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Electric Resistance Heat Characterization Study Report

Rhode Island Energy

Developed For

Rhode Island Energy

Developed By

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ILLUME Advising, LLC is a forward-thinking consulting company at the rare intersection of insight and execution. Founded in 2013, the company has quickly grown to include a deep bench of quantitative and qualitative research experts. ILLUME uses cutting edge research strategies to help build a resilient energy ecosystem to enrich lives, improve global health, and ensure a more secure and sustainable future.

For this effort, we would like to acknowledge, first and foremost, Brett Feldman and Ann Clarke. We would also like to recognize the dedicated work of Kathryne Cleary and Jeremy Newberger. Finally, we would like to acknowledge the ILLUME team members Lisa Qu, Kimberly Jaeger Johnson, and Eileen Hannigan.

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Executive Summary

As part of the HVAC Program, Rhode Island (RI) Energy offers rebates for energy-efficient equipment to help customers save energy and money, improve comfort, and upgrade eligible equipment including central heat pumps, and mini-split heat pumps. In addition to these standard rebates, RI Energy offers an "Enhanced Rebate" for energy-efficient central and mini-split heat pumps ($1,250 per ton with or without ducts) installed in qualifying homes that primarily use electric baseboard resistance heating.

Why Study Customers with Electric Resistance Heat?

ILLUME Advising, in collaboration with Cadeo Group, conducted the Electric Resistance Heat (ERH) Customer Characterization Study to help RI Energy better understand the needs of homeowners and landlords with ERH and ways to overcome barriers to heat pump adoption.

Key Findings

Heat Pump Adoption

- **Opportunity for Heat Pumps** among ERH users are to target those who believe their heating costs are too expensive, want to keep their homes comfortably warm, and want more energy efficient equipment in their homes. These opportunities are similar across groups of ERH users with different ERH experiences and levels of willingness to change their heating system.
- **Barriers to Heat Pump Adoption** are customers' preferences for the ERH system, upfront equipment and installation costs, the hassle of completing the upgrade project, uncertainty about or disbelief that potentially lower energy bills would outweigh the upfront costs in the time that they planned to stay in their homes, and the look of the equipment. These barriers are similar across groups of ERH users with different ERH and heat pump experiences.
- **Competing Landlord Priorities** – Landlords prioritize financial return over energy savings or property upgrades when considering equipment upgrades. They also prefer to make these upgrades when units are unoccupied.

752 Pre-survey respondents who shared home heating system information

70 Completes from customers with electric resistance heat

3 Interviews with landlords

Recommendations to Encourage Heat Pump Adoption

- **Help customers plan for and manage upfront costs and potential increases to their monthly expenses** like increased heating bills by, 1) lengthening equipment payback times, streamlining the payback process through on-bill financing, or residential property assessed clean energy offerings, and 2) providing easy-to-understand guidance to customers about how to estimate their return-on-investment.
- **Build customers' confidence in the benefits of a heat pump upgrade** by marketing case studies or testimonials from past ERH-user program participants who could speak to their satisfaction with rebate amounts, , the ease of the process, heating bill savings, and having a more comfortably warm and energy efficient home.
- **Streamline the rebate application process and provide comprehensive information on the website on what is needed** so that landlords can prepare for future upgrades while tenants are occupying units.
- **Improve the program website by providing additional information on heat pump savings to encourage more applications.** Add an online savings calculator to help landlords make more informed decisions about installing heat pumps in their properties.

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Study Introduction

ILLUME Advising conducted the Electric Heat Customer Characterization Study to help RI Energy better understand the needs of both homeowners and landlords with electric resistance heat (ERH) and ways to help customers overcome barriers to heat pump adoption.[1] For this study, we administered online surveys with RI Energy customers who own single-family homes with electric resistance heat, and conducted in-depth interviews (IDIs) with landlords who are rental property owners and managers (excluding public housing authorities) who rent out homes that primarily use electric resistance heat. We also conducted an RI Energy customer data review and secondary research of other similar programs and the rental housing market. This document presents the findings and recommendations from the study.

Program Description

As part of the HVAC Program, RI Energy offers rebates for energy-efficient equipment to help customers save energy and money, improve comfort, and make their homes better including:

- Central air conditioning (ducted) at $50 per ton;[2]
- Central heat pumps (ducted) at $350 per ton; and
- Mini-split heat pumps - ducted/mixed ducted at $350 per ton, and non-ducted at $150 per ton.

In addition to these standard rebates, RI Energy offers an "Enhanced Rebate" for energy-efficient central and mini-split heat pumps ($1,250 per ton with or without ducts) installed in qualifying homes that heat primarily with electric baseboard resistance heating.[3] Customers are limited to four rebates per electric account.[4] The residential electric heating and cooling rebates form describes customer qualification prerequisites for the Enhanced Rebate:

- Valid Rhode Island Energy customers must participate in a free EnergyWise Home Energy Assessment.
- Home must be fully insulated and weatherized, as recommended or verified through the EnergyWise Program.
- Equipment must be installed by a program-approved contractor.
- Existing heating system must be electric baseboard resistance heating.
- Replacing old or failed electric heat pump systems does not qualify for the Enhanced Rebate.

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[1] ILLUME Advising is a member of the evaluation team, led by Cadeo.

[2] RI Energy update June 2024: RI Energy no longer offers the central air condition (ducted) rebate.

[3] This information comes from the residential electric heating and cooling rebates form linked to the Rhode Island Energy, webpage, retrieved Aug 2023 from: https://www.rienergy.com/RI-Home/Energy-Saving-Programs/Heat-Pump-Incentives

[4] The rebate form also describes qualifying smart thermostat rebates, a limit of two per residential electric account, at $75 each.

In addition to equipment rebates, RI Energy offers zero-interest loans of up to $25,000 for approved high-efficiency heat pump systems that are displacing electric resistance heating systems. No-cost energy-saving improvements are available to households that meet certain income guidelines. Income-based EE services are administered by RI Energy and provided through local Community Action Program (CAP) agencies.

Research Approach

This study conducted a customer survey, landlord interviews, and secondary research (a review of similar programs, RI Energy customer data, and online rental housing market data) to address the following key research questions about homeowners who actively and primarily use ERH systems to heat their homes:

1 | What are homeowners' experiences with their electric resistance heating (ERH) systems?
2 | What are the barriers for homeowners with ERH systems to installing heat pumps?
3 | What are the characteristics of ERH homeowners including household income (low income/not low income) or other characteristics?
4 | What are the barriers for landlords for installing heat pumps in their properties?

Customer Survey

According to the most recent RI Residential Appliance Saturation Survey (RASS) (RI2311) report (NMR Group, 2018), the saturation of electric resistance heating amongst Rhode Island's residential sector is 9%.[5] However, RI Energy – like most utilities – does not know specific customers' heating fuel type. As a result, the team needed to conduct a large "pre-survey" of residential customers to identify the relatively small subset of homeowners that heat with ERH.

The team identified analysis completed May 2022 as part of the Participation and Multifamily Census Study (RI-21-RX-Participation) as a potential sample frame for the survey. As part of that study, the team identified 61,542 specific customers that – based on their seasonal electric consumption profile - potentially used electricity (ERH, an electric furnace, or heat pump) to heat their home (see Appendix B: Survey Methodology). This list of potential electric heat customers served as the sample frame for this study's efforts to identify and survey the customers that specifically heat with ERH.

In total, the study completed 752 online pre-survey completes from RI Energy customers who own single-family homes to identify ERH users. These customers reported information on their home heating systems in addition to questions designed to screen eligibility to take the full survey. Of these, 70 homeowners with ERH were eligible and went on to complete the full

[5] Reference Tables 3 and 4 in the RI RASS report (NMR Group, 2018).

survey. To be eligible, a customer had to have ERH equipment and use ERH as their primary heating source.

Customers who completed the full survey reported information about specific challenges and barriers to installing heat pumps for this customer segment. The survey took about 10 minutes to complete. We entered customers who completed the survey into a sweepstakes drawing for a chance to win one of five $250 Tango gift cards as a thank you for their time. [6] See Appendix B: Survey Methodology for detailed survey methods.

Landlord Interviews

The study conducted three interviews with landlords. We identified landlord/property manager contacts through the Online Rental Market Review, described below. The web-scraping and manual data collection tasks of the review resulted in 871 landlord and property management company contacts. After removing cases with duplicate property management companies, manager names, manager emails, and manager phone numbers, the final sample had 311 unique landlord contacts. We made up to four attempts to contact each landlord/property manager. See Appendix F: Landlord Interview Methodology and Guide, Sampling for more details.

Initially we targeted properties with electric resistance heat. However, due to low interest in participating in our research, we relaxed the criteria to speak with landlords with other heating types. We spoke to one landlord who owns a one-bedroom duplex in West Warwick, one who owns a three-bedroom home in Downcity, and one who owns two to three bedroom apartments in Elmhurst. We received fuel type information from two of these landlords, and their properties are heated by natural gas. None of landlords reported that the properties have A/C. One landlord reported that some utilities are included in rent, but electric and natural gas bills are not included. The two other landlords did not include utilities in rent. However, one of these said would consider including the utilities if their tenants request it, as some tenants may want a more consistent month-to-month utility payment.

Through these interviews, we gathered information to explore barriers to heat pump adoption including equipment and installation costs and concerns, previous experiences with heat pumps, implications for properties where tenants pay utilities, and other tenant concerns. We conducted these 45 to 60-minute interviews using Zoom or Teams online meeting platforms. We provided participants with a $200 Tango gift card incentive for their time. See Appendix F: Landlord Interview Methodology and Guide for detailed interview sampling, response rates, and methods.

[6] Tango gift cards are digitally redeemed by choosing from 100+ merchants, like Amazon, Target, and Walmart.

Secondary Research

We conducted several secondary research activities, described below. The findings from these activities were reported in an interim memo (Appendix A: Interim Research and Data Review Memo) and we include relevant findings in the Detailed Findings: Landlords and Property Managers section.

RI Energy Customer Data Review

We used existing data sources to better understand RI customers with electrically heated homes. As part of the 2021 Participation and Multifamily Census Study, RI-21-RX-Participation (Cadeo, 2022), the Cadeo team built a database of RI Energy customers that includes an indicator of primary heating fuel at the account-level matched to other demographic, property, and participation data. The RI Energy team analyzed this data to understand trends in electrically heated homes. ILLUME reviewed the RI Energy analysis to better understand and describe the characteristics of customers with electric heat.

Online Rental Market Data Review

Online rental marketplaces provide a snapshot of rental options and often include property manager contact information, an indicator of who pays the utilities, and heating type, along with other property details, though not all sites include all details. The study reviewed online rental marketplaces to identify property managers and landlords to recruit for landlord interviews and develop rough estimates of how often the tenant has responsibility for their heating bills.

Programs Review

We reviewed program and evaluation reports from Massachusetts, Rhode Island, and a nationwide report from ACEEE to explore incentive levels and any available data on installations in electrically heated rental properties to inform the landlord interviews. We completed a web-scan for any studies that address barriers to rental or multifamily properties in general (not specifically focusing on heat pumps), for information applicable to this research. This was designed as a limited review as this area has limited published research.

Key Findings and Recommendations

This section reports the conclusions and associated recommendations from the study.

The team developed these conclusions and recommendations based on information from 70 surveyed ERH homeowners who primarily use ERH equipment to heat their homes ("ERH users"). Collectively, these homeowners provided the team with useful insight into how customers experience their ERH system, the characteristics of ERH homes, and barriers to heat pump adoption. These insights, and the conclusions and recommendations that resulted from them, can inform RI Energy's effort to serve and improve the efficiency of residential customers heating with ERH.

Below we note some study limitations related to the customer survey.

- Key study findings from all eligible customer survey respondents (n=70), represent a specific customer group (single-family homeowners with email) who confirmed via self-report that they use ERH for *primary* heating. Even with the sampling limitations (see Appendix B. Survey Methodology), these findings represent the best available information about the barriers and motivators of this customer segment to upgrade to a heat pump.
- The primary intent of this study was to understand the experiences of ERH customers and their potential pathway to a heat pump, not to determine the specific number of ERH customers within RI Energy's service territory. While quantifying the ERH saturation was not the objective of this study, the team's efforts to identify ERH customers within RI Energy's overall customer base yielded findings that RI Energy and future study planners should consider as part of related, future ERH research. For example, future study planners who want to understand the full single-family RI Energy population with ERH equipment in their homes should consider: 1) how, in screening for customer survey eligibility (n=752), this study found that there are portions of customers who have ERH systems but use other systems as their primary heating source, and 2) portions of customers identified as potentially using electric heat that already had heat pumps installed (16%) or had systems using fuel types other than electric (29% non-electric, 31% unknown fuel - may include electric). In other words, ERH users - those who primarily use ERH for heating - represent a subset of total electric heating customers, which, in turn are a relatively small subset of RI Energy's residential customers. As a result, it's important to plan for a larger outreach effort to identify all RI Energy customers who have ERH equipment in their homes.

In addition, this study reports findings from secondary research about landlord/property manager experiences with ERH and HP systems supplemented with the perspectives the study heard from conducting three landlord interviews. The viewpoints from three landlords provides very qualitative findings that should be interpreted cautiously. However, information these landlords shared did not contradict the findings from the secondary research review.

Conclusion #1: The main barriers to heat pump adoption are customers' preferences for the ERH system, upfront equipment and installation costs, the hassle of completing the upgrade project, uncertainty about or disbelief that potentially lower energy bills would outweigh the upfront costs in the time that they planned to stay in their homes, and the look of the equipment. These barriers are similar across groups of ERH users with different ERH and heat pump experiences.

Barriers to Heat Pump Adoption for ERH Users

- **ERH Satisfaction - ERH users who are satisfied with their heating system are unlikely to be interested in upgrading to any type of heating system.** Most ERH users are satisfied with their heating systems with 77% of respondents rating their satisfaction a 3 or higher on a 5-point scale. These customers are less interested or not at all interested in upgrading their heating systems to any other type of system. Interestingly, ERH system features including energy costs, zoned heating, and equipment durability, drove both high (26% of ERH users) and low (23% of ERH users) satisfaction ratings at similar rates among survey respondents.

- **Willingness to Change - ERH users who are not interested in changing their heating system were most commonly concerned about equipment and installation costs of any heating system type.** Few ERH users have near-term plans to change their heating systems to any other type of system. Only 8% of respondents are currently considering a change while 46% would consider changing their system in the future. The majority (5 out of 8) of survey respondents who were not considering any heating system upgrade mentioned upfront equipment and installation costs as a top concern.

- **Heat Pump Awareness and Interest - ERH users are familiar with heat pumps but not sure about having the equipment in their homes.** Most ERH users are familiar with heat pump technology (77%) and about half (51%) are unsure if they would install one in their home. The 13 respondents who were aware of heat pumps and would not install one in their home expressed concerns about the hassle to change the equipment (4), the cost of the equipment not outweighing the longer term heating bill savings, especially if they were not planning on staying in their home (3), and not liking the look of the equipment (3).

