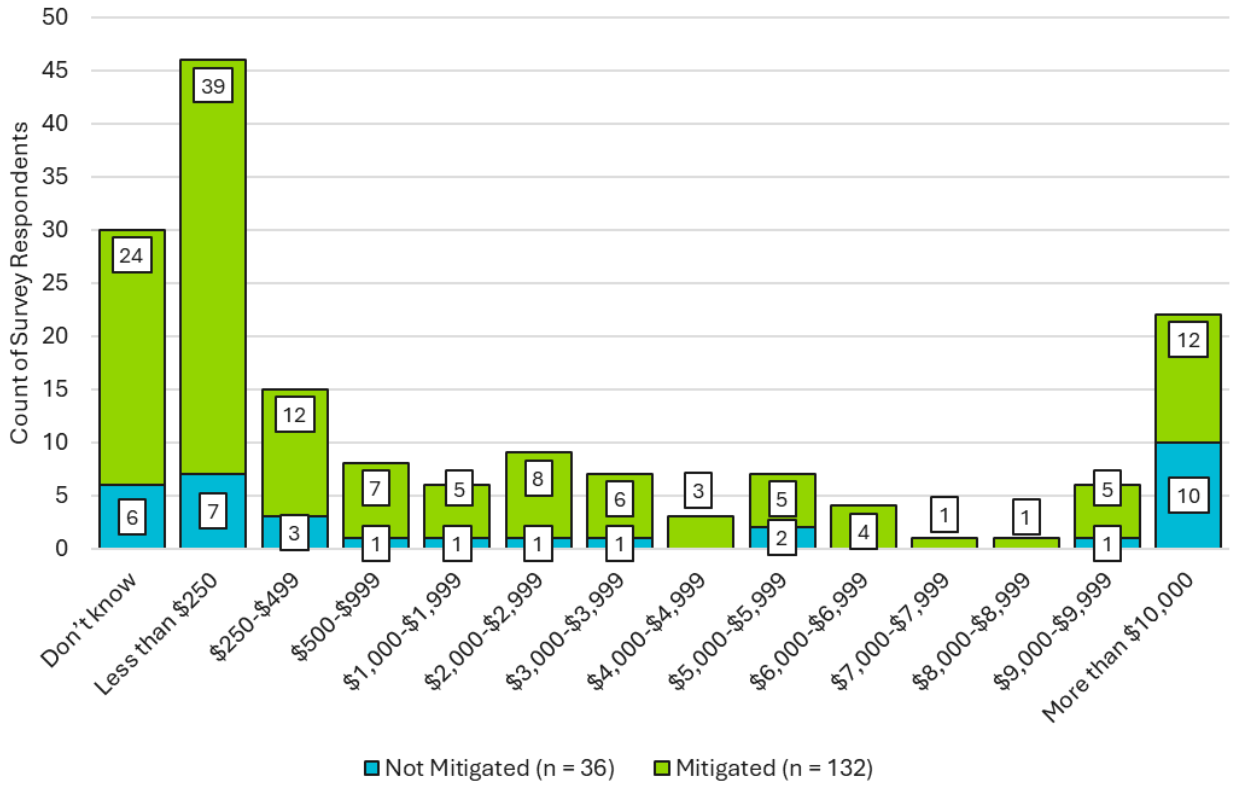
The participant survey explored the timeline of barrier remediation and the cost of barriers both remediated and not remediated. For the timeline of pre-weatherization barriers, 96 of 115 survey respondents that experienced barriers and received weatherization upgrades remediated barriers in less than 2 months. Of those survey respondents, 12 indicated receiving K&T sign-off, meaning their K&T wiring was inspected, found inactive, and did not require remediation.[13] Similarly, 23 of 33 survey respondents who experienced pre-electrification barriers and received electrification upgrades remediated barriers in less than one month. Of those survey respondents, three received K&T sign-off.

Regarding barrier costs, the participant survey asked customers about the cost of the barrier remediation, as Figure 12 shows. Survey respondents reported a wide range of costs for weatherization barriers with most barriers being remediated at a cost of less than $5,000 (80 of 132 survey respondents).[14] For barriers not being remediated, the cost of remediation for weatherization barriers tended to be higher with 10 of 36 survey respondents stating the weatherization barrier cost estimate was over $10,000.

[13] The team flagged survey respondents as having K&T sign-off if the participant indicated the K&T wiring was found inactive in their response to the question "How was the barrier remediated?" or if the participant indicated the remediation of their K&T wiring cost less than $250.

[14] Twelve of the 80 survey respondents were flagged as K&T sign-off.

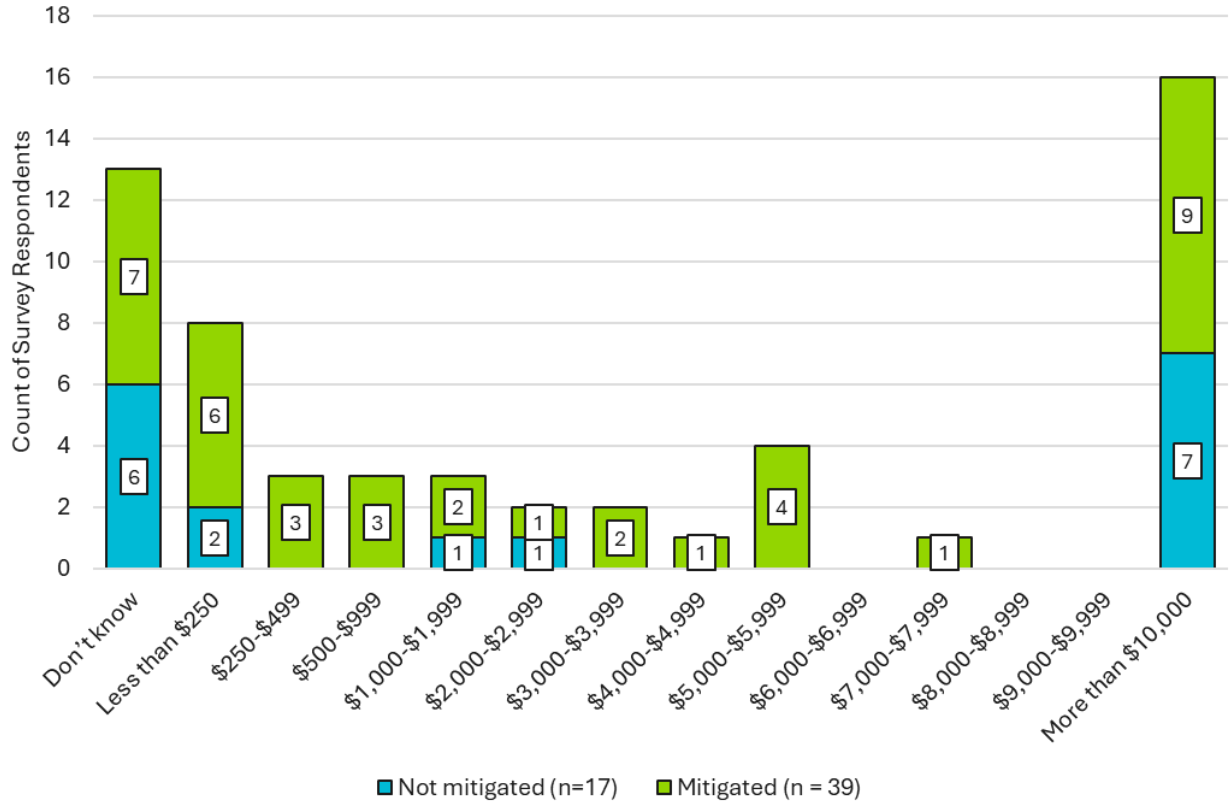
Figure 12. Overall Weatherization Barrier Remediation Costs