- **Willingness to Pay.** When the survey presented ERH users with a scenario of a heat pump installation project that costs an estimated $15,000, the majority were not willing to pay for the switch. The scenario's rebate of $2,500 was not enough to convince them to install such a heat pump.

- **ERH Customer Data Limitations - Limited information about customers' heating systems is a risk to the effectiveness of targeting marketing to and conducting research with ERH users.** Based on information available at the time of this study, accurate identification of ERH users is difficult. This study found that single-family homeowners with

ERH systems are not as prevalent among customers predicted to have electric heat as RI Energy believed. RI Energy has limited information about customers' heating systems that is generated mostly from information that may be gathered through customers' participation in RI Energy offerings like the HVAC program or an online home assessment. Proxy information like high electric usage during cold months like this study used (Appendix B: Survey Methodology) has had limited effectiveness in identifying ERH users with just 9% (70) of the 752 customers who answered survey screener questions being ERH users.

Conclusion #2: The main opportunities for RI Energy to increase heat pump adoption among ERH users are to target those who believe their heating costs are too expensive, want to keep their homes comfortably warm, and want more energy efficient equipment in their homes. These opportunities are similar across groups of ERH users with different ERH experiences and levels of willingness to change their heating system.

Opportunity for Heat Pump Adoption for ERH Users

- **ERH Satisfaction - ERH users who are less satisfied with their ERH systems expressed concerns about their expensive heating costs.** Twenty-four ERH users who are not satisfied with their current systems mentioned that ERH heating costs are too expensive for their households.

- **Willingness to Change - ERH users who are willing to change their heating systems want to save money on their heating costs, want to be more energy efficient, and want to make their homes more comfortably warm.** Over half of ERH users (54%) are willing to change their heating systems (8% currently and 46% in the future) in general. Of those, 89% are thinking about changing systems because they want to save money on heating costs. Many (70%) want to be more energy efficient, and half (50%) want to make their home more comfortably warm.

- **RI Energy Program Interest. There is alignment between the drivers mentioned by ERH users who are willing to change their heating systems and the reasons why ERH users would be motivated to look into RI Energy resources.** ERH users are motivated to look into RI Energy resources because they want lower electric bills (84%), increased energy savings (49%), improved comfort (48%), and more energy efficient equipment in their homes (48%). In addition, RI Energy is the top source of information ERH users would use to learn more about heat pumps (59%).

- **Mini-Split Opportunity.** Most ERH users do not have existing ductwork in their homes (86%). Customers without existing ductwork may be more likely to consider and install a mini-split system.

Support and Messaging to Engage ERH Users

- **Customer Cost Burden - Help customers plan for and manage upfront costs and potential increases to their monthly expenses (for example, equipment payment plans and increased heating bills) post-participation.** RI Energy will need to identify ways to make customers' upfront heat pump equipment and installation costs more manageable to increase participation from ERH users. As noted in Conclusion 1, these upfront costs are a main barrier for those who said they were not interested in changing their systems or were not interested in upgrading to a heat pump specifically. Conclusion 2 shows that ERH customers who are interested in upgrading their heating system want to lower their monthly heating bills.
    - RI Energy should help customers manage upfront costs and potential increases to their monthly bills by providing support to customers who wish to access tax credits, lengthening equipment payback times, streamlining the payback process through on-bill financing, or residential property assessed clean energy (PACE), if Rhode Island offers PACE in the future.
    - RI Energy should provide easy-to-understand guidance to customers about how to estimate their return-on-investment (ROI) for a heat pump upgrade. For example, create an ROI worksheet or an online calculator that builds in key factors like estimated equipment costs, estimated installation costs, current heating bill amounts, projected heating bill amount post-installation, the number of years customers plan to stay in their homes, and the number of years that will pass before they realize an ROI. Other guidance RI Energy could provide includes guidance on how to select heat pump equipment that would best suit their home and guidance to understand what set temperature settings or other factors they would need to consider to help them achieve a better ROI.

- **Program and HP Interest - Build customers' confidence in the benefits of a heat pump upgrade by marketing case studies or testimonials from past ERH users who participated in RI Energy's rebate program and upgraded to a heat pump.** Gather testimonials and prioritize for marketing those that speak to satisfaction with rebate amounts and heating bill savings, how heat pumps helped customers keep their homes more comfortably warm than ERH systems, the ease of the process, and what it means to them to have a more energy efficient home.

- **ERH User Identification - Hone processes for identifying ERH users by gathering better information about customers' primary heating systems.** As noted in Conclusion 1, accurate identification of ERH users is a challenge with implications for program participation goals and effective marketing strategies. To mitigate these risks, RI Energy should continue current, and explore new, ways to gather information about customers' primary heating systems:

- Continue to leverage heating system information from online and in-person home energy assessment (HEA) participants who did not go on to receive a heating system upgrade.

- Consider collecting primary heating system information through the customer portal, then running a campaign to encourage customers to update their profiles with this information.

- Use self-reported customer data to validate or update customers' heating system type. For example, auto-updating customers profiles with information they enter into the online HEA.

- Conduct an email or mail campaign to customers that are likely to have electric heat based on energy usage patterns and/or homes in zip codes with a high percentage of homes built in the 1970s and 1980s. Homes built in these decades in the northeast are more likely to have electric resistance heating systems. [7,8]

Conclusion #3: Landlords carefully consider financial implications of any property upgrades but may prioritize near-term maintenance needs and prefer to schedule upgrades within limited timeframes when units are vacant.

- **HP Benefits to Landlords -** Through our interviews we heard that landlords were interested in upgrades when they could see a benefit to their business' bottom line, prioritizing financial return on investment over energy savings or other factors in property upgrade decision-making.

- **Opportune Participation Timing -** Past research in Rhode Island found that landlords prefer to do work in units when the units are unoccupied (ILLUME and Cadeo, 2021). Because these are limited windows for them to make equipment changes, they are sensitive to any possible delays that a more complicated upgrade or participating in a utility rebate program may cause.

[7] RI Energy update June 2024: Since this recommendation was initially drafted, RI Energy conducted an email campaign with customers.

[8] Atlas Building Hub. Gas Reigns, Electricity Lags: A Brief History of Home Heating in the Northeast. April 4, 2022. Retrieved May 2024 from: https://atlasbuildingshub.com/2022/04/04/gas-reigns-electricity-lags-a-brief-history-of-home-heating-in-the-northeast.

Recommendation: Consider opportunities to educate landlords ahead of time so that landlords can process the technical and financial considerations and be ready to go when units become vacant making upgrades easier.

- **HP Awareness and Energy Savings -** Provide additional information about heat pump savings on the RI Energy website. The current webpage outlines rebate details and heat pump best practices but does not include details about savings. Emphasizing potential bill savings will help encourage more landlords to apply for the program. Bill savings can directly benefit landlords who pay the electricity bill. It can also benefit landlords where tenants pay the electricity bill. Having units with lower electricity costs can help landlords attract and retain tenants and reduce tenant energy burden. Adding an online savings calculator or option for an online consultant can help landlords determine if their property is a good candidate for heat pumps.

- **Transparent Participation Process -** Currently, the website does not include information on the program process. Use visuals to depict what is expected of landlords before they apply, allowing them to prepare for future improvements. The Clean Heat RI website has a clear step-by-step process for eligible homes and businesses with oil, propane, or natural gas heating. A similar approach geared toward multifamily housing, especially properties with ERH, could provide the technical and financial specifications necessary for decision-making.

Detailed Findings: Customer Survey

This section presents the detailed customer survey findings supporting the related key findings and recommendations described in this report.

The section is organized as follows:

- Survey respondent characteristics
- Opportunity for switching to heat pumps
- Barriers to heat pump adoption

Survey Respondent Characteristics

The team developed these findings based on information from 70 surveyed ERH homeowners who primarily use ERH equipment to heat their homes ("ERH users"). Collectively, these homeowners provided the team with useful insight into how customers experience with their ERH system, the characteristics of ERH homes, and barriers to heat pump adoption. These insights, and the conclusions and recommendations that resulted from them, can inform RI Energy's effort to serve and improve the efficiency of residential customers heating with ERH.

Below we note key considerations for interpreting findings from the customer survey.

- Key study findings from all eligible customer survey respondents (n=70) represent a specific customer group (single-family homeowners with email) who confirmed via self-report that they use ERH for *primary* heating. Even with the sampling limitations (see Appendix B. Survey Methodology), the findings from these customers represent the best available information about the barriers and motivators of this customer segment to upgrade to a heat pump.
- The primary intent of this study was to understand the experiences of ERH customers and their potential pathway to a heat pump, not to determine the specific number of ERH customers within RI Energy's service territory. While quantifying the ERH saturation was not the objective of this study, the team's efforts to identify ERH customers within RI Energy's overall customer base yielded findings that RI Energy and future study planners should consider as part of related, future ERH research. For example, future study planners who want to understand the full single-family RI Energy population with ERH equipment in their homes should consider: 1) how, in screening for customer survey eligibility (n=752), this study found that there are portions of customers who have ERH systems but use other systems as their primary heating source, and 2) portions of customers identified as potentially using electric heat that already had heat pumps installed (16%) or had systems using fuel types other than electric (29% non-electric, 31% unknown fuel - may include electric). In other words, ERH users - those who primarily use ERH for heating - represent a subset of total electric heating customers, which, in turn, are a relatively small subset of RI

Energy's residential customers. As a result, it's important to plan for a larger outreach effort to identify all RI Energy customers who have ERH equipment in their homes.

ERH Users

Among eligible survey respondents (70 customers), single family homeowners who used ERH for primary heating, most (93%) identify as White (Table 1). They represented a broad household income range with about a quarter (26%) earning between $100,000 to less than $150,000, a quarter (25%) earning $75,000 to less than $100,000, and about a fifth (21%) earned $50,000 or below. Most lived in households with 1 to 2 people (67%); about a third (27%) had 3 to 4 people.

ERH respondents have typically lived in their homes for more than 10 years (77%). About half of ERH respondents' homes were built between 1960 and 1979 (50%) and another third were built between 1980 and 1989. Their homes were typically between 1,001 and 2,000 square feet (65%). Most had insulated their exterior walls (83%), and over half had insulated their roofs (60%) and ceilings (58%).

Table 1. Characteristics of Survey Respondents Who Primarily Use ERH Heating

Characteristic	Count	Percentage
Single-family home type (n=70)		
Single family detached from any other house	64	91%
Row home – single family house attached to one or more single family homes	1	1%
Building with 2-4 units (duplex, condo, townhomes, apartment, etc.)	5	7%
Race/Ethnicity (multiple choice) (n=66)		
White	57	93%
Hispanic, Latino, or Spanish origin	3	5%
Asian	1	2%
Black or African American	1	2%
Middle Eastern or North African	1	2%
Household income (n=66)		
$100,000 to less than $150,000	15	26%
$75,000 to less than $100,000	14	25%
Up to $50,000	12	21%
$50,000 to less than $75,000	10	18%
$150,000 or over	6	10%
Household size (n=63)		
1 to 2 people	42	67%
3 to 4 people	17	27%
5 or more people	4	6%
Years lived in home (n=67)		
More than 10 years	51	76%
6-10 years	8	12%
2-5 years	8	12%

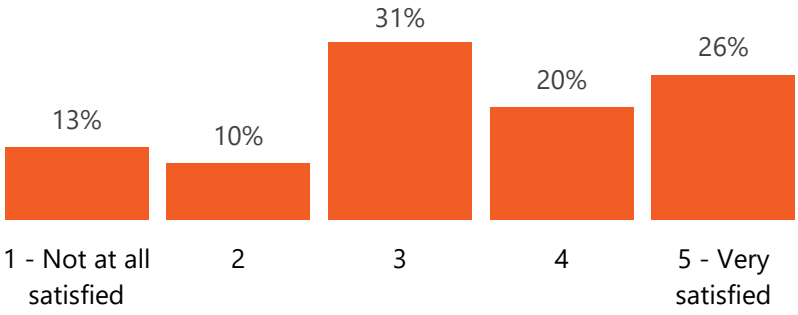
Characteristic		Count	Percentage
Year home was built (n=67)			
	1960 to 1979	33	49%
	1980 to 1989	24	36%
	1900 to 1959	7	11%
	1990 to 1999	2	3%
Square footage of home (n=66)			
	1,001 to 2,000 sq ft	45	65%
	2,001 to 5,000 sq ft	15	22%
	1,000 sq ft or less	9	14%
Insulated areas of homes (n=67)			
	Exterior walls	53	79%
	Ceiling	38	57%
	Roof	37	55%
	Floors over unconditioned spaces	29	43%
	Interior walls	25	37%
Water heater fuel (n=60)			
	Electric	56	89%
	Oil	5	8%
	Natural gas	1	2%
	Propane	1	2%
Water heater age (n=64)			
	Less than 5 years	21	33%
	5 to 9 years	20	31%
	10 to 14 years	17	27%
	15 years or more	6	9%

Opportunity for Switching to Heat Pumps

ERH Satisfaction

Respondents have varying levels of satisfaction with their electric heating systems (Figure 1). Energy costs, the zoned heating feature, and equipment durability are factors that drive satisfaction with ERH systems.

Figure 1. Satisfaction with ERH, Mean Rating = 3.4



Q18. "Overall, how would you rate your satisfaction with your electric baseboard heaters? Please rate on a scale of 1 to 5 where 1 is "Not at all satisfied" and 5 is "Very satisfied.", n=70.

Those that gave lower satisfaction ratings described how expensive ERH is to operate (24 customers) and that they have issues with keeping the house at a comfortable temperature with the zoned/room-based ERH controls (13 customers).

> ***"[The ERH system] Heats up quickly but we are never warm and it is VERY expensive." – Respondent, 2 rating***

In contrast, respondents that gave higher satisfaction ratings *preferred* zoned/room-controlled heating (7 customers) and said that their systems work well (13 customers).

> ***"They are very easy to use. And you can selectively turn them on." – Respondent, 5 rating***
>
> ***"[Respondent] had no issues with baseboard heating keeping the house warm." – Respondent, 5 rating***

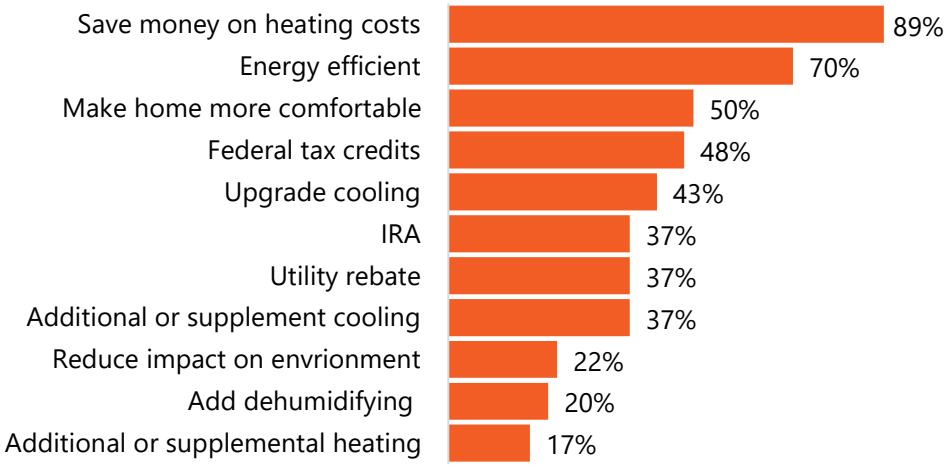
ERH systems last for a long time. Almost two thirds (59%) of respondents have ERH systems that are 20+ years old (79% have ERH systems that are at least 10 years old) and 86% said they have zero broken heaters.

Willingness to Change

Heating System Upgrades

Over half (54%) of ERH users are willing to change their heating system, including 46% who would consider changing their heating system in the future and 8% currently considering such a change. Among this 54%, most (89%) want to change heating systems to lower heating bills (Figure 2). Many (70%) want to be more energy efficient, and half (50%) want to make their home more comfortable.

Figure 2. Reasons to Consider Changing Heating System



Q26. "Why would you/are you considering changing to a different heating or heating/cooling system? Select all that apply.", n=54.

Five out of 8 respondents who were not interested in changing their heating system mentioned costs as a reason. For example, respondents cited the general expense of making the change, the perceived low return on the investment, and the cost of other concurrent upgrades like an electrical panel. Three ERH users are satisfied with their current because they are working well, with one respondent saying they "like the way it works."[9]

> ***"To expensive to change." – ERH user***
>
> ***"It just takes too many years before you realize any actual savings…Some systems are cost prohibitive; others would require additional work (upgrade electrical system, etc.) making the cost of the system oh so much more. I have seen this happen time and time again with friends." – ERH user***
>
> ***"I expect it would be costly and I have so many other home repairs that are needed." – ERH user***

Many ERH survey respondents (64%) used room/window air conditioners to cool their homes (Table 2). Only about 14% had central air conditioning with ducts, indicating that only 14% of ERH users would be able to leverage existing ductwork to reduce the cost of installing a centralized heat pump system. Customers without existing ductwork may be more likely to consider and install a mini-split system.

[9] *Q20. "Why would/did you not consider changing to a different heating or heating/cooling system?", n=12.*

Table 2. Self-Reported Presence of Cooling Equipment and Ductwork Among Survey Respondents Who Primarily Use ERH Heating

Cooling Equipment and Ductwork	Count (N=66)	Percentage
Room/window A/C	42	64%
Central A/C with air ducts	9	14%
None	9	14%
Ductless mini-split A/C	5	8%
Other	5	8%
Evaporative cooler	1	2%

Fuel Switching

ERH users who are considering switching heating systems do not have strong preferences for heating fuel type. About as many respondents prefer electric (26%) as those who have no preference (21%) at all. About half as many respondents (12%) prefer natural gas, and 17% are not sure what fuel they would choose.[10] When asked why they would prefer this fuel, customers cited their preferred fuel types being energy efficient (46%) and cheaper (43%). Unsurprisingly, those who would stick with electric were most motivated by energy efficiency (8 out of 17) and those who prioritized having cheaper fuel preferred fuel types other than electric (6 out of 10).[11]

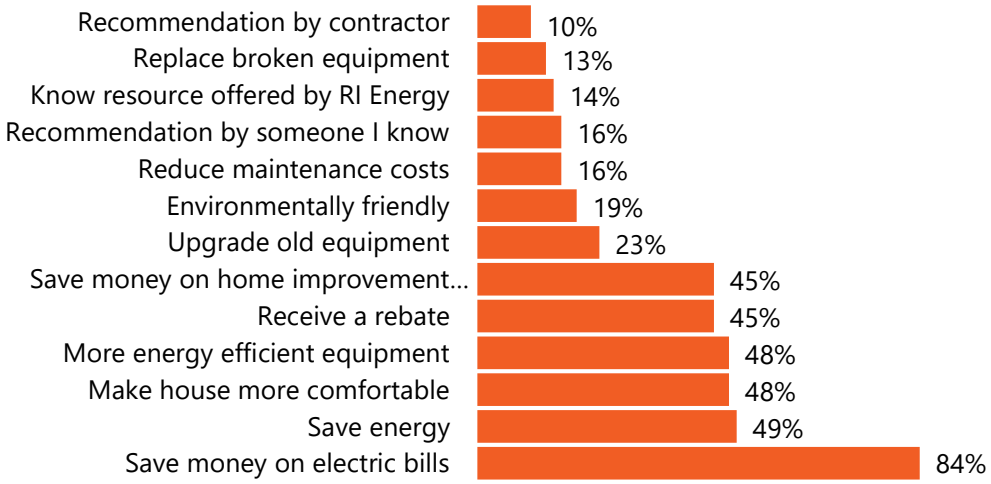
Motivations to Make Energy Efficient Upgrades

Respondents described lower electric bills (84%), energy savings (49%), improved comfort (48%), and a desire to install more energy efficient equipment in their homes (48%) as the top reasons for why they might look into RI Energy's programs and financial resources (Figure 3). Saving money on electric bills is the most motivating factor by far.

[10] *Q28. "If you were to consider changing to a different heating/cooling system, which of the following fuel sources would you prefer to use to heat your home?", n=66*

[11] *Q29. "Why would you prefer [Q28 response] heating? Select all that apply", n=37.*

Figure 3. Motivations to Look into RI Energy Resources



Q47. "What would motivate you to look into these RI Energy financial resources (rebates, zero-interest loans, or free services or equipment) in the future? Select all that apply.", n=69.

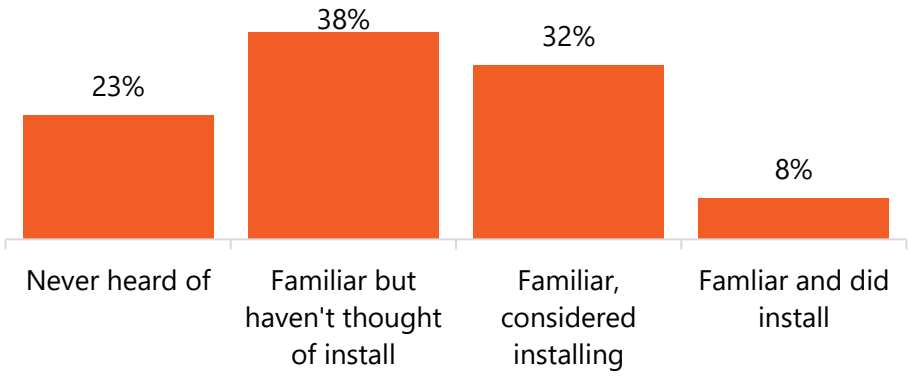
These motivations line up with the benefits of new heat pump systems. When asked to rank perceived benefits of heat pumps, respondents also ranked saving money on bills at the top (mean = 1.7 on 5-point scale where 1 is the highest ranked). Another top perceived benefit was having cooling (mean = 2.4), which can also be provided by heat pumps.

Barriers to Heat Pump Adoption

Heat Pump Awareness

About a quarter (23%) of respondents had never heard of a heat pump before taking the survey. While most (77%) respondents were familiar with heat pumps, the proportion of those who were unfamiliar indicates a need to continue raising awareness about the equipment and benefits.

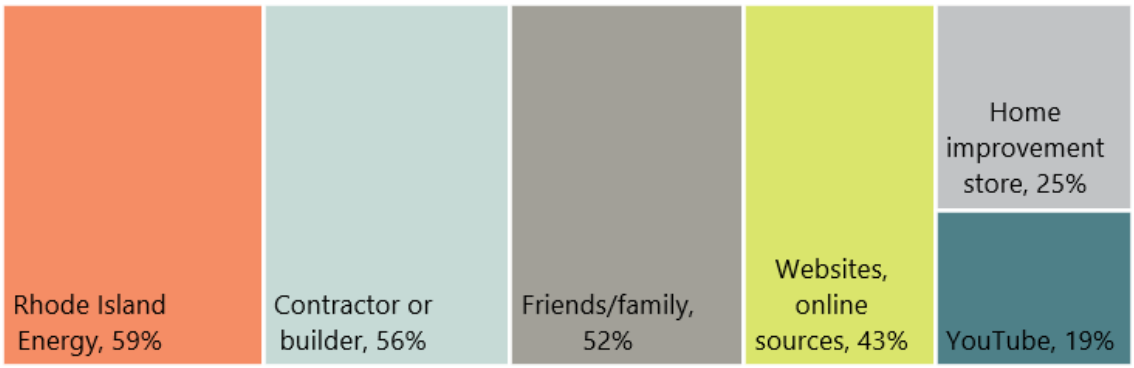
Figure 4. Familiarity with Heat Pumps



Q32. "How familiar are you with heat pumps?", n=66. Numbers add to above 100% due to rounding, see Appendix E: Survey Data Tables for exact frequencies.

RI Energy is the top source of information ERH users would use to learn more about heat pumps (59%), followed by contractors or builders (56%) and friends or family (52%) (Figure 5).

Figure 5. Resources to Learn About Heat Pumps



Q33. "What resources, if any, would you use to learn about purchasing/installing a heat pump in your home?", n=63.

Willingness to Pay [12]

Upfront costs are a barrier to heat pump installation. We presented respondents with a heat pump upgrade scenario including a description of potential energy savings ranging from $100s to over $1,000 each year. We asked respondents how much they would pay out of pocket for a heat pump that costs about $15,000 (including installation). Most (74%) would pay none or less than half of the $15,000. We then asked if they would be motivated by a $2,500 rebate to help cover the costs. Most respondents (73%) said no. Another 21% were not sure if $2,500 would be enough for them to take on the project. Only four respondents view the $2,500 rebate as enough of an incentive to install a heat pump.

Heat Pump Interest

About half of respondents (51%) said they were unsure if they would consider installing a heat pump in their home, and less than one-third (30%) said they would. Most of those who would consider installing a heat pump in the future had previous awareness of heat pumps (19 out of 20 respondents), again demonstrating the need for more heat pump marketing among ERH Among the 13 others who would not consider installing a heat pump, the top reason was it being too much hassle (4 customers). Three customers were concerned about heat pumps

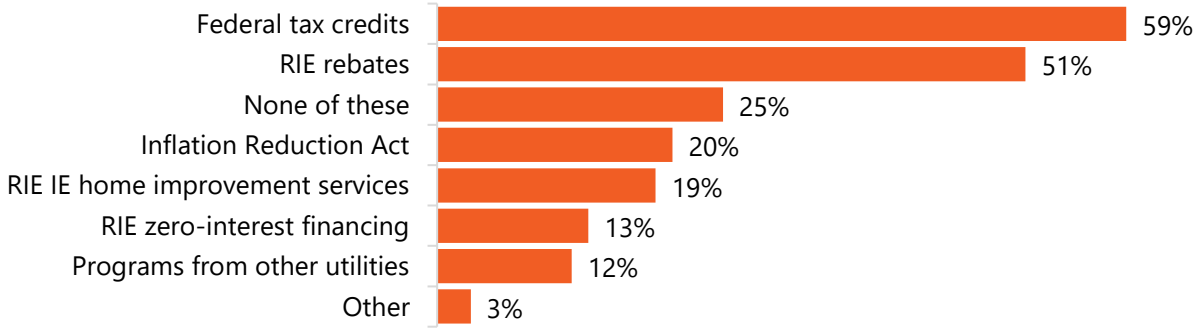
[12] Note: To supplement heat pump willingness-to-pay (WTP) findings from the 2020 RI Strategic Electrification Study (Cadmus, 2020), this study explored limited WTP survey questions to provide more context about ERH users. Due to lower-than-expected counts of ERH users in the sample and respondents' high satisfaction with ERH systems, WTP data is not sufficient for detailed analysis, including cuts of data by other respondent characteristics.

having high costs and not enough long-term bill savings. In addition, three customers said they don't like the look of heat pumps and don't plan to live in their home long enough to justify the installation.

RI Program and Other Energy Savings Resource Awareness

About half of respondents were aware of RI Energy rebates (51%) and other energy savings resources like federal tax credits (59%) (Figure 6). Of these, half (53 customers) had considered applying for rebates or other energy efficiency services, but only 6 respondents had ever received them. Four of these respondents received financial resources from RI Energy.

Figure 6. Awareness of Financial Resources for Energy Efficiency Improvements



Q41. "Which of the following financial resources had you heard of before today? Select all that apply.", n=66.

Detailed Findings: Landlords and Property Managers

This section presents the detailed study findings from the landlord interviews and secondary research that support the key findings and recommendations described in this report.

Below we blend findings from the secondary research with the perspectives we heard from the three landlord interviews. We acknowledge that the viewpoints from three landlords provides very qualitative findings that should be interpreted cautiously. However, we note that what we heard did not contradict the findings from our secondary research review. Please refer to Appendix A: Interim Research and Data Review Memo for more detailed secondary research findings.

The secondary research and our interviews suggest, unsurprisingly, that knowledge, financial considerations, and prioritization are important factors in heat pump adoption.

Knowledge About Heat Pumps

Secondary research and landlord interviews suggest that there is a knowledge gap about heat pumps among landlords and landlords will need detailed technical information to decide if heat pumps could be a good choice for their properties. According to landlords, this information, and other information that could help tenants save energy, is not currently available in Rhode Island.

> ***"This small state does a very poor job of providing information to landlords that could in turn help tenants reduce their energy significantly. It's my job to help [my tenants] out if there's incentives out there that don't require me to invest a ton of money. I [would] at least give them access to it [if I could]." - Landlord***

Researchers in Massachusetts found that multifamily building decision-makers are not familiar with heat pumps, with two-thirds of survey respondents reporting that they are either slightly or not at all familiar with heat pumps (Guidehouse, 2022a). Contractors in Massachusetts confirmed that multifamily property decision-makers are generally unfamiliar with heat pumps and that typically do not ask about them (Guidehouse, 2022a).

In the evaluation team's conversations with landlords, we observed that landlords seek out detailed technical specifications to inform decisions about equipment upgrades like heat pumps. When prompted with a hypothetical heat pump cost scenario to answer willingness to pay questions, landlords found it hard to respond without more comprehensive technical information. For example, they asked: square footage of the property, year built, the presence of insulation, seasonal temperature settings, energy cost for different fuels, equipment tonnage, kWh usage, and more. This demonstrates that landlords we spoke with understood and relied

on detailed technical information about properties and equipment to make decisions about upgrades.