Source: Evaluation team survey analysis

In comparison, Figure 13 presents the electrification barrier remediation costs for participants who both did and did not remediate electrification barriers. Survey results indicated that customers are more likely to mitigate barriers that cost less and subsequently proceed with electrification upgrades. For electrification barriers, higher remediation costs often relate to K&T wiring, unsafe or outdated electrical systems, and insufficient electrical panel capacity.

Figure 13. Overall Electrification Barrier Remediation Costs



Source: Evaluation team survey analysis

During the participant interviews, the team explored how participants covered the cost of barrier remediation, whether they paid entirely out of pocket or received financial assistance through Mass Save, as Table 13 shows. Responses varied with some participants reporting they paid the full cost themselves: "I paid all out of pocket for this." Others noted they received support through program incentives: "Mass Save covered the cost." And several participants highlighted a shared approach: "I paid out of pocket and then was reimbursed for a portion of it through the program."

Table 13. Participant Payment Methods for Barrier Remediation

Payment Method for Barrier Remediation	Number of Participants
Out of Pocket	4
Partially paid out of pocket and partially with Mass Save rebate	4
HEAT Loan	2
Mass Save rebate covered the cost	2

Payment Method for Barrier Remediation	Number of Participants
Partially paid with Mass Save rebate and partially with federal tax credits	1

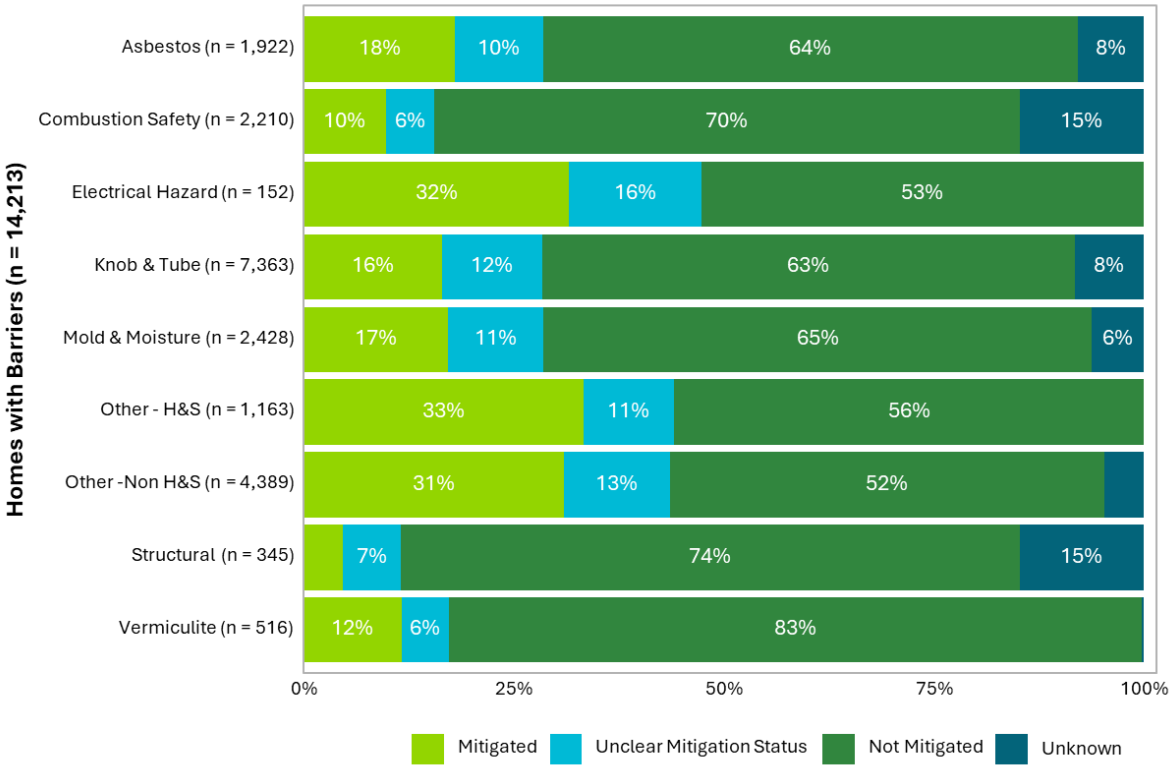
Source: Evaluation team interview analysis

Experiences in identifying financing options varied. Some found it straightforward while others described the process as arduous: "They were easy to find, but the [HEAT Loan] process felt a bit tedious, having to make certain selections in the online system, and the interface was antiquated." Without program support, many would have delayed remediation, done less work, or not been able to afford it at all. One participant noted, "We would have paid out of pocket but would not have done it as soon as we did in the program. We would have maybe done it slower and mitigated one barrier this year and another next year, but this way we were comfortable doing it all at once." Others stated, "No. We could not have afforded it," and "I would not have been able to do it without the HEAT Loan."

4.3.2.3 Barriers Remediated and Approaches for Remediation

The team reviewed the audit and installed measure data to categorize participants into their anticipated mitigation status, as described in Section 3.1.2. Figure 14 presents the results of the different mitigation status by barrier type for homes with barriers to discover any potential trends in barriers that are being remediated. From this analysis, the team found that vermiculite may remain unmitigated in approximately 83% of homes and structural barriers in 74% of homes.

Figure 14. Barrier Mitigation Anticipated Status by Barrier Type

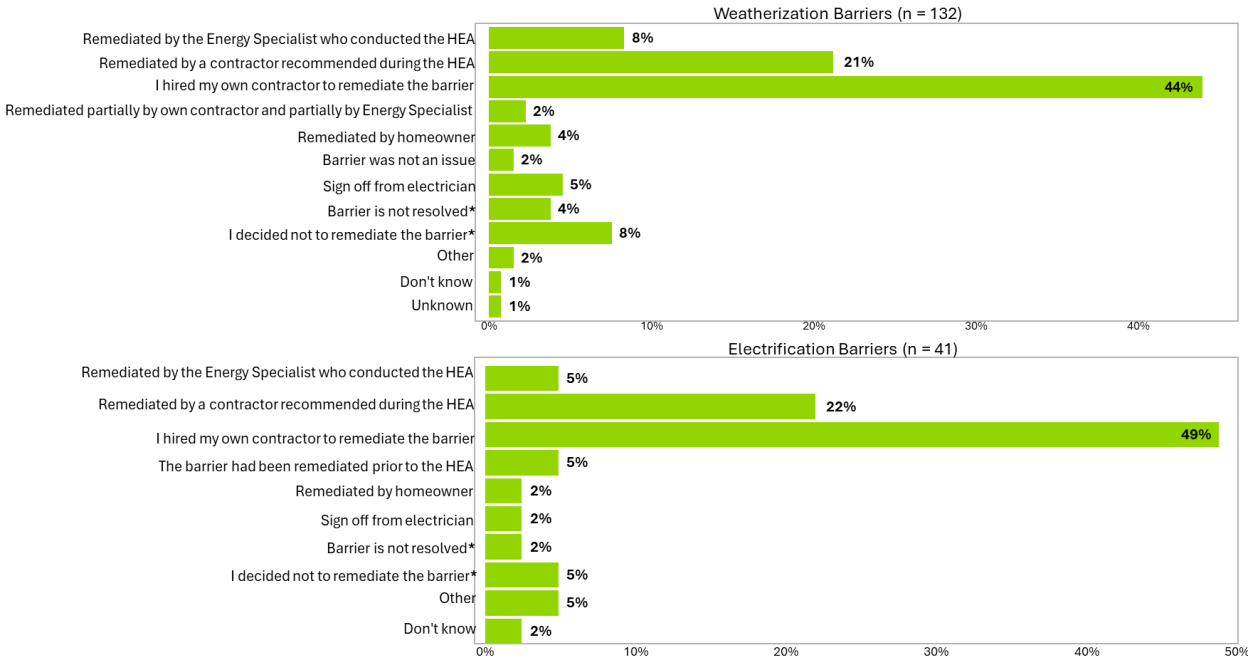


Source: Evaluation team data analysis

From the participant survey and interviews, the team did not see any significant trends in certain barrier types being mitigated versus not mitigated, but rather the cost of the barrier being the driving factor.

Figure 15 shows how survey respondents moved forward with remediating barriers. Approximately 20% followed recommendations from their HEA auditor and used contractors affiliated with Mass Save: "We had the HEA done and the HEA person gave us a recommendation for the vermiculite removal. We had the vermiculite done first and then had the K&T scoped out with NEEECO doing the work." Approximately 45% of survey respondents found and hired their own contractors independently, sometimes after receiving general guidance from inspectors: "The guys were simply inspectors. They won't even recommend a company but told me to go online and find a contractor in my area." Several participants combined program support, such as rebates and referrals, with their own contractor selection and project management.

Figure 15. Barrier Remediation Approaches



*Respondents who indicated that they did not remediate their barrier(s) also did not move forward with the installation of the recommended weatherization or electrification upgrades in their home.

Source: Evaluation team survey analysis

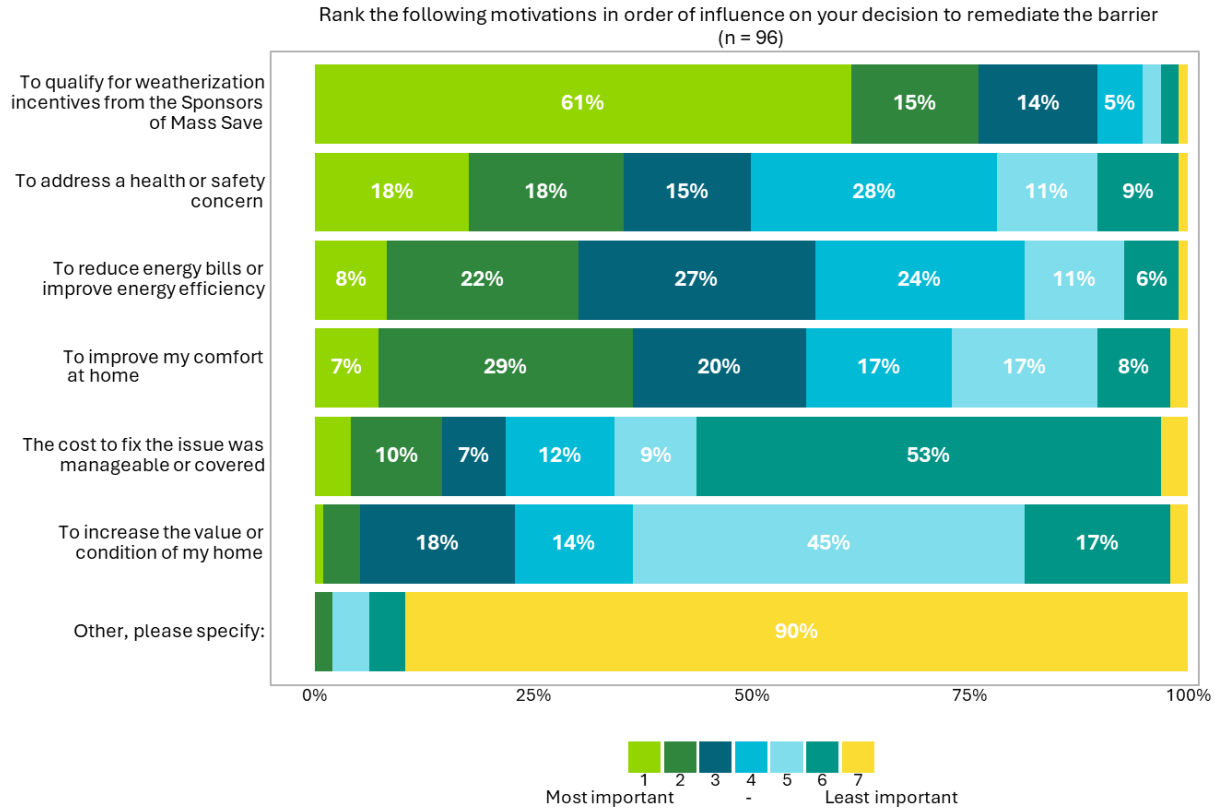
4.3.3 Barrier Mitigation Drivers

The following sections discuss the motivations for both deciding to mitigate and not mitigate barriers. These results are derived from the participant survey and interview responses.