> ***"It's hard to say how [upgrading to heat pumps] would impact rent rates. . . I'd have to see what the cost savings are [with the new system] vs the gas." - Landlord***

To explore this a bit further, the evaluation team briefly scanned online landlord discussion forums and identified multiple examples of landlords sharing tips and recommendations about heat pump upgrades by referencing equipment and property specifications. RI Energy could use this insight to inform how much or what information to make available to landlords on RIEnergy.com or in marketing materials.

Financial Considerations

Landlords consider upgrades when they can see a benefit to the bottom line for their business. The technical barriers in some buildings add to the cost of installing heat pumps which affects financial feasibility.

Through our interviews we heard that landlords were interested in investing in heat pump upgrades, or any energy efficient upgrade, when they could see a benefit to their business's bottom line. As business owners, landlords prioritize financial return on investment (ROI) over energy savings or other factors in property upgrade decision-making. When estimating ROI for upgrades like heat pumps, landlords consider their current budget, upfront costs, long term maintenance, impacts to the electric/energy bill, and tenant impacts like comfort, ability to pay the electric bill if applicable, and likelihood to stay in the unit longer (lower tenant turnover).

> ***"My mindset is that my properties have a certain retail value if I sell them. Retail value is enhanced if I invest in that property. . .essentially, I'm thinking about the added value that that property is providing me in the future over its current system."- Landlord***

The detailed financial considerations may be magnified by the technical barriers noted in the literature. According to Massachusetts contractors, the additional complexity of heat pumps means additional installation time and greater risk for contractors (Guidehouse, 2022b). Contractors manage that risk with higher bids, resulting in bids with higher installation costs than traditional HVAC.

The condition of the property may also add additional costs. For example, units may not have a 240-V circuit, or available outlets needed for heat pump installation (Bastian and Cohn, 2022). For buildings with existing ductwork, the ductwork must be large enough for the volume of air of a new heat pump system and any mold, rust, or other issues with existing ductwork needs to be addressed prior to heat pump installation (Bastian and Cohn, 2022).

Prioritization & Timing

While prioritization did not specifically come up as a theme during our interviews, several other research studies with landlords and property managers have highlighted that turnover and occupancy are top of mind; landlords prioritize immediate needs and try to fit in work in units when they are unoccupied.

For example, researchers who talked to small multifamily property decision-makers in Massachusetts reported that property owners and landlords "find it hard to invest in something like Mass Save when they are concerned with immediate turnover and keeping units occupied, concerns about revealing code violations if they were to participate, and any upfront costs—even if participating in Mass Save may assist with some of these concerns in the long run." (Guidehouse, 2022b).

Installing heat pumps requires coordination with building residents to schedule times for contractors to enter building units. Researchers in Massachusetts found that small properties are "more frequently self-managed—meaning less access to more robust tenant communication platforms— which exacerbates the significant amount of time and effort required to coordinate access." The RI Nonparticipant Market Barriers study found that landlords prefer to do work in units when the units are unoccupied (ILLUME and Cadeo, 2021). Because these are limited windows for them to make equipment changes, they are sensitive to any possible delays that a more complicated upgrade or participating in a utility rebate program may cause.

Smaller property owners indicated that they prioritize the immediate needs of their small properties and do not prioritize upgrades with longer-term benefits such as greater tenant comfort, reduced turnover, and improved property value (Guidehouse 2022b). Surveyed renters from the same study described their landlords as very frugal and would not fix or invest in updating anything that is not completely broken.

Appendix A: Interim Research and Data Review Memo (Updated)

The evaluation team shared this memo with Rhode Island Energy on August 21, 2023. This version is slightly revised to reflect the status of the project.

Introduction

The Electric Heat Customer Characterization Study considers the perspectives and barriers to heat pump adoption of two groups of customers: 1) homeowners with electric resistance heat; and 2) landlords who own properties with electric resistance heat. The study included in-depth interviews with multifamily property decision-makers. In preparation for the interviews, the evaluation team assessed the characteristics of the rental housing market in Rhode Island and conducted a literature of existing research on barriers to multifamily building heat pump adoption. This memo summarizes the findings from these two activities.

Rental Housing Market

The evaluation team identified rental market trends by reviewing existing data and online rental listings and reviewing existing research on heat pump adoption.

Rental housing has specific challenges to converting to heat pumps: changes to heating systems require the participation of the landlord who may not be aware of the options, may balk at the upfront costs, and/or may not see a need to make upgrades if they are not paying the monthly electric bill (the split incentive problem). An additional complication is that (with some exceptions) the current income-eligible program will not upgrade an electric resistance heating system unless the landlord is also on an income eligible rate.

As part of the Participation and Multifamily Census Study (RI-21-RX-Participation), the Cadeo team combined multiple data sources including utility accounts, tax parcel data, and other third-party data to identify multifamily rental properties (Cadeo 2022). Due to the complexities of these data and the many variations on multifamily and rental configurations, these data are approximate. The Cadeo project team identified about 44,000 multifamily rental accounts and estimated that about 9% of them likely have electric heat. They were unable to specifically identify electric resistance heat. There are an additional 4,800 multifamily accounts with unknown renter/owner status that likely have electric heat.

Online Rental Market

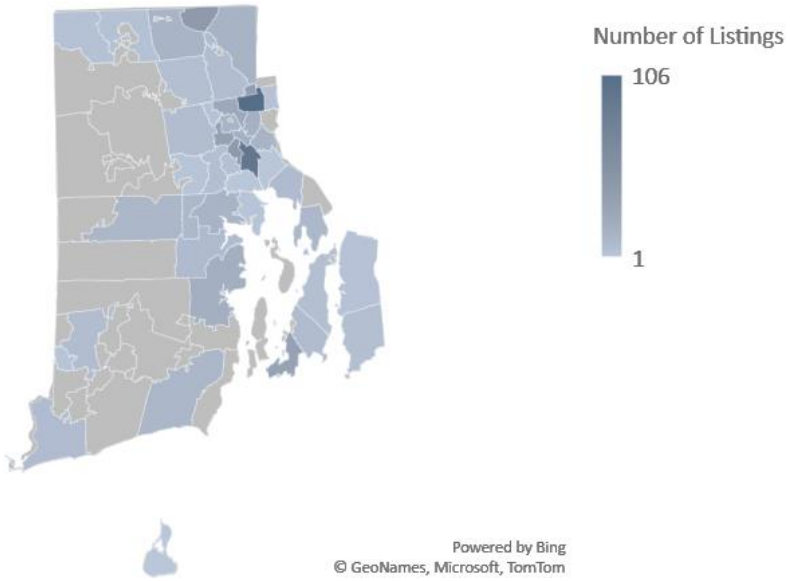
The evaluation team pulled current rental listings from three online sites. For one site we used a web scraping approach. For sites that had blocks in place to prevent web scraping, we pulled listing information manually.

Web scraping

The evaluation team used web scraping to pull all available listings (n=671) from RIHousing.com during the week of July 24, 2023.

1 | RI Housing.com: RIHousing is "a self-supporting, quasi-public agency created by the General Assembly in 1973 to provide financing and resources to offer housing options to Rhode Islanders."[13] RIHousing provides loans for buying homes, subsidies for qualifying renters, and financing for affordable housing development. The listings from RI Housing.com were primarily listings for income-restricted rentals (90% of listings). Figure A1 shows the ZIP code areas of the listings.

Figure A1. RI Housing.com Rental Listings – Week of July 24, 2023

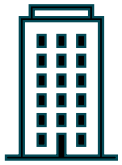


While there is uncertainty around how well this list from RIHousing.com represents the entire rental market in RI Energy territory, it does provide a point-in-time snapshot of the income-restricted market.

[13] RI Housing. Who We Are, What We Do. Accessed July 2023. https://www.rihousing.com/wp-content/uploads/Who-We-Are-What-We-Do_FINAL.pdf

18% of listings had electric heat.

In 33% of listings with electric heat, electricity was included in rent.



About 50% of listings with electric heat were for buildings built before 1980. About 4% were built before 1940.

88% of listings with electric heat also had electric water heating.

Manual data collection

The evaluation team also manually collected 202 listings from Apartments.com (n=101) and ForRent.com (n=47) during June 2023 and July 2023 based on a set of inclusion criteria:

- Include a mix of units where electricity was included in rent versus not
- Include a mix of income-qualified units versus not
- Include a mix of home types (single-family, duplex, condo, apartment, etc.) and sizes (number of units)
- Include a mix of units available within Providence County versus all other counties
- Exclusion of public housing authorities and vacation homes

2 | Apartments.com provides information and resources for renters and property managers to help renters find a place to live. The site specializes in apartment rentals nationwide and provides information like verified current availability, utility bill responsibility, and features like EV charging and "efficiency appliances." Apartments.com had fewer income-based rental units than found in RIHousing.com at the time of our scan.

3 | ForRent.com also offers nationwide listings of rental units to help both renters and property owners match available units to interested renters. The site describes listings for rental houses, condos, townhouses, and apartments. Listings on ForRent.com had information about utility bill responsibility. Our scan found that many listings did not show heating fuel type or list property owner contact information. Interested renters inquire about listings by filling out a form on the site.

Barriers to Heat Pump Adoption

The evaluation team reviewed existing research on barriers to energy efficiency and heat pumps for multifamily and rental properties as part of the Task 1 Program Review. Below we summarize the key barriers identified in the literature that apply to energy efficiency upgrades in general, and to converting multifamily and rental properties to heat pumps, specifically.

Knowledge

Unfamiliar equipment. Researchers in Massachusetts found that multifamily building decision-makers are not familiar with heat pumps, with two-thirds of survey respondents reporting that they are either slightly or not at all familiar with heat pumps (Guidehouse, 2022a). Contractors in Massachusetts confirmed that multifamily property decision-makers are generally unfamiliar with heat pumps and that they typically do not ask about them (Guidehouse, 2022a).

Prioritization

Limited available time. In the RI Nonparticipant Market Barriers Study, landlords and property managers shared that daily job demands and the added pandemic workforce issues made exploring energy efficiency options a low priority (ILLUME and Cadeo, 2021). This was echoed by researchers who talked to small multifamily property decision-makers in Massachusetts. Researchers reported that property owners and landlords "find it hard to invest in something like Mass Save when they are concerned with immediate turnover and keeping units occupied, concerns about revealing code violations if they were to participate, and any upfront costs—even if participating in Mass Save may assist with some of these concerns in the long run." (Guidehouse, 2022b).

Installation coordination time. A heat pump installation can be time-consuming, noisy, and disruptive for residents in a building (Bastian and Cohn, 2022). In order install heat pumps in occupied units, landlords need to coordinate with building residents and schedule times for contractors to enter building units. Researchers in Massachusetts found that small properties are "more frequently self-managed—meaning less access to more robust tenant communication platforms— which exacerbates the significant amount of time and effort required to coordinate access." The RI Nonparticipant Market Barriers study found that landlords prefer to do work in units when the units are unoccupied (ILLUME and Cadeo, 2021). Because these are limited windows for them to make equipment changes, they are sensitive to any possible delays that a more complicated upgrade or participating in a utility rebate program may cause.

Focus on short-term maintenance in small properties. Smaller property owners indicated that they prioritize the immediate needs of their small properties and do not prioritize upgrades with longer-term benefits such as greater tenant comfort, reduced turnover, and improved property value (Guidehouse 2022b). Surveyed renters from the same study described their landlords as very frugal and would not fix or invest in updating anything that is not completely broken.

Technical Challenges

Non-competitive bids due to installation timing and costs. According to Massachusetts contractors, the additional complexity of heat pumps means additional installation time and great risk (Guidehouse, 2022b). They manage that risk with higher bids, resulting in bids with higher installation costs than traditional HVAC. In the same study, building decision-makers noted that their capital budgets are very tight and that they do much of their own maintenance.

Space and complexity. In Massachusetts, researchers found that installing central or ductless heat pumps in multifamily retrofits is more complicated than traditional HVAC systems, due to space limitations to locate compressors or the need to use a lift (Guidehouse, 2022a). For example, outdoor heat exchangers should be protected from ice and sunlight with space surrounding them to prevent debris from interfering with their functioning. Siting the outdoor units in areas such as resident balconies, yards, or other spaces may lead to tenant dissatisfaction (Bastian and Cohn, 2022).

Power supply. Interior heat pump units can be powered by 1) the external heat exchanger unit, which is connected to the home electrical panel on a dedicated 240-V circuit; or 2) each indoor unit which provides its own low-voltage power from an outlet located in the room. Homes that did not have A/C, may not have a 240-V circuit, necessitating an upgrade to the electrical panel. Rooms that do not have available outlets may require additional wiring. (Bastian and Cohn, 2022).

Condition of the ductwork. For buildings with existing ductwork, the ductwork must be large enough for the volume of air of a new heat pump system and any mold, rust, or other issues with existing ductwork needs to be addressed prior to heat pump installation (Bastian and Cohn, 2022).

Practical Considerations

Aesthetic Concerns. In Massachusetts research (Guidehouse, 2022a & 2022b), supply-side stakeholders said heat pump equipment aesthetics are a major barrier preventing greater adoption. Multifamily building decision-makers were less adamant, and rated aesthetics concerns as a mid-level barrier to heat pump adoption.

Appendix B: Survey Methodology

ILLUME conducted 70 online surveys with single-family homeowners who use ERH equipment as their primary source of heat to understand the specific challenges and barriers to installing heat pumps for this specific customer segment. This study did not include phone surveys. The survey took about 10 minutes to complete. We entered customers who completed the survey into a sweepstakes drawing for a chance to win one of five $250 Tango gift cards as a thank you for their time. Table 3 shows which sections of the survey address the research questions.