4.3.3.1 Motivations for Remediation

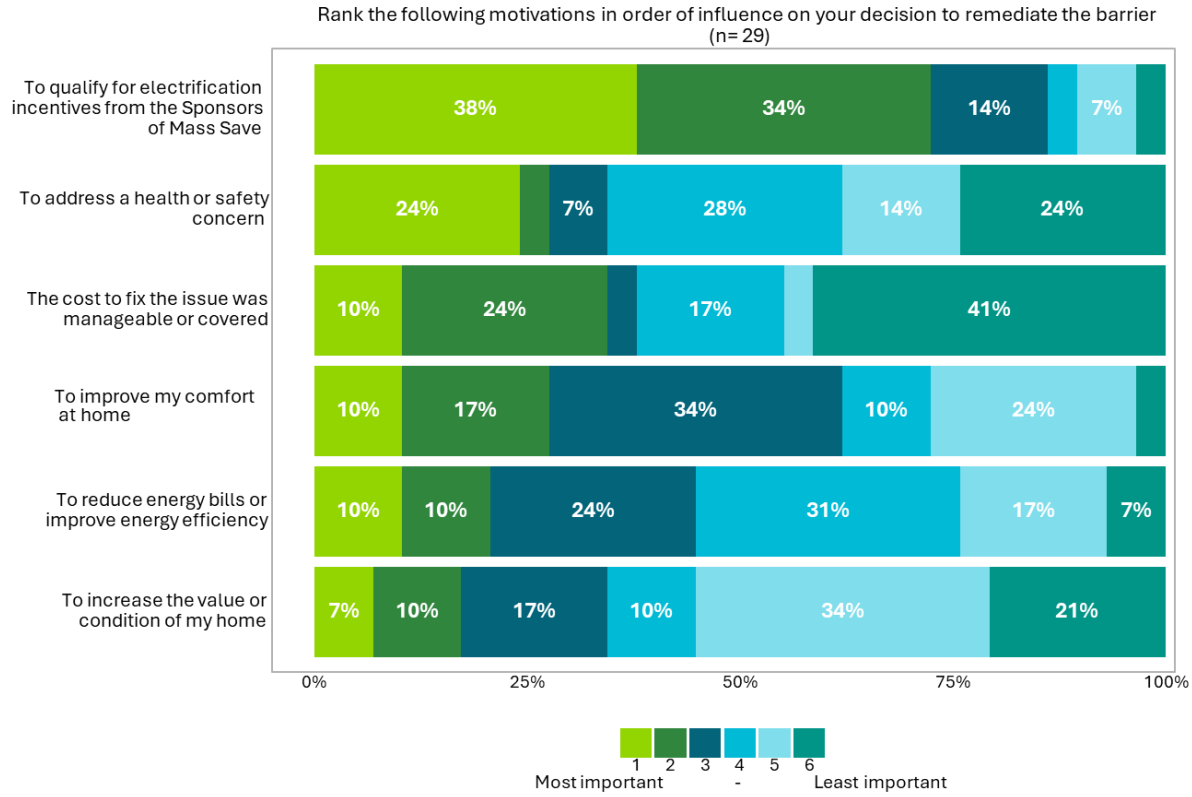
Sixty-one percent of survey respondents identified qualifying for weatherization incentives as their leading motivator for remediating weatherization barriers. Many respondents also cited addressing H&S concerns and reducing energy bills or improving energy efficiency as significant drivers. Similarly, 38% of survey respondents indicated that qualifying for electrification incentives was the primary motivator for remediating electrification barriers, with H&S considerations again ranking as a key reason for action. Figure 16 and Figure 17 show how survey respondents ranked the influence of different factors on their decision to remediate weatherization and electrification barriers.

Figure 16. Motivators for Remediating Weatherization Barriers



Source: Evaluation team survey analysis

Figure 17. Motivators for Remediating Electrification Barriers



Source: Evaluation team survey analysis

Based on participant interviews, safety and comfort emerged as the primary motivators for remediation, especially after discovering hazards in their homes. One participant explained, "The biggest reasons were safety and energy efficiency from the financial side, as well as being comfortable in the space. Once we identified both K&T and vermiculite, safety was the highest priority."

Financial incentives also played a crucial role, making upgrades more feasible. One participant stated, "We were aware of them (financial incentives) and the Mass Save program's incentives helped us justify the home purchase." Energy efficiency and reduced utility costs were also strong motivators, with another participant noting, "We could not do the weatherization work without it. We bought the house in the summer and realized the insulation was not doing much and we wanted to weatherize before the winter."

For electrification upgrades, substantial rebates for installing mini-split heat pumps and other measures motivated participants to remediate barriers. As one participant shared, "My main motivation was that we wanted to get the mini split with the large rebate, and it gets really humid in the summer." Improved climate control and comfort was also found important, with participants eager to resolve heating and cooling needs: "We wanted to get mini splits to heat and cool our

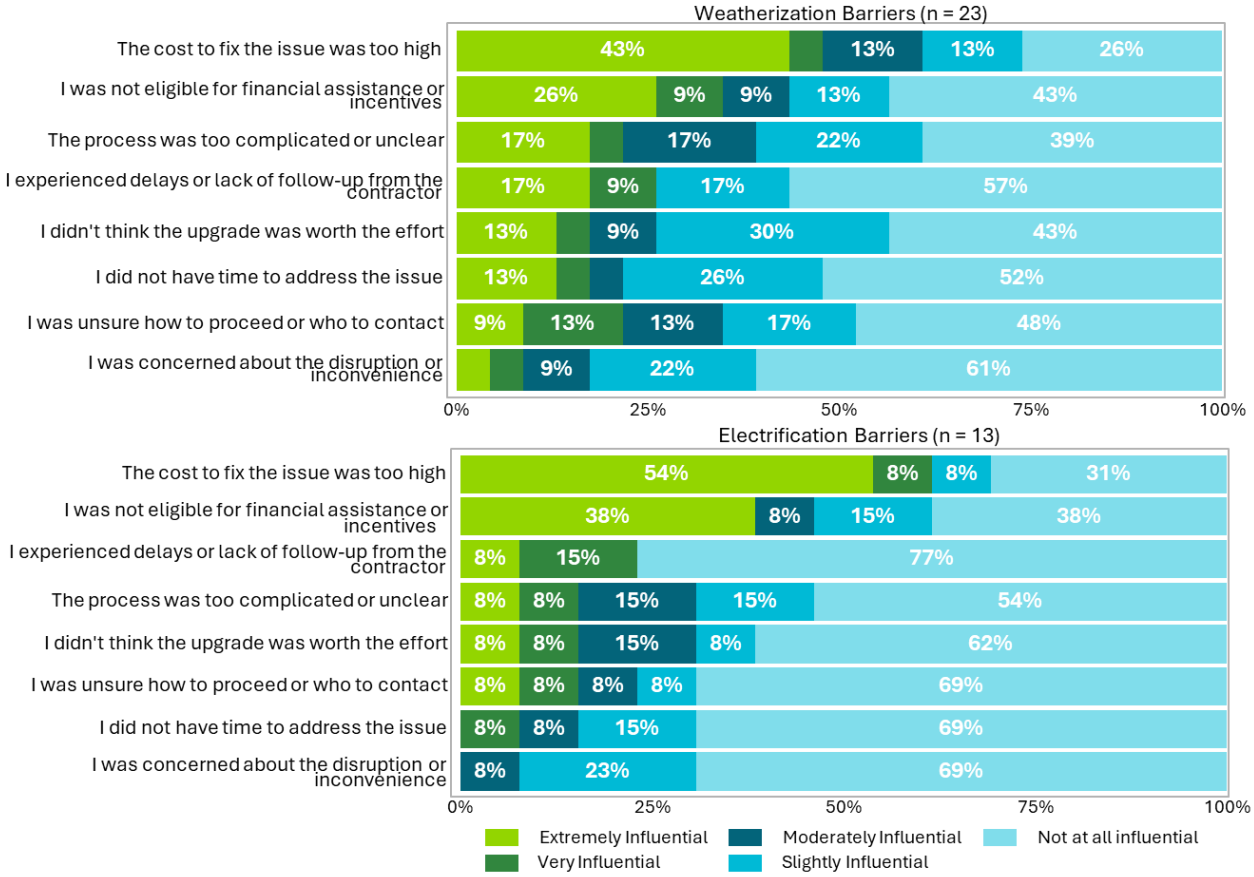
home and fixing the hot water heater issue and panel capacity was the best option to get that done."

Those pursuing both weatherization and electrification cited a mix of safety, efficiency, and the opportunity to take advantage of incentives before potential policy changes. "We wanted to ensure that we did not have anything problematic in the home. Also, we wanted to take advantage of the opportunities before political shifts happened, and it may be removed," one participant explained. Upgrades were also seen as investments in home value and future planning: "I wanted to increase the home value for the future when I go to sell the home." Additional motivators included family H&S, modernization, and preparation for future needs such as EV charging.

4.3.3.2 Reasons for Not Remediating Barriers

In both the participant survey and participant interviews, the most frequently cited reason for not proceeding with remediation was cost, as Figure 18 shows. Ten out of 23 participants stated that the cost was extremely influential in their decision to not remediate weatherization barriers, and seven out of 13 participants for electrification barriers. Many participants found the quoted prices prohibitively expensive, especially those who did not qualify for enhanced incentives. One participant stated, "The price they quoted cost too much. Cost was the main and only reason." Another added, "On paper I don't qualify for enhanced incentives but still need to save up to be able to afford these." Even those motivated to act expressed the need to delay due to financial constraints: "I would like to do this more than anything, but I am saving up while looking into quotes."

Figure 18. Motivators for Not Remediating Barriers



Source: Evaluation team survey analysis

Interview participants also indicated storage and space limitations within the home as significant barriers. Participants described physical constraints that made upgrades impractical or more costly. For example, one noted, “Mainly it was a storage issue in the attic but also a cost issue." Another shared, “The biggest issue was the furnace did not pass the combustion safety test and there is limited space as well for the furnace,” highlighting how technical assessments sometimes revealed challenges that could not easily be resolved.

Survey participants highlighted confusion in the process as a driving motivator not to remediate barriers, with 12 of 23 respondents indicating that being unsure on how to proceed or who to contact with remediating weatherization barriers influenced their decision on not remediating barriers.

The team interviewed one renter who noted the decision to remediate rested with the landlord or property manager who was unwilling to invest in the upgrade. One participant explained, “The landlord was not willing to pay for a new furnace. They did not get a quote for the furnace replacement.” Furthermore, they added context: “My landlord owns two other units but is not a

management company," suggesting limited resources or lack of formal processes for property improvements.

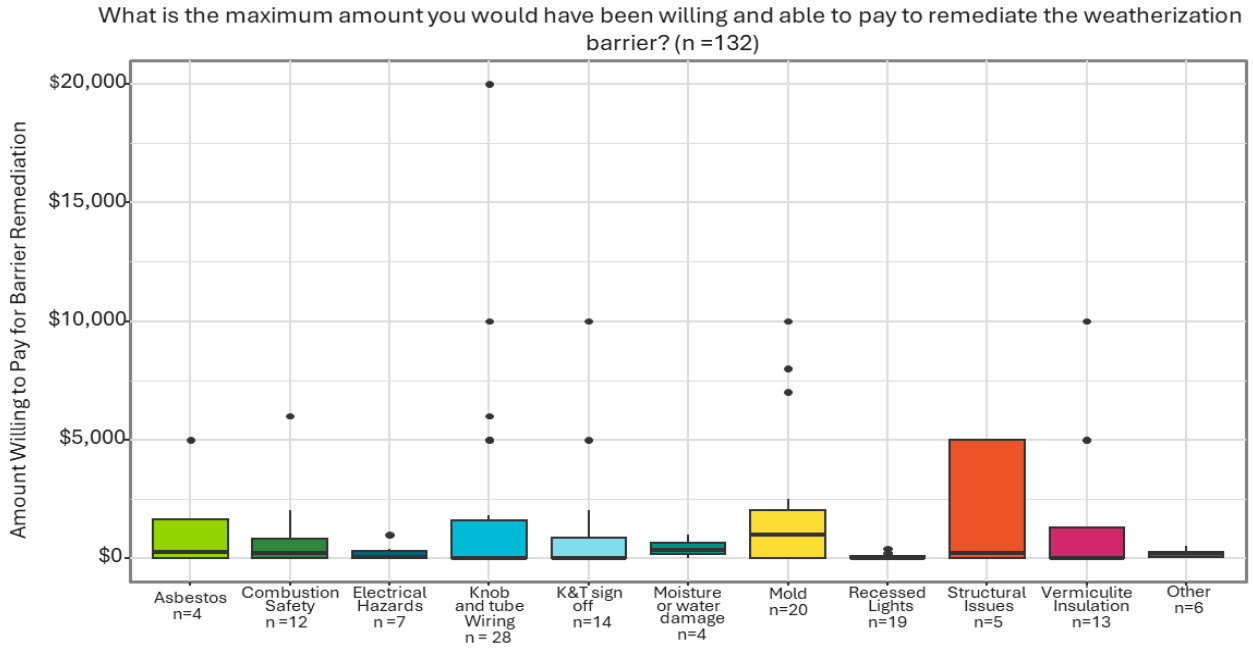
In summary, participants cited high costs, physical constraints within the home, and confusion in the process as the primary reasons for not moving forward with remediation. These factors made remediation financially or logistically unfeasible for many, even when the desire to improve their living conditions was strong.