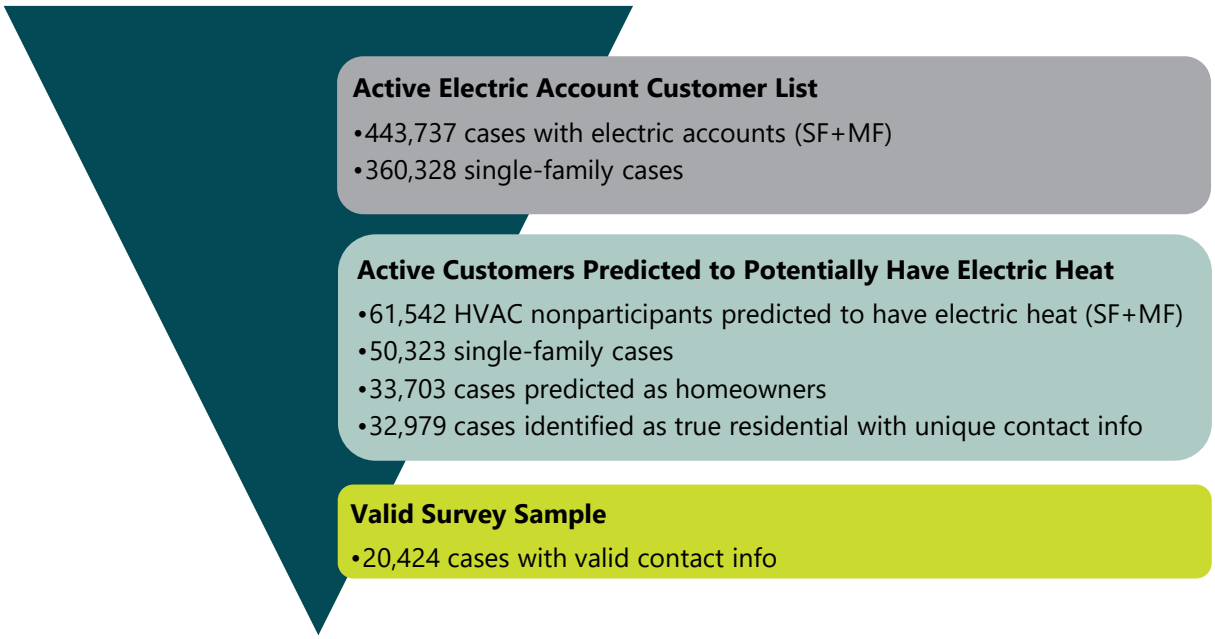
Table 3. Research Question Index

Research questions	Survey section
Among homeowners who actively and primarily use ERH systems to heat their homes, what are homeowners' experiences with their electric resistance heating (ERH) systems? • Satisfaction: How satisfied are customers with their ERH equipment? • Cost burden: How do customers perceive the cost of heating their homes (e.g., their electric bills)? • Maintenance: How do customers use and maintain/repair their ERH systems? • Heating system changes: What are customers' experiences with switching from one heating system to another, or switching from electric fuel to natural gas, oil, or propane?	Heating Equipment
Among homeowners who actively and primarily use ERH systems to heat their homes, what are the barriers for homeowners to installing heat pumps? Specifically: • Incentives: How aware are customers of RI Energy' s Heat Pump Incentives? Of other incentives like Inflation Reduction Act (IRA) incentives? • Equipment: How aware are customers of heat pump technology? • Interest: What is their interest in installing heat pumps? Have they considered switching to heat pumps in the past? If yes, why didn't they? What considerations do customers think are or would be important when deciding whether to switch from ERH to heat pump technology?	Participation Barriers
Among homeowners who actively and primarily use ERH systems to heat their homes, what are ERH homeowners' characteristics including household income (low income/not low income) or other characteristics, for example: • Length of home ownership • Year home was built • Age of existing heating system • Type of cooling system • Presence of ductwork • Presence of insulation	Characteristics

Sample Design

This section describes the sampling process from the development of the base sample frame to the identification of valid survey sample cases. Figure 7 provides an upfront summary of the sampling process interms of numbers of cases remaining at each stage.

Figure 7. Sampling Chart



Active Electric Account Customer List (N=443,737)

The survey sample frame is pulled from a dataset of all active RI Energy customers with electric accounts (N=443,737) that was created as part of the recent Participation and Multifamily Census Study (RI-21-RX-Participation) Study (Cadeo 2022, Section 2 Cross-Cutting Data Assembly). This dataset included 360,328 single-family (81%) and 83,409 multifamily (19%) cases. It represents the best available information to identify potential ERH customers at the time of this study.

The sample frame dataset is modeled from several sources including:

- The active customer list as of March 2021;
- Property tax data as of August 2021;
- Energy consumption data for every electric and natural gas account active in RI between January 1, 2016 and December 31, 2020;
- Building-level data aggregated by National Grid from account-level data and other customer and tax parcel data;
- Program participation tracking data from electric and gas accounts that participated between 2016 and 2020; and

- Census Bureau's American Community Survey (ACS) data from the 2020 ACS 5-year estimates at the census block group-level.

Active Customers Predicted to Have Electric Heat (N=61,542)

From the active electric customer list, the Participation and Multifamily Census Study team identified 61,542 accounts that – based on their seasonal electric consumption – potentially used electric heat to heat their home. This list excluded customers known to have participated in RI Energy's HVAC program because they were more likely to have already installed a heat pump and not have ERH systems.

The breakdown of residential codes among the list of 61,542 is:

- Elec A-16 Residential-Std Ofr (n=52,438)
- Elec A-16 T&D Residential (n=4,634)
- Elec A-60 Resi Low Income-Std Ofr (n=3,943)
- Elec A-60 T&D Resi Low Income (n=527)

To identify the subset of residential customers likely to heat with electricity, Cadeo:

- Identified customers that participated in Income-Eligible Single Family and Income-Eligible Multifamily program with validated heating fuel types (recorded in program tracking data)
- Calculated each participant's average monthly energy consumption during the heating months (December, January, and February) and "shoulder" seasons (i.e., the months with less heating or cooling – March, April, May and September, October, November).
- Compared the ratio of heating and shoulder consumption to establish a consumption profile for known electric heating customers.
- Calculated each nonparticipating customer's heating and shoulder consumption and corresponding consumption ratio
- Flagged all nonparticipating customers with a seasonal consumption ratio equal to or greater than the average participant known to heat with electricity as likely to heat with electricity.

Among active electric customers predicted to have electric heat, 82% (50,323) were single-family and 18% (11,219) were multifamily. These proportions line up with the ratios of single- and multifamily electric accounts overall (81% and 19% respectively).

Active Electric Heat Customer List Limitations: False Negatives and False Positives

The approach described above offered insight into which residential customers are likely to heat with electricity and, consequently, an estimate of the total number of electric heat customers in Rhode Island Energy's service territory. However, the approach only offers insight into the *relative likelihood* that a given participant heats with electricity. Like any dataset built on a prediction model, it is inherently imperfect and should not be considered a definitive assessment regarding any specific customer's heating fuel type. This is because any predictive approach will result in both false negatives (i.e., failing to identify customer that heats their

home with electricity) and false positives (i.e., predicting a customer uses electric heat when they do not).

With the information available to the evaluation team, it is not possible to explain why specific false positives or negatives occurred, there are a variety of factors that contribute uncertainty to the analysis. These include customers' use of secondary or supplemental plug-in electric space heaters, customers not living in their homes full time, or customers engaging in some other kind of electrically intensive activities like using a hot tub in winter.

Even with the limitations, the evaluation team concludes that this dataset was the best available data to identify potential ERH customers at the time of the study.

Survey Sample (N=20,424)

This study filtered the list of 61,542 cases predicted to have electric heat based on the following criteria, and identified 20,424 cases with valid contact information that were most likely to be eligible for this study's targeted survey:

- 82% predicted to live in single-family homes, not including public housing (50,323 of 61,542)
- 89% predicted to own their homes (33,703 of 38,257 since 12,066 cases had unavailable homeownership prediction information)
- 98% consisted of customer names and email addresses that did not include business, organization, or governmental agency information, and among cases with email addresses, had a unique email address (32,979 of 33,703)

The study then determined through survey screening that 20,424 of the remaining 32,979 cases had valid contact information (email, deliverable mailing address). These 20,424 make up the total valid sample for this study. These selected cases represent 33% of the 61,542 active electric heat customer list and 5% of the 443,737 active electric account customer list.

Survey Sample Limitations: False Negatives and False Positives

In addition to limitations noted above for the active electric heat customer list, this study's targeted sample filtering process may have identified false negatives or included false positives from the predictive modeling process. As the process removed cases from the sample, some may have been false negatives. For example, the process removed 12,066 cases where predicted homeownership status information was unavailable. Any number of these cases may have been eligible for the study. The process also removed 724 cases where names and email addresses resembled a business, organization, or governmental agency. It could be that some of these cases were homes of self-employed people that account for utility costs under the businesses they operate.

Considerations for future use of this sample

In potential future research with ERH users in RI, researchers should consider the imperfections of predictive modeling and filtering noted in the limitations sections above, and the very specific customer group that this survey targeted. The survey targeted not just electric heat customers

living in homes with ERH equipment, but of those, the customers who could self-report that they use ERH systems as their *primary* source of heat.

Sample Stratification and Recruitment

Overall Summary

This study targeted homeowners in single family homes (1-4 units) with electric resistance heat. We conducted survey recruitment in two waves. In all, we recruited from 20,424 sample cases with valid email (18,595) or mailing address (1,829) information and received 752 responses for a 4% response rate. Of those, 70 were eligible completes. Table 4 and Table 5 summarize survey distribution efforts and compare the study population to the survey respondents. The following sections describe sampling and recruitment in greater detail.

Table 4. Overall Customer Survey Distribution Summary by Recruitment Wave

Wave	Population Count	Valid Sample Count	Distribution Mode	Answered Home Heating System Screener Question	Eligible Completes
Wave 1a	23,600	2,046	Email	96	19
Wave 1b	37,942	1,829	Postcards	22	3
Wave 2	-	16,549	Email	634	48
Total	61,542	20,424	-	752	70

Table 5. Comparison of Population to Respondents by Distribution Mode

Distribution Mode	Total Count	Email		Postcards* (Wave 1 only)	
		Count	Percent	Count	Percent
Population	61,542	23,600	38%	37,942	62%
Met Study Criteria	32,979	19,971	60%	13,008	40%
Valid Sample*	20,424	18,595	91%	1,829*	9%
Answered Home Heating System Screener Question	752	730	97%	22	3%
Eligible Completes	70	67	96%	3	4%

*The study distributed postcards to a sample of customers who did not have email addresses during Wave 1. Due to the project scope and low response rates among postcard respondents, remaining postcard cases were dropped prior to Wave 2, an email-only effort. As a result, the Valid Sample has a smaller proportion of postcard cases than the Population.

Wave 1

We first stratified the sample in consideration of accounts with and without email addresses, location/county of residence (Providence County or all others), and likelihood to have a high energy burden, then drew a random sample of 3,300 single family homeowners with a goal of 210 completed surveys.

Email. The customer list included 23,600 customers with email addresses (38%) and 37,942 with no email address (62%). The 3,300 sample size was primarily based on a split response rate of

about 10% among customers with email addresses and about 4% among customers with no email addresses. After drawing the sample, 1,887 of 3,300 customers have no email (57%) and 1,413 customers have email (43%).

We distributed postcards to reach customers who do not have an email address. Due to timeline and budget constraints, we were not able to do repeated follow-ups with postcard-only customers, so firm completion targets for customers who do not have an email address were not set.

Location. The customer list included the county where the home is located, with about 40% (24,190) of homes in Providence County. We flagged customers residing outside of Providence County (37,352) to attempt to stratify the sample with about a 50/50 mix of customers based on location. After drawing the sample, we achieved a 50/50 mix with 1,650 of 3,300 customers with residences in Providence County (50%) and 1,650 customers across all other counties (50%).

Energy Burden. RI Energy's customer list included a flag for those who are likely to have a high energy burden, defined as an annual electricity expenditure higher than 6% of annual income. The flag will help the study better understand barriers for customers who could benefit greatly from upgrades and the associated energy cost savings. In this calculation, we used Median Area Income as a proxy for individual income due to concerns about the reliability of the income data in the customer data set. This approach flagged 1,655 customers in single-family homes as likely having high energy burden. Because there are uncertainties in this data and to ensure we attain adequate completes from customers with a high energy burden, we are supplementing that group with customers with annual energy use in the 80th percentile or greater. We attempted to stratify the sample with about a 50/50 mix of customers based on high or low/moderate energy burden levels. After drawing the sample, we achieved a 35/65 mix and estimated that 1,153 of 3,300 customers are likely to have a high energy burden (35%) and 2,147 customers are likely to have low or moderate energy burden (65%).

Table 6 shows counts of customers by sample characteristic grouped by RI Energy list, sampling targets. It also shows the actual sample with the resulting counts from the sampling process described above.

Table 6. Customer Counts by Sample Characteristic

RI Energy list		Sampling targets			Actual sample	
Characteristic	Population count	Sample size	Response rate	Survey completes	Count	Percent
Email						
No email	37,942	2,000	4%	75	1,887	57%
Has email	23,600	1,300	10%	135	1,413	43%
Location (county)						
Providence	24,190	1,650	6%	105	1,650	50%
All others	37,352	1,650	6%	105	1,650	50%
Energy burden						
High	1,655	1,650	5%	90	1,153	35%
Low/moderate	59,887	1,650	7%	120	2,147	65%
Overall Total	**61,542**	**3,300**	**about 6%**	**210**	**3,300**	**100%**

Wave 1 Response

We received 130 survey responses, which is about a 3% response rate given a sample of 4,044 customers. The challenge we encountered was that most were not eligible (108 ineligible, 83%), usually because they did not use ERH as their primary home heating source.

Of these 130 respondents, 22 were eligible and completed the full survey (0.6% response rate) (Table 7). Eligible customers who met study criteria were listed in the data as single family homeowners with electric heat who had not participated in the RI Energy HVAC program and likely had not had a heat pump upgrade. These customers also had names and email addresses that did not include business, organization, or governmental agency information. We removed sample cases with duplicate email addresses.

Table 7. Wave 1 Customer Survey Disposition

Description	Count	Percent of List (n=61,542)	Percent of Sample
Total customers in the list (population)	61,542	100%	-
Met study criteria *19,971 with email, 13,008 no email*	32,979	54%	-
Sample pulled *2,168 with email, 1,876 no email*	4,044	7%	-
Valid sample pulled *Removed 122 bounced emails, 47 returned postcards*	3,875	6%	96% of Sample Pulled
Total completes *RR = total completes / valid sample*	130	-	3% of Valid Sample
Total eligible completes *RR = total eligible completes / valid sample*	22	-	0.6% of Valid Sample
Remaining sample with emails only	17,803	29%	-

Wave 2

The evaluation team worked with RI Energy to expand the survey research with a second wave in attempt to get additional completes that would result in more strongly supported findings from both the screener and full survey. To get further completes, we distributed survey invitations via email to the remaining 17,803 customers in the sample list who appeared to meet study criteria and had email contact information. This strategy included a slight modification to the screener to ensure all respondents completed the heating system question before being screened out if ineligible, and to attempt to gather landlord contact information. This second launch of the survey also included a second gift card sweepstakes – a drawing for one of five $250 gift cards. All customers who completed the screener, not just eligible completes, were entered into the drawing.

Wave 2 Response

We've received 622 additional survey responses. Of these, 48 were eligible and completed the full survey for a response rate of 0.3% based on a sample of 16,549 (valid sample, Table 8).

Table 8. Wave 2 Customer Survey Disposition

Description	Count	Percent of list (N=17,803)	Percent of sample
Total customers in the list (population)	17,803	100%	-
Sample pulled (census)	17,803	100%	-
Valid sample pulled *Removed 1,254 bounced emails*	16,549	93%	93% of Sample Pulled
Total completes *RR = total completes / valid sample*	622	-	4% of Valid Sample
Total eligible completes *RR = total eligible completes / valid sample*	48	-	0.3% of Valid Sample

Recruitment Materials

The recruitment approach combines postcard and email invitation outreach as described above under Sampling. We recruited customers to complete the survey primarily through email. We distributed one round of postcards to attempt to reach customers who did not have an email address.

The information below presents an example of an email survey invitation.

Subject: RI Energy would like your feedback

Sender: [EMAIL]

Hello [NAME],

My company, ILLUME Advising, is conducting research on behalf of RI Energy to learn about their customers' experiences with home heating systems and to help RI Energy better serve customers like you.

We'd like to hear from you! The survey will take about 10 minutes of your time and any feedback you provide will be confidential**.** We will enter customers who complete the survey into a drawing to win one of five $250 Tango gift cards (Tango gift cards are digitally redeemed by choosing from 100+ merchants, like Amazon, Target, and Walmart). If you are interested, please click on the link below to get started.

Complete the survey by [DATE] to be entered in the drawing.

> Click **HERE** **[SURVEY LINK]** to take the survey.
> Or copy and paste the URL below into your internet browser: ${l://SurveyURL}

ACCESS CODE: [XXXXX]

Please contact [RI Energy Staff] at [email] should you have any concerns about this research.

Thank you for your time, we look forward to speaking with you!

[RESEARCHER NAME]

Follow the link to opt out of future emails: ${l://OptOutLink?d=Click here to unsubscribe}

Appendix C: Survey Screener Insights

This section presents insights about electric account customers' heating systems gleaned from the survey screener. The survey screener verified which customers in the sample met eligibility criteria for the full survey (household decision-makers who use ERH systems as their *primary* source of heat). Screened respondents with ERH systems who primarily used *different* equipment to heat their homes were ineligible to complete the full survey. More customers completed the screener (N=752) than the full survey (N=70).

Study Reach

Among the 752 screener respondents with active RI Energy electric accounts, 98% self-reported living in single-family homes, 72% said their primary heating fuel was electric, 22% said that they had ERH systems in their homes, and 16% said they use their ERH equipment as their primary source of home heating. These rates uniquely reflect the responses of customers targeted through the sampling process (see Appendix B: Survey Methodology) rather than the general RI Energy or State of RI population.

As a point of reference, Table 9 compares characteristics of single-family homes between general population survey respondents who informed the most recent RI Residential Appliance Saturation Survey (RASS) (RI2311) report (NMR Group, 2018, Tables 3 and 4) and the full active electric *account* list used as the sample frame for this study. The comparison shows similar rates of 1) single-family buildings, and 2) homes that primarily heat with electricity (RI Energy customers modeled as potentially using some form of electric system (ERH, furnace, heat pump) to heat their home).

While not an apples-to-apples comparison given the differing sample designs, the table also demonstrates that the targeted survey screener successfully reached 22% of customers predicted to have electric heat who also had ERH equipment compared to the statewide rate of ERH penetration (9%).

Table 9. RI Single-Family Home Heating System Characteristics

Home Characteristics	RI Population	Sampling		Study Reach
	2018 General Population RI RASS Results (N=708)	Active Electric *Account* List [1] (N=443,737)	Valid Survey Sample (N=20,424)	Targeted Survey *Screener* Results [2] (N=752)
SF buildings	82% [3]	81%	Selected 100%	98%
SF *primary* heating fuel is electric	10%	Predicted 13%	Selected 100%	72%
SF penetration of *electric baseboard* heating systems	9% [4]	Unknown	Unknown	22%
SF *primary-use* heating equipment is electric baseboards	N/A	Unknown	Unknown	16%

[1] Information about the active electric *account* customer list comes from the Participation and Multifamily Census Study (RI-21-RX-Participation) Study (Cadeo 2022).
[2] Within this study's targeted survey screener results, the N for each table row varies due to respondents being screened out as the screener questions progressed. Ns are 752 unless otherwise mentioned here: SF buildings N=758, heating fuel type N=400, primary-use electric baseboards N=720. Refer to footnote 15 for more details on heating fuel type analysis.
[3] Information about the proportion of SF buildings in RI is sourced from the 2023 RI Integrated Housing Report (RI DOH, 2023), Figures 11-1 for the total number of SF housing units (483,053) and 11-4 for the count of SF buildings with 1-4 units (397,224).
[4] The 9% rate of ERH penetration reported in the RI RASS report is the proportion of homes with ERH equipment in their homes regardless of primary heating fuel type and including homes that may have more than one type of heating system.

Heating Equipment

The screener gathered self-reported information about respondents' heating equipment and, if they have multiple types of heating equipment in their home, which equipment they used as their primary source of heat. The findings from Table 11 and Table 10 show that among sampled customers predicted to heat their homes with electric equipment, the study found homes with non-electric equipment, electric equipment other than ERH systems, and homes with multiple types of heating equipment that may have, but not primarily use, an ERH system for heating.

All Heating Equipment

Many homes have more than one source of heating. Of all heating equipment respondents (N=752), not just primary-use systems, 22% have ERH equipment in their homes and 16% have heat pumps (Table 10**Error! Reference source not found.**). These are slightly higher percentages than homes who use ERH or heat pumps as their primary system. Boilers are the most popular heating system (39%).

Table 10. All Heating Equipment Among Screener Respondents, Self-Reported (N=752)

Heating Equipment Type	Count	Percentage of Respondents
Boiler (total)	294	39%
Furnace	204	27%
Other (fireplace, wood or pellet stove, or other)	203	27%
Electric baseboard heaters	168	22%
Heat pump	118	16%
Portable, plug-in electric heaters	49	7%

Primary-Use Heating Equipment

Of the 752 screener respondents, 400 reported having primary heating equipment that was either electric or not.[14] About 29% (n=114) of respondents use ERH as their primary heating system (Table 11). About 18% (n=73) already use heat pumps. Overall, screener responses confirm that about 48% of homes in our sample use some form of electric heat. The exact proportion is likely higher as fuel type is unconfirmed for 320 respondents.

Table 11. Primary-Use Heating Equipment by Inferred Fuel Type Among Screener Respondents, Self-Reported (N=400)

Heating Equipment by Inferred Fuel Type	Count	Percentage of Respondents
Electric heat	192	48%
Electric resistance baseboard heating	114	29%
Heat pump	73	18%
Portable, plug-in electric heaters	5	1%
Not electric	208	52%
Boiler (self-reported not electric)	106	27%
Other (fireplace, wood/pellet stove, or other)	102	26%
Unconfirmed fuel type	320	-
Furnace	182	-
Boiler (unknown if electric)	42	-
Boiler (self-reported electric)	96	-

[14] Due to the initial goals of the project, the screener did not specifically ask about heating fuel type as the study was not intended to verify this information and the screener was designed to identify those with electric baseboard heating specifically. The study inferred heating fuel type from equipment type. As such, 320 cases were dropped from the heating fuel type analysis including 224 respondents who selected equipment that could be either electric or gas like furnaces and 96 others who said their boilers were electric. Based on the RI RASS, there were no electric boilers identified among the general population respondents and, therefore, it is more likely that these screener respondents inaccurately identified their primary heating fuel type than it is that they accurately reported it.

Appendix D: Survey Data Tables

The crosstab and frequency tables in this appendix are intended to describe the survey population. There were not enough survey respondents to draw significant conclusions about the whole RI Energy customer population who have electric baseboard heating. Any insights gleaned from these tables should be considered cautiously when using the information for future program planning or decision-making.

Key Crosstabs

This section provides crosstabs comparing ERH satisfaction, RI Energy program awareness, and heat pump familiarity, benefits, and interest by select respondent characteristics: income group, level of familiarity with heat pumps, and year when homes were built. Because these tables show cuts of data defined by survey respondents who answered some questions but not others, and because some questions were designed to allow more than one response selection for a single respondent, percentages do not always add up to 100%

Income Group

Table 12. Q12 Satisfaction with ERH System on 5-point scale by Income

Income	Base	Frequency			Percentage			Mean
		1 to 2	3	4 to 5	1 to 2	3	4 to 5	
Less than $75,000	22	5	7	10	23%	32%	45%	**3.4**
Between $75,000 and $150,000	29	6	10	13	21%	34%	45%	**3.3**
More than $150,000	6	2	2	2	33%	33%	33%	**3.0**

Table 13. Q27 RI Program and Other Resource Awareness by Income

Resource	Frequency			Percentage for each choice among those with incomes of:		
	<$75,000	Between $75,000 and $150,000	>$150,000	<$75,000	Between $75,000 and $150,000	>$150,000
Federal tax credits	13	19	3	59%	66%	50%
RI Energy rebates	9	19	2	41%	66%	33%
None of these	7	5	2	32%	17%	33%
RI Energy free home improvement services for income-eligible households	5	5	0	23%	17%	0%

Resource	Frequency			Percentage for each choice among those with incomes of:		
	<$75,000	Between $75,000 and $150,000	>$150,000	<$75,000	Between $75,000 and $150,000	>$150,000
Programs or financial resources from other utility companies	3	3	1	14%	10%	50%
RI Energy zero-interest financing	2	6	0	9%	21%	0%
Inflation Reduction Act rebates (e.g. HOMES program)	2	7	0	9%	24%	0%
Other, please specify	2	0	0	9%	0%	0%
Total (base)	22	29	6	-	-	-

Table 14. Q36 Familiarity with Heat Pumps by Income

Income	Base	Frequency		Percentage	
		Familiar	Not familiar	Familiar	Not familiar
Less than $75,000	21	5	16	24%	76%
Between $75,000 and $150,000	29	5	24	17%	83%
More than $150,000	5	1	4	20%	80%

Table 15. Q38 Top Benefits of HPs by Income

Customers regardless of income reported that the top benefit of installing HPs is saving money on electric heating bills.

Income	Base	Saving money on electric heating bills	
		Percentage who ranked #1	Mean Ranking
Less than $75,000	20	60%	2.0
Between $75,000 and $150,000	28	57%	1.8
More than $150,000	4	75%	1.3

Table 16. Q41 Consider Installing Heat Pump in Future by Income

Income	Base	Frequency			Percentage		
		Yes	No	Not sure	Yes	No	Not sure
Less than $75,000	22	9	3	10	41%	14%	45%
Between $75,000 and $150,000	28	9	4	15	32%	14%	54%
More than $150,000	6	1	2	3	17%	33%	50%

Heat Pump Familiarity

Table 17. Q27 RI Program and Other Resource Awareness by HP Familiarity

Resources	Frequency		Percent familiar with HP per resource:	
	Familiar	Not familiar	Familiar	Not familiar
Federal tax credits	31	7	61%	50%
RI Energy rebates	28	5	55%	36%
None of these	12	5	24%	36%
RI Energy free home improvement services for income-eligible households	11	2	22%	14%
Inflation Reduction Act rebates (e.g. HOMES program)	9	4	18%	29%
RI Energy zero-interest financing	8	1	16%	7%
Programs or financial resources from other utility companies	4	2	8%	14%
Other, please specify	2	0	4%	0%
Total (base)	51	15	-	-

Table 18. Q41 Would Consider Installing HP in Future by HP Familiarity

Familiarity	Base	Frequency			Percentage		
		Yes	No	Not sure	Yes	No	Not sure
Familiar	50	19	9	22	38%	18%	44%
Not familiar	15	1	2	12	7%	13%	80%

Table 19. Q41 Top Benefits of HPs by HP Familiarity

Customers, regardless of previous awareness, reported that the top benefit of installing HPs is saving money on electric heating bills.

Familiarity	Base	Saving money on electric heating bills	
		Percentage who ranked #1	Mean Ranking
Familiar	47	57%	1.8
Not familiar	13	77%	1.6

Year Home Built

Table 20. Q12 Satisfaction with ERH System on 5-point scale by Year Home Built

Year Built	Base	Frequency			Percentage			Mean
		1 to 2	3	4 to 5	1 to 2	3	4 to 5	
Before 1980	40	10	10	20	25%	25%	50%	3.4
1980 to 1999	26	5	11	10	19%	42%	38%	3.3

Note: None of the respondents had homes built after 1999.

Table 21. Q27 RI Program and Other Resource Awareness by Year Home Built

Program	Frequency		Percentage for each choice among those with homes built:	
	Before 1980	1980 to 1999	Before 1980	1980 to 1999
Federal tax credits	25	14	64%	54%
RI Energy rebates	22	11	56%	43%
Inflation Reduction Act rebates (e.g. HOMES program)	9	4	23%	15%
None of these	8	7	21%	27%
RI Energy free home improvement services for income-eligible households	6	5	15%	19%
RI Energy zero-interest financing	5	4	13%	15%
Programs or financial resources from other utility companies	5	3	13%	12%
Other, please specify	1	1	3%	4%
Total (base)	39	26	-	-

Table 22. Q36 Familiarity with Heat Pumps by Year Home Built

Year Built	Base	Frequency		Percentage	
		Familiar	Not familiar	Familiar	Not familiar
Before 1980	39	29	10	74%	26%
1980 to 1999	23	19	4	83%	17%

Table 23. Q38 Top Benefits of HPs by Year Home Built

Customers regardless of income reported that the top benefit of installing HPs is saving money on electric heating bills.

Year Built	Base	Saving money on electric heating bills	
		Percentage who ranked #1	Mean Ranking
Before 1980	36	64%	1.7
1980 to 1999	24	63%	1.7

Table 24. Q41 Consider Installing Heat Pump in Future by Year Home Built

Year Built	Base	Frequency			Percentage		
		Yes	No	Not sure	Yes	No	Not sure
Before 1980	39	13	10	16	33%	26%	41%
1980 to 1999	26	7	3	16	27%	12%	62%

Overall Survey Frequencies

This section lists response counts for each survey question.