4.3.3.3 Willing and Able to Pay

The participant survey asked both those who remediated and those who did not remediate barriers about the maximum amount they are willing and able to pay for barrier mitigation. Figure 19 and Figure 20 show the amount participants are willing and able to pay for those who addressed weatherization and electrification barriers. On average, respondents reported they are willing and able to pay about $1,280 for weatherization barrier remediation and $3,200 for electrification barrier remediation. When excluding those who indicated they are willing and able to pay $0, the averages rise to $2,600 and $5,600, respectively, for weatherization and electrification barrier remediation.

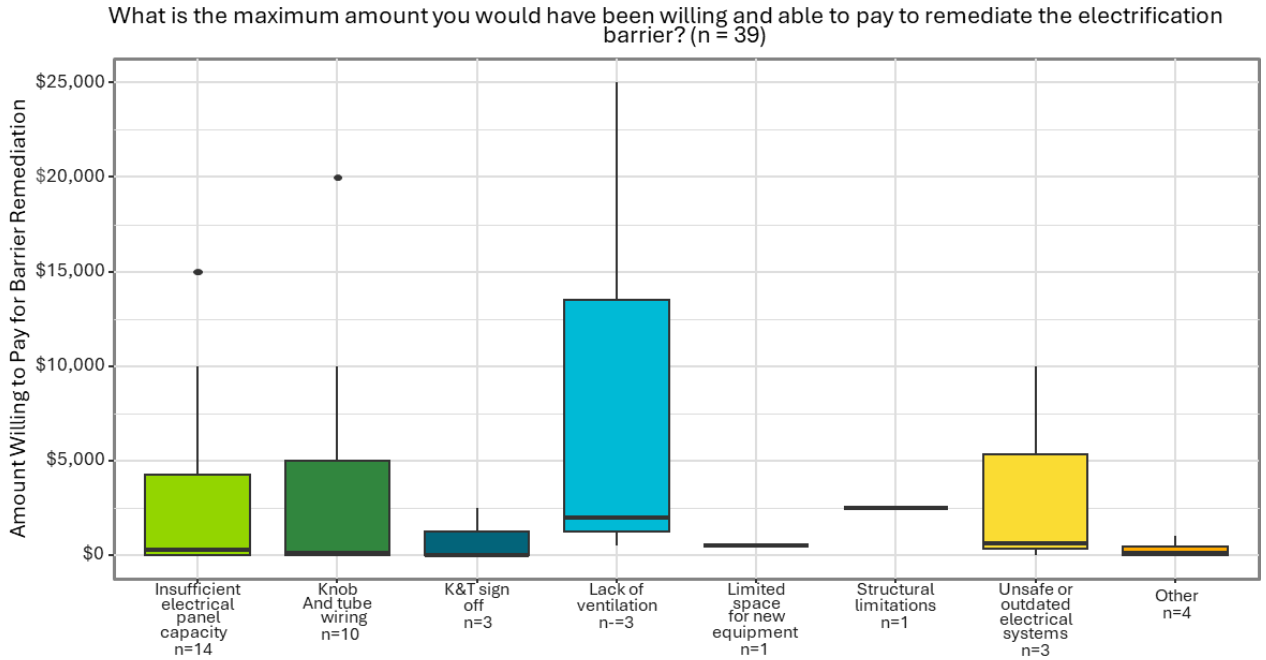
Among survey respondents who indicated they are willing and able to pay $0 for barrier remediation, the team compared the amount they are willing and able to pay with the actual costs incurred to identify any discrepancies. For weatherization barriers, 66 participants reported they are willing and able to pay $0. However, of these, 26% did not know the actual cost, 29% paid less than $250, 24% paid less than $5,000, and 21% paid more than $5,000 for remediation. For electrification barriers, 15 respondents stated they are willing and able to pay $0, yet 20% did not know the cost, 13% paid less than $250, 27% paid less than $5,000, and 40% paid more than $5,000 for remediation.

Figure 19. Willing and Able to Pay - Remediated Weatherization Barriers



Source: Evaluation team survey analysis

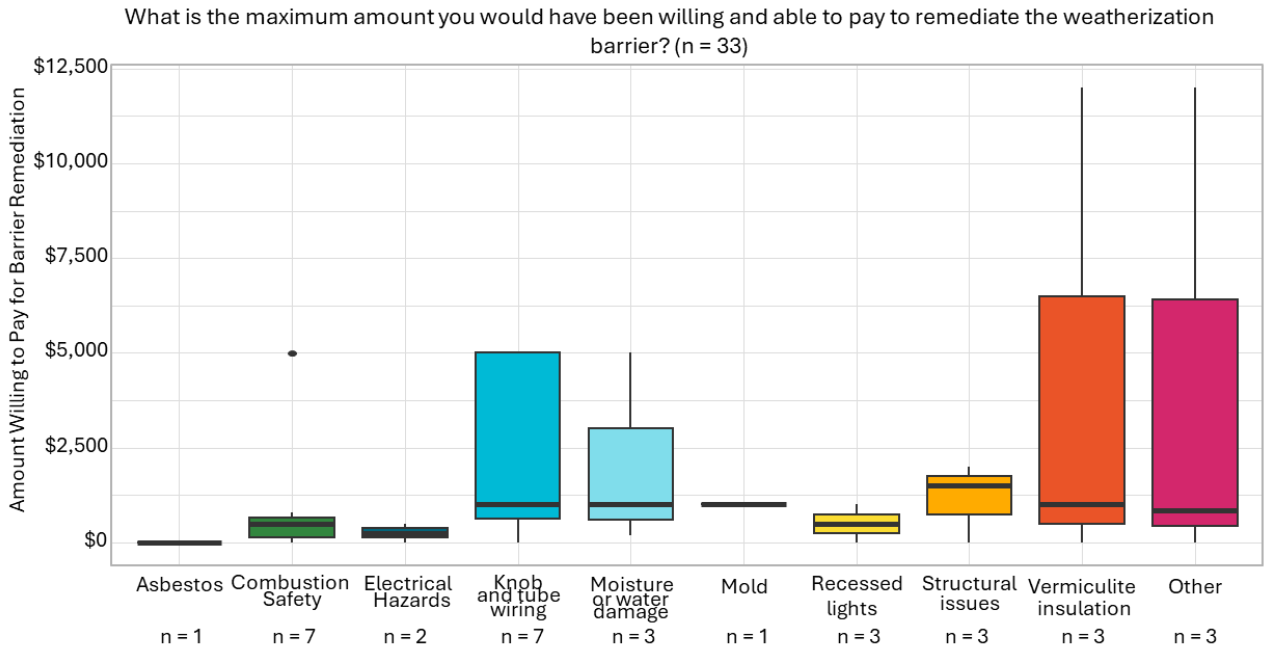
Figure 20. Willing and Able to Pay - Remediated Electrification Barriers



Source: Evaluation team survey analysis

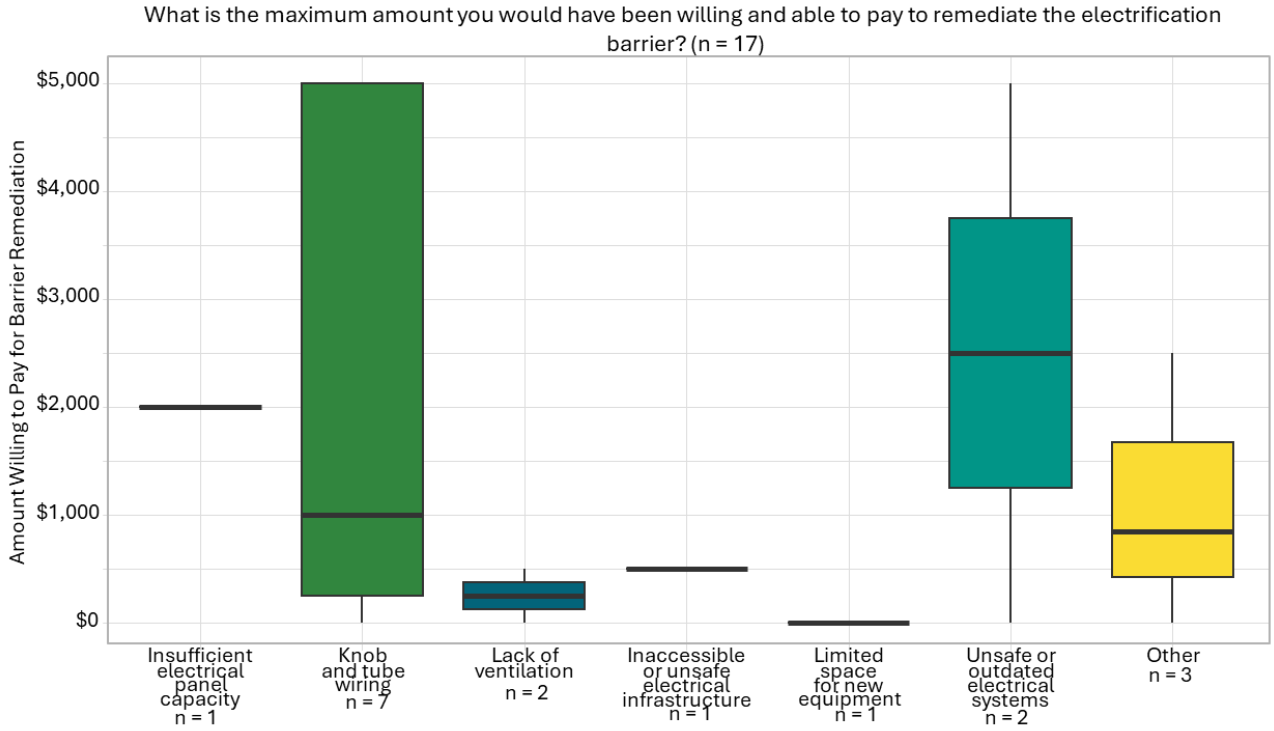
Figure 21 and Figure 22 show the amounts that participants who did not remediate barriers indicated they are willing and able to pay for barrier remediation. On average, survey respondents reported they were willing and able to pay approximately $1,900 for weatherization barrier remediation and $1,600 for electrification barrier remediation. When excluding those who indicated they are willing and able to pay $0, the averages increase to $2,600 and $2,500, respectively. Comparing respondents' amount they are willing and able to pay with their estimated remediation costs, the team found that for weatherization barriers, 49% of participants are not willing and able to pay the estimated cost, 33% are willing and able to pay the estimated cost, and 18% did not know the cost but are willing and able to pay between $1,000 and $5,000. For electrification barriers, 71% of participants are willing and able to pay the estimated cost, 6% are not willing and able to pay the estimated cost, and 24% did not know the cost but are willing and able to pay between $1,000 and $5,000.

Figure 21. Willing and Able to Pay – Did Not Remediate Weatherization Barriers



Source: Evaluation team survey analysis

Figure 22. Willing and Able to Pay – Did Not Remediate Electrification Barriers



Source: Evaluation team survey analysis

4.3.4 Program Feedback

The following presents the program feedback received during the LV and contractor interviews as well as from the participant survey and interviews. It highlights their main observations and suggestions for improving program and barrier mitigation processes, addressing challenges, and making the overall experience better for both contractors and customers.

4.3.4.1 Program Feedback from Lead Vendors and Contractors

Feedback from the contractor side highlights several critical areas for program improvement. Contractors emphasize the need to streamline processes, particularly by combining the rebate and HEAT Loan workflows into a single, unified process. They point out that current budget requirements and approval processes often do not reflect real project costs or customer needs, suggesting that more flexible and responsive budgeting would better support both contractors and clients. A major concern is the lag time between program steps, where delays in receiving estimates and completing work significantly slowed project delivery.

Contractors also call for enhanced communication, both with customers and within the program itself, recommending better organization of emails and the use of account managers to verify contact information. Finally, they stress the importance of providing clearer communication and

transparency regarding approval or rejection decisions, which would help all parties understand the process and reduce frustration. These recommendations are aimed at boosting program efficiency, improving the customer experience, and ensuring that contractors can deliver services more effectively.