Screener, All Respondents

		Counts	Percentage of respondents (N varies as respondents screened out)
Are you at least 18 years of age? (N=770)	Yes	769	99.9%
	No	1	0.1%
Are you an RI Energy customer? (N=769)	Yes	769	100.0%
	No	0	0.0%
	Not sure	0	0.0%
Do you rent or own the home you live in? (N=769)	Own	721	93.8%
	Rent	48	6.2%

		Counts	Percentage of respondents (N varies as respondents screened out)
Which option below best describes your home type? (N=758)	Single family detached from any other house	696	92%
	Row home – single family house attached to one or more single family homes	5	<1%
	Building with 2-4 units (duplex, condo, townhomes, apartment, etc.)	39	5%
	Building with 5-10 unit	3	<1%
	Building with 20+ units	4	<1%
	Other	11	1%

		Counts	Percentage of respondents (N=265)
Are you involved in decisions about how you heat your home, for example, temperature settings, equipment maintenance, or paying energy bills?	Yes	263	99.2%
	No	2	0.8%

Heating Equipment

All Heating Systems (Respondents might have more than one kind in their home)

	Counts	Percentage of respondents (N=752)
Boiler (total)	294	39%
Furnace	204	27%
Other (Fireplace, wood or pellet stove, or other)	203	27%
Electric baseboard heaters	168	22%
Heat pump	118	16%
Portable, plug-in electric heaters	49	7%

		Counts	Percentage of respondents (N=256)
Is the boiler that heats your home electrically powered?	Yes	113	44.1%
	No	123	48.0%
	Not sure	20	7.8%

Primary Heating System by Fuel Type (where available) [1]

	Counts	Percentage of respondents (N=400)
Electric Heat	192	48%
Electric baseboard heating	114	29%
Heat pump	73	18%
Portable, plug-in electric heaters	5	1%
Not electric	208	52%
Boiler (self-reported not electric)	106	27%
Other (fireplace, wood/pellet stove, or other)	102	26%
Unconfirmed fuel type	320	-
Furnace	182	-
Boiler (unknown if electric)	42	-
Boiler (self-reported electric)	96	-

[1] Refer to footnote 15 for more details on heating fuel type analysis.

Full Survey, Eligible Completes

Electric Resistance Heat

		Count	Column Valid N %
EBH Satisfaction	1.00	9	12.9%
	2.00	7	10.0%
	3.00	22	31.4%
	4.00	14	20.0%
	5.00	18	25.7%
	Overall Mean	70	3.36
Which choice best describes how you use the electric baseboard heaters and/or their thermostat controls to warm your home?	Whole-home heating (all rooms and spaces at once)	7	10.1%
	Zoned heating (only on certain floors or larger sections of the home)	3	4.3%
	Other, please specify	4	5.8%
	Room-zoned heating (only in certain rooms)	55	79.7%
About how old is your electric baseboard heating system? Please answer with your best guess.	Up to 2 years ago	3	4.3%
	Between 2 and 5 years ago	3	4.3%
	Between 5 and 10 years ago	8	11.6%
	Between 10 and 20 years ago	14	20.3%

		Count	Column Valid N %
	More than 20 years ago	41	59.4%
About what portion of your electric baseboard heaters are broken and/or in need repair? Please answer your best guess.	None are broken	56	86.2%
	At least one, but not half	6	9.2%
	About half	3	4.6%
	More than half, but not all	0	0.0%
	All are broken	0	0.0%
How do you plan to address the needed repairs?	Do the repairs myself	2	22.2%
	Get the repairs done by a professional contractor	2	22.2%
	Do no repairs and continue to use the ones that work for as long as possible	3	33.3%
	Do no repairs and plan to install a different heating system	1	11.1%
	Other, please specify	1	11.1%

Willingness to Change

		Count	Column Valid N %
Would you consider changing from electric baseboard heating to a different home heating or heating/cooling system in the future?	Yes, I would consider it	31	46.3%
	Yes, I am currently considering it	5	7.5%
	Not sure	18	26.9%
	No, I would not consider it	13	19.4%
Why would you consider changing to a different system? Select all that apply.	To make my home more comfortable	27	50.0%
	To add dehumidifying capabilities	11	20.4%
	To upgrade my cooling to get rid of window A/C units	23	42.6%
	To have additional or supplemental heating	9	16.7%
	To have new, additional, or supplemental cooling	20	37.0%
	To replace my heating system that is broken or not working well	4	7.4%
	To replace my cooling system that is broken or not working well	1	1.9%
	To take advantage of a utility rebate	20	37.0%

		Count	Column Valid N %
	To take advantage of federal tax credits	26	48.1%
	To take advantage of Inflation Reduction Act rebates (for example, the HOMES program)	20	37.0%
	To save money on heating costs	48	88.9%
	To be more energy efficient	38	70.4%
	To reduce my impact on the environment	12	22.2%
	Other, please specify	2	3.7%
If you were considering changing to a different system, which heating fuel would you prefer?	No preference	14	20.3%
	Natural gas	8	11.6%
	Electric	18	26.1%
	Propane	4	5.8%
	Oil	3	4.3%
	Other, please specify	6	8.7%
	Not sure	12	17.4%
	Wood or wood pellets	4	5.8%
Why would you prefer this fuel type? Select all that apply.	Cheaper to use	16	43.2%
	More energy efficient	17	45.9%
	More environmentally friendly	8	21.6%
	Safer than the other options	12	32.4%
	Better heats the home	11	29.7%
	Other, please specify	9	24.3%

Electric Bill Affordability

Please rate your agreement with the following statements on a scale of 1 to 5 where 1 is "Do not agree at all" and 5 is "Strongly agree".

	If my electric bill goes up, I feel like I must do something to reduce it.	I feel like I have control over how my household uses electricity.	I feel like I have control over my electric bill.	I keep my home at a comfortable temperature in cold weather.	I am easily able to pay my electric bill each month.
Mean	2.19	2.70	3.70	2.67	2.84
N	70	69	70	69	70
Std. Deviation	1.344	1.321	1.387	1.325	1.379

		Count	Column Valid N %
If my electric bill goes up, I feel like I must do something to reduce it.	5 - Strongly agree	37	52.9%
	4	17	24.3%
	3	13	18.6%
	2	2	2.9%
	1 - Do not agree at all	1	1.4%
I feel like I have control over how my household uses electricity.	5 - Strongly agree	20	29.0%
	4	20	29.0%
	3	16	23.2%
	2	9	13.0%
	1 - Do not agree at all	4	5.8%
I feel like I have control over my electric bill.	5 - Strongly agree	7	10.0%
	4	11	15.7%
	3	14	20.0%
	2	8	11.4%
	1 - Do not agree at all	30	42.9%
I keep my home at a comfortable temperature in cold weather.	5 - Strongly agree	20	29.0%
	4	14	20.3%
	3	20	29.0%
	2	9	13.0%
	1 - Do not agree at all	6	8.7%
Please rate your agreement with the following statements on a scale of 1 to 5 where 1 is "Do not agree at all" and 5 is "Strongly agree". - I am easily able to pay my electric bill each month.	5 - Strongly agree	16	22.9%
	4	12	17.1%
	3	18	25.7%
	2	13	18.6%
	1 - Do not agree at all	11	15.7%

Heat Pumps

		Count	Column Valid N %
How familiar are you with heat pumps?	Never heard of them before today.	15	22.7%
	Familiar, but haven't thought about installing one in my home	25	37.9%
	Familiar and considered installing one in my home	21	31.8%

		Count	Column Valid N %
	Familiar and did install one in my (current or past) home	5	7.6%
What resources, if any, would you use to learn about purchasing/installing a heat pump in your home? Select all that apply.	Contractor or builder	35	53.8%
	YouTube videos or channels	12	18.5%
	Websites, blog, or other online sources	27	41.5%
	My friends, family members, or neighbors	33	50.8%
	Rhode Island Energy	37	56.9%
	Members of my church or religious community	4	6.2%
	Home improvement stores (like Home Depot, Lowe's)	16	24.6%
	Choice Neighborhood/community group	3	4.6%
	Home improvement magazines	5	7.7%
	Other, please specify:	2	3.1%
	None	1	1.5%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Saving money on electric bills	1	40	62.5%
	2	10	15.6%
	3	6	9.4%
	4	7	10.9%
	5	1	1.6%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Upgrading old equipment	1	0	0.0%
	2	3	15.0%
	3	2	10.0%
	4	6	30.0%
	5	9	45.0%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Replacing broken equipment	1	0	0.0%
	2	1	50.0%
	3	0	0.0%
	4	0	0.0%
	5	1	50.0%
Which of these benefits of switching to a heat pump are most interesting to you?	1	5	9.4%
	2	14	26.4%

		Count	Column Valid N %
Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Making my home more comfortable year round	3	15	28.3%
	4	11	20.8%
	5	8	15.1%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Getting equipment that was more energy efficient	1	5	11.6%
	2	9	20.9%
	3	12	27.9%
	4	10	23.3%
	5	7	16.3%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Saving energy	1	3	5.7%
	2	12	22.6%
	3	10	18.9%
	4	11	20.8%
	5	17	32.1%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Being more environmentally friendly	1	1	4.2%
	2	3	12.5%
	3	3	12.5%
	4	7	29.2%
	5	10	41.7%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Reducing maintenance costs	1	0	0.0%
	2	2	12.5%
	3	4	25.0%
	4	5	31.3%
	5	5	31.3%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Cooling my home in the summer	1	12	28.6%
	2	11	26.2%
	3	11	26.2%
	4	5	11.9%
	5	3	7.1%
Which of these benefits of switching to a heat pump are most interesting to you? Please number your top five where 1 is first most interesting and 5 is fifth most interesting. - Other, please specify:	1	0	0.0%
	2	0	0.0%
	3	0	0.0%
	4	0	0.0%
	5	1	100.0%

Benefits of Switching to a Heat Pump

	Mean	N
Saving money on electric bills	1.73	64
Upgrading old equipment	4.05	20
Replacing broken equipment	3.5	2
Making my home more comfortable year round	3.06	53
Getting equipment that was more energy efficient	3.12	43
Saving energy	3.51	53
Being more environmentally friendly	3.92	24
Reducing maintenance costs	3.81	16
Cooling my home in the summer	2.43	42
Other, please specify:	5	1

Willingness to Pay

		Count	Column Valid N %
The cost of purchasing and installing heat pumps can range between a few thousand dollars to tens of thousands of dollars based on the size of the home, number of thermostats needed, available supply, and other factors. Imagine you were considering installing a heat pump that cost about $15,000 (includes the equipment and installation costs). About how much would you be willing or able to pay?	All of it	2	2.9%
	More than half	5	7.4%
	About half	11	16.2%
	Less than half	24	35.3%
	None of it	26	38.2%
There are funding resources available like rebates, incentives, and tax credits like those we mentioned previously. Imagine you were eligible for a $2,500 rebate to help cover the costs of that $15,000 heat pump installation. Would this rebate amount be enough to motivate you to make the improvement?	Yes	4	5.7%
	No	51	72.9%
	Not sure	15	21.4%
Based on your current understanding of heat pumps and available incentives, would you consider installing one in your home in the future?	Yes	21	30.4%
	No	13	18.8%
	Not sure	35	50.7%

		Count	Column Valid N %
Why wouldn't you consider installing heat pumps in your home?	Upfront costs	9	69.2%
	Not enough long term electric bill savings	3	23.1%
	Don't like the look of it	3	23.1%
	Concerned about how well it will keep my home warm on cold days	2	15.4%
	Too much hassle to change my equipment	4	30.8%
	Don't plan to live in my home much longer	3	23.1%
	Contractor recommended not to install it	0	0.0%
	Other, please specify	1	7.7%

Participation Barriers

Home Improvements

		Count	Column Valid N %
The next few questions ask about home improvement projects more generally. When it comes to choosing which home improvements to work on, what considerations are most important to you? Select all that apply.	Having the latest technology	1	1.4%
	Having smart technology (for example, thermostat, sound speaker, doorbell camera)	7	10.0%
	Replacing broken equipment	10	14.3%
	Upgrading old equipment before it breaks	14	20.0%
	Design or aesthetics	9	12.9%
	Comfort (making my home comfortable)	52	74.3%
	Having a safe home	36	51.4%
	Increasing the value of my home	34	48.6%
	Saving water and/or energy	36	51.4%
	Reducing my impact on the environment	17	24.3%
	Finding the best deals or lowest prices	30	42.9%
	Lowering my electric bill	55	78.6%
	Making what I have last as long as possible	22	31.4%
	Not wasting money on new equipment I don't need	33	47.1%
Do you plan to do any of the following home	Upgrade a cooling system (central air conditioning, heat pump)	7	10.4%

		Count	Column Valid N %
improvements in your current home in the next 12 months? Select all that apply.	Upgrade a water heater	6	9.0%
	Install a smart/wi-fi enabled thermostat	5	7.5%
	Update the style of a room (kitchen, bath, bedroom, etc.)	14	20.9%
	Install water-saving devices (low-flow showerheads, toilets, faucet aerators, etc.)	7	10.4%
	Buy or replace an appliance (refrigerator, freezer, clothes washer/dryer, etc.)	11	16.4%
	Install insulation in the ceiling or walls	7	10.4%
	Install or replace windows (skylights, storm windows, etc.)	7	10.4%
	Check for and repair air leaks around the house	4	6.0%
	Construct a major renovation or add-on to the house	5	7.5%
	Other, please specify	7	10.4%
	None	26	38.8%

RI Program and Other Resource Awareness

		Count	Column Valid N %
Which of the following financial resources for energy efficient equipment had you heard of before today? Select all that apply.	RI Energy rebates	35	50.7%
	RI Energy zero-interest financing	9	13.0%
	RI Energy free home improvement services for income-eligible households	13	18.8%
	Inflation Reduction Act rebates (e.g. HOMES program)	14	20.3%
	Programs or resources from other utility companies	8	11.6%
	Federal tax credits	41	78.8%
	Other	2	3.8%
	None of the above	17	24.6%
Have you ever considered applying for rebates, discounts, zero-interest loans, or free services or equipment for your home from RI Energy?	Yes	24	45.3%
	No	23	43.4%
	Not sure	6	11.3%

		Count	Column Valid N %
Have you ever received rebates, discounts, zero-interest loans, or free services or equipment from RI Energy?	Yes	6	25.0%
	No	15	62.5%
	Not sure	3	12.5%
Which of the following RI Energy resources have you received for improvements to your current home within the past five years? Select all that apply.	Rebates for home equipment	3	50.0%
	Zero-interest loan for home equipment	1	16.7%
	Free home improvement services	1	16.7%
	Free home equipment upgrades	0	0.0%
	Other, please specify	1	16.7%
	None of these	1	16.7%
Would you have made the home improvement(s) without the RI Energy resources you received?	Yes	3	75.0%
	No	1	25.0%
	Not sure	0	0.0%
What would motivate you to look into these RI Energy resources (rebates, zero-interest loans, or free services or equipment) in the future? Select all that apply.	To receive a rebate	31	44.9%
	To save money on home improvement project costs	31	44.9%
	To save money on electric bills	58	84.1%
	To upgrade old equipment	16	23.2%
	To replace broken equipment	9	13.0%
	To add to a larger remodel or renovation project	5	7.2%
	To make the house more comfortable	33	47.8%
	To get equipment that was more energy efficient	33	47.8%
	To save energy	34	49.3%
	To be more environmentally friendly	13	18.8%
	To reduce maintenance costs	11	15.9%
	To know the resource was offered by RI Energy	10	14.5%
	Previous experience with other RI Energy program	2	2.9%
	Recommendation by a professional contractor	7	10.1%
	Recommendation by someone I know (family, friend, neighbor, etc.)	11	15.9%
	Other, please specify	0	0.0%

		Count	Column Valid N %
Which of the following issues or concerns might keep you from looking into these RI Energy resources (rebates, zero-interest loans, or free services or equipment) in the future? Select all that apply.	Being home during the day to meet someone for an appointment	6	9.4%
	Having enough time to apply and participate	18	28.1%
	Not needing these resources at this time	21	32.8%
	Needing to know more about the resources	26	40.6%
	Thinking these resources are not for me	10	15.6%
	Being able to learn more about the resources by reading or talking to someone in the language I prefer (not English)	1	1.6%
	Not being interested	9	14.1%
	Other, please specify	10	15.6%

Respondent Characteristics

Demographics

		Count	Column Valid N %
How many years have you lived in your current home? (N=70)	One year or less	0	0.0%
	2-3 years	2	2.9%
	4-5 years	6	8.6%
	6-10 years	8	11.4%
	More than 10 years	54	77.1%
	Not sure	0	0.0%
What is the square footage (sq ft) of your home? Your best guess is fine.	500 sq ft or less	1	1.4%
	501 to 1,000 sq ft	8	11.6%
	1,001 to 1,500 sq ft	20	29.0%
	1,501 to 2,000 sq ft	25	36.2%
	2,001 to 3,000 sq ft	12	17.4%
	3,001 to 5,000 sq ft	3	4.3%
	More than 5,000 sq ft	0	0.0%
When was your home built? Your best guess is fine.	Before 1900	0	0.0%
	1900 to 1939	2	2.9%
	1940 to 1959	5	7.1%

		Count	Column Valid N %
	1960 to 1979	35	50.0%
	1980 to 1989	25	35.7%
	1990 to 1999	2	2.9%
	2000 to 2004	0	0.0%
	2005 or later	0	0.0%
	Not sure	1	1.4%
Which part(s) of your house are insulated? Select all that apply. Your best guess is fine	Exterior walls	56	83.6%
	Interior walls	27	40.3%
	Floors over unconditioned spaces like garages and basements	30	44.8%
	Roof	40	59.7%
	Ceilings	39	58.2%
	Other, please specify	4	6.0%

Including you, how many people in each of the age categories listed below live in your home? Please remember to include yourself in the count. If you prefer not to answer, please leave this blank, and go on to the next question.

	Number of children under 18 years old:	Number of adults 18 to 45 years old:	Number of adults 45 to 64 years old:	Number of adults 65 or older:
Mean	.2388	.6176	.6176	.7794
N	67	68	68	68
Std. Deviation	.69826	.93089	.79230	.87836

		Count	Column Valid N %
Including you, how many people in each of the age categories listed below live in your home? Please remember to include yourself in the count. If you prefer not to answer, please leave this blank, and go on to the next question. - Number of children under 18 years old:	.00	58	86.6%
	1.00	4	6.0%
	2.00	4	6.0%
	4.00	1	1.5%
Number of adults 18 to 45 years old	.00	44	64.7%
	1.00	9	13.2%
	2.00	12	17.6%

		Count	Column Valid N %
	3.00	3	4.4%
Number of adults 45 to 64 years old	.00	39	57.4%
	1.00	16	23.5%
	2.00	13	19.1%
Number of adults 65 or older	.00	34	50.0%
	1.00	16	23.5%
	2.00	17	25.0%
	3.00	1	1.5%
Which choice best represents your current annual household income before taxes (including from all sources)?	Less than $25,000	5	8.8%
	$25,000 to less than $50,000	7	12.3%
	$50,000 to less than $75,000	10	17.5%
	$75,000 to less than $100,000	14	24.6%
	$100,000 to less than $150,000	15	26.3%
	$150,000 to less than $200,000	4	7.0%
	$200,000 or over	2	3.5%
Which categories best describe you? Select all that apply.	American Indian or Alaska Native (for example, Mashpee, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, or Nome Eskimo Community.)	0	0.0%
	Asian (for example, Chinese, Filipino, Asian Indian, Vietnamese, Korean, or Japanese)	1	1.6%
	Black or African American (for example, African American, Jamaican, Haitian, Nigerian, Ethiopian, or Somalian)	1	1.6%
	Hispanic, Latino, or Spanish origin (for example, Mexican or Mexican American, Puerto Rican, Cuban, Salvadorian, Dominican, or Colombian)	3	4.9%
	Native Hawaiian or Other Pacific Islander (For example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, or Marshallese)	0	0.0%

		Count	Column Valid N %
	Middle Eastern or North African (for example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, or Algerian)	1	1.6%
	White (for example, German, Irish, English, Italian, Polish, or French)	57	93.4%
	Other, please specify	0	0.0%

Home Characteristics

		Count	Column Valid N %
Which options best describe your home cooling system? Select all that apply.	Central air conditioning with air ducts	9	13.6%
	Ductless mini-split air conditioners	5	7.6%
	Room/Window air conditioners	42	63.6%
	Evaporative coolers	1	1.5%
	None	9	13.6%
	Other, please specify	5	7.6%
What fuel does your water heater use? Select all that apply.	Electric	56	88.9%
	Natural gas	1	1.6%
	Oil	5	7.9%
	Propane	1	1.6%
	Other, please specify	0	0.0%
Is your hot water stored in a tank prior to use, or do you have an on-demand tankless water heater?	Tank	58	93.5%
	Tankless	4	6.5%
Which option best describe your water heater?	Heat pump water heater	10	31.3%
	Combination boiler water heater	10	31.3%
	Condensing water heater	4	12.5%
	Other, please specify	8	25.0%
About how old is your water heater? Your best guess is fine.	Less than 5 years	21	32.8%
	5 to 9 years	20	31.3%
	10 to 14 years	17	26.6%
	15 to 20 years	3	4.7%
	More than 20 years	3	4.7%

Appendix E: Survey Instrument

This appendix reports the guide researchers used when conducting surveys with customers for the Rhode Island (RI) Energy (formerly, National Grid RI) Electric Heat Customer Characterization Study.

Screener

Recruitment materials will direct interested customers to the screener section of the survey instrument. The screener will have a dual purpose, 1) to screen for their eligibility to participate, and 2) to immediately connect eligible customers to the full survey. Eligible customers are homeowners within RI Energy's service area that have electric resistance heating in their homes.

[ASK ALL] [LANDING PAGE]

1. [SCREEN_INTRO] Welcome! Thank you for your interest in this Rhode Island (RI) Energy study. Please answer the next few questions to confirm your eligibility to participate before you begin the survey. [TEXT]

[ASK ALL] [DISPLAY ON LANDING PAGE]

2. [AGE] Are you at least 18 years of age? [SINGLE CHOICE; FORCE RESPONSE]
   a. Yes [CONTINUE]
   b. No [INELIGIBLE]

[IF Q2=a] [POP-UP ON SAME PAGE AFTER Q2. a IS SELECTED, ELSE SKIP TO INELIGIBLE_MESSAGE]

3. [RICX] Are you an RI Energy customer? [SINGLE CHOICE; FORCE RESPONSE]
   a. Yes [CONTINUE]
   b. No [INELIGIBLE]
   c. Not sure [INELIGIBLE]

[IF Q3=a] [POP-UP ON SAME PAGE AFTER Q3. a IS SELECTED, ELSE SKIP TO INELIGIBLE_MESSAGE]

4. [OWN] Do you rent or own the home you live in? [SINGLE CHOICE; FORCE RESPONSE]
   a. Own [CONTINUE]
   b. Rent [INELIGIBLE]

[IF Q4=a] [NEW PAGE]

5. [DECIDER] We'd like to hear from someone in your household who helps make decisions about how you heat your home, for example, temperature settings, equipment maintenance, or paying energy bills. Are you involved in those decisions? [SINGLE CHOICE; FORCE RESPONSE]
   a. Yes [CONTINUE]
   b. No [SKIP TO REFERRAL1]

[IF Q5=a] [NEW PAGE]

6. Q5b. [TYPE] Which option below best describes your home type? [SINGLE CHOICE; FORCE RESPONSE]
   a. Single family house detached from any other house
   b. Row home - single family house attached to one or more single family homes
   c. Building with 2-4 units (duplex, condo, townhouse, apartment, etc.)
   d. Building with 5-10 units
   e. Building with 20+ units
   f. Other (please specify)

[IF Q5=a] [NEW PAGE]

7. [HEAT1] Which of the following options best describe your home heating system? Select all that apply. [ROTATE; MULTIPLE CHOICE; FORCE RESPONSE]
   a. Electric baseboard heater(s) (heaters located along the bottom of the wall in individual rooms) [CONTINUE]
   b. Portable, plug-in electric heater [CONTINUE IF a IS ALSO SELECTED, ELSE INELIGIBLE]
   c. Heat pump (centralized with air ducts or in smaller areas as ductless mini splits) [CONTINUE IF a IS ALSO SELECTED, ELSE INELIGIBLE]
   d. Boiler [CONTINUE IF a IS ALSO SELECTED, ELSE INELIGIBLE]
   e. Fireplace (if used for heating your home) [CONTINUE IF a IS ALSO SELECTED, ELSE INELIGIBLE]
   f. Wood or pellet stove [CONTINUE IF a IS ALSO SELECTED, ELSE INELIGIBLE]
   g. Furnace [CONTINUE IF a IS ALSO SELECTED, ELSE INELIGIBLE]
   h. Other, please specify [ANCHOR; OPEN END; INELIGIBLE]
   i. Not sure [ANCHOR; EXCLUSIVE; INELIGIBLE]

[IF Q7=a AND ANY b-h IS ALSO SELECTED] [NEW PAGE]

Q7b. Is the boiler you use electrically powered? [SINGLE CHOICE; FORCE RESPONSE] *(Only asked to Wave 2 of survey respondents).*
   a. Yes
   b. No
   c. Not sure

[IF Q7=a AND ANY b-h IS ALSO SELECTED] [NEW PAGE]

8. [HEAT2] Which type of heating equipment provides most of the heat for your home? [ROTATE; SINGLE CHOICE; FORCE RESPONSE]
   a. [PIPE IN Q7.a IF SELECTED] Electric baseboard heater(s) [CONTINUE]
   b. [PIPE IN Q7.b IF SELECTED] Portable, plug-in electric heater [INELIGIBLE]
   c. [PIPE IN Q7.c IF SELECTED] Heat pump [INELIGIBLE]
   d. [PIPE IN Q7.d IF SELECTED] Boiler [INELIGIBLE]
   e. [PIPE IN Q7.e IF SELECTED] Fireplace [INELIGIBLE]
   f. [PIPE IN Q7.f IF SELECTED] Wood or pellet stove [INELIGIBLE]
   g. [PIPE IN Q7.g IF SELECTED] Furnace [INELIGIBLE]
   h. [DISPLAY IF Q7.h SELECTED] Other [INELIGIBLE]

[IF Q7=ONLY a SELECTED OR Q8=a] [NEW PAGE]

9. [ELIGIBLE_MESSAGE] Congratulations! You are eligible to participate. The survey will now begin. [CONTINUE TO FULL SURVEY]

[IF Q5=b] [NEW PAGE]

10. [REFERRAL1] Is there someone else who lives with you who is involved in those decisions that you could refer to us? [SINGLE CHOICE]
    a. Yes and I can share their contact information [CONTINUE TO REFERRAL2]
    b. No [INELIGIBLE]

[IF Q10=a] [DISPLAY ON SAME PAGE AFTER Q10.a IS SELECTED, ELSE SKIP TO INELIGIBLE_MESSAGE]

11. [REFERRAL2] Thank you! Please enter their contact information below. We may send them an invitation to participate in the study. [NAME AND EMAIL REQUIRED] [ONCE COMPLETE, CONTINUE TO INELIGIBLE_MESSAGE]
    a. First Name [OPEN END]
    b. Last Name [OPEN END]
    c. Phone [OPEN END]
    d. Email [OPEN END]

[IF Q4=b] [NEW PAGE]

12. [INELIGIBLE_RENTER] Unfortunately, you are not eligible to participate in this study at this time. As part of this research, we are interviewing rental property owners and managers. If you would like to refer us to your landlord, please share their contact information below. To thank you, we will include you in the drawing for one of five $250 Tango gift cards even though you were not eligible to participate in this study. Note: Sharing your landlord's contact information is optional and voluntary. Please only share this information if you feel comfortable doing so.
    e. Landlord Name [OPEN END]
    f. Property Management Company (optional) [OPEN END]
    g. Landlord Email [OPEN END]
    h. Email [OPEN END]

[IF INELIGIBLE AND NOT RENTER] [NEW PAGE]

13. [INELIGIBLE_MESSAGE] Thank you for your interest. Unfortunately, you are not eligible to participate in this research at this time. [END SCREENER AND SURVEY]

Heating Equipment

Electric Baseboard Heaters

[Purpose of section: Understand customers' experiences with using and maintaining their electric baseboard heaters including energy costs and savings attitudes.]

[ASK ALL] [NEW PAGE]

14. [YEARS] These first few questions ask about your home. How many years have you lived in your current home? [SINGLE CHOICE]

a. One year or less
b. 2-3 years
c. 4-5 years
d. 6-10 years
e. More than 10 years
f. Not sure [ANCHOR; EXCLUSIVE]

[ASK ALL]

15. [SIZE] What is the square footage (sq ft) of your home? Please answer with your best guess. [SINGLE CHOICE]
    a. 500 sq ft or less
    b. 501 to 1,000 sq ft
    c. 1,001 to 1,500 sq ft
    d. 1,501 to 2,000 sq ft
    e. 2,001 to 3,000 sq ft
    f. 3,001 to 5,000 sq ft
    g. More than 5,000 sq ft

[ASK ALL]

16. [BUILT] When was your home built? Please answer with your best guess. [SINGLE CHOICE]
    a. Before 1900
    b. 1900 to 1939
    c. 1940 to 1959
    d. 1960 to 1979
    e. 1980 to 1989
    f. 1990 to 1999
    g. 2000 to 2004
    h. 2005 or later
    i. Not sure [ANCHOR; EXCLUSIVE]

[ASK ALL] [NEW PAGE]

17. [INSULATION] Which part(s) of your house are insulated? Please answer with your best guess. [MULTIPLE CHOICE]
    a. Exterior walls
    b. Wall cavities
    c. Floors over unconditioned spaces like garages and basements
    d. Roof
    e. Ceilings
    f. Other, please specify [ANCHOR; OPEN END]
    g. Not sure [ANCHOR; EXCLUSIVE]

[ASK ALL] [NEW PAGE]

18. [EBH_SAT] Overall, how would you rate your satisfaction with your electric baseboard heaters? Please rate on a scale of 1 to 5 where 1 is "Not at all satisfied" and 5 is "Very satisfied." [RECORD RATING]

1	2	3	4	5	[6] [EXCLUSIVE]
Not at all satisfied				Very satisfied	Not