4.3.4.2 Participant Satisfaction with Mass Save Support

Overall, participants expressed high satisfaction with the support provided by Mass Save sponsors. Many described their experience as very positive, citing helpfulness, professionalism, and strong customer service from contractors and program partners. One participant shared, “The contractors were exceptional, hardworking, clean, quick and polite.” Another added, “Moving into this house would have been impossible without the help from Mass Save.” Moderate satisfaction was reported by those who experienced delays or communication challenges. For example, one participant noted, “I submitted the paperwork and the Mass Save team would not get back to me in time, and there was a lot of back and forth.”

Specific critiques included slow rebate processing, lack of a single point of contact, and issues with equipment performance. One participant noted, “I was happy with the barrier removal part, but the rebate process for the whole Mass Save program was challenging. The reps were not very knowledgeable about the process, and it was tedious, sending photos, and working with the team there was a challenge.” Another noted, “If they were to restructure everything, it would be beneficial to have each person at Mass Save have a defined case load. Having a single point of contact at Mass Save is essential.”

Despite these areas for improvement, the team found that most participants were pleased with the program, particularly regarding customer service and professionalism. The main areas needing attention included rebate processing, communication, and comprehensive guidance, with a small number of participants experiencing technical or follow-up issues.

5. Considerations and Recommendations

This section presents considerations and recommendations for the Massachusetts Program Administrators (PAs) regarding enhancements to data collection, potential program improvement, and areas for future research.

5.1 Considerations and Recommendations for Data Collection

While reviewing the LV data, the team noted potential data collection enhancements for tracking barriers that might allow the Massachusetts PAs to better understand how many severe barriers exist in homes and for which measures the barriers are preventing installation. First, barrier tracking should be standardized across LVs and systems. This standardization would include identifying which barriers are considered high priority and ensuring consistent documentation of their presence, location within the home (e.g., attic, basement), size of the barrier (e.g., entire attic, one attic wall), and the specific measures they impact. Additionally, a clearer distinction should be made between soft barriers (e.g., storage issues) and hard barriers (e.g., structural limitations), to improve the accuracy of barrier classification. For soft barriers that are impacted by the homeowner's decision or storage, the LV could create a flag for future follow-up if there is a new homeowner as the barrier may not exist in the future. For barrier remediation, the LVs should improve the tracking of K&T sign-off and could further investigate how LV #4 currently implements this tracking.

The Massachusetts PAs could consider standardizing the HEA form across LVs and HPCs to ensure collection of high-priority fields and the consistent use of a unique identifier across all datasets. This may support more reliable data integration and analysis. Field names and data recording practices could also be aligned across LVs to reduce inconsistencies and improve data quality. Free-entry fields and unknown values could be handled with clear guidelines, including the use of standardized tags or negative values where appropriate.

In early 2026, most of the state will be using the same software, which will likely improve consistency in barrier tracking and data collection. Thus, the Massachusetts PAs should improve the uniformity and accuracy of building characteristic data. The Massachusetts PAs could consider improving the documentation of insulation R-values, with consistent tagging for cases where no insulation is present. Documentation could include both pre-existing insulation levels and any improvements made, with post-installation values flagged alongside pre-case information. Finally, blower door tests could be clearly marked when not completed, using a standardized tag or value to distinguish these cases from valid test results.

5.2 Considerations and Recommendations for Program Improvements

As Section 4.3.4.1 identifies, contractors highlighted several opportunities for program improvement, including the integration of rebate and HEAT Loan workflows into a single, streamlined system to simplify administration and expedite project delivery. They also emphasized the importance of revising budget and approval processes to reflect the true costs of barrier

remediation and participant needs more accurately, enabling more flexible and responsive support for both contractors and customers navigating the financial aspects of remediation. The Massachusetts PAs should continue to review their rebate and HEAT Loan processes as well as consider reviewing project budgets to make sure incentives are adequate.

The Massachusetts PAs should continue to target DECs for barrier remediation and could consider targeting triple decker and double decker homes as these communities and dwelling types have a higher prevalence of barriers as identified in Sections 4.1.4 and 4.1.5. The Massachusetts PAs could also consider offering additional incentives for homes that experience both pre-weatherization and pre-electrification barriers as multiple barriers can be costly and prevent the installation of both weatherization and electrification measures.

As Section 4.3.4.2 identifies, participants identified several areas for improving the customer experience, with a key theme being the need for centralized support and clear communication. Assigning a dedicated point of contact or account manager for each participant may offer personalized assistance and ensure consistent communication throughout the process. While the RTS initiative is currently providing this support, the Massachusetts PAs could review feedback from moderate-income customers to assess its effectiveness and determine if additional support is needed or if offering a primary contact for market-rate customers would be effective. Other considerations include enhancing the organization of program communications, such as better email management and verified contact information, and increasing transparency in approval and rejection decisions to reduce confusion and improve participant satisfaction. Massachusetts PAs could consider continuing to seek ways to improve customer guidance at every stage of the project, with particular attention to rebate processing.

5.3 Considerations for Future Research

During the planning phases of this study, the team met with one of the low-income implementation vendors to discuss data availability regarding barriers. The team ultimately decided to not focus on low-income customers for this study due to the lack of electronic data available regarding barriers. The PAs could consider performing a similar study focused on low-income participants once more electronic data regarding barrier tracking is available. Furthermore, the PAs should continue to work with the low-income program vendor on establishing electronic tracking of barriers and could leverage the electronic tracking of barriers currently used by LVs for moderate- and market-rate customers as a starting point.

Other future research could include investigating the prevalence of K&T sign-off. There was limited detail in the tracking data on which K&T wiring was already inactive. The Massachusetts PAs could further investigate which percentage of these barriers are K&T sign-off. This investigation could include surveying participants with K&T wiring identified and interviewing inspectors or electricians to better understand the frequency of K&T sign-off as well as the regions with the highest prevalence of active K&T wiring in homes. This study could also provide additional focus on pre-electrification barriers as the data tracking from 2024 had limited information regarding pre-electrification barriers.

Additionally, the PAs could perform targeted research on both participants and non-participants on what motivates customers to get or not get an HEA and whether additional marketing or reframing as a home safety and comfort inspection would encourage greater participation.

Appendix A. Data Request

A data request was submitted to the LVs for building characteristic data from customers who received an HEA between January 2023 and December 2024. The primary data fields requested and used in the analysis are listed below:

- Dwelling characteristics
    - Building type
    - Dwelling type
    - Primary heating fuel
    - Building age/year built
    - Square footage
    - Stories
- Building energy audit data
    - Pre and post R values for wall, attic, and foundation
    - Pre and post CFM50 values
- Barriers
    - Type of barrier
    - Number of barriers
    - Location of barriers
- Weatherization and electrification measure recommendations and installations
- Income type/moderate income flag
- Owner versus renter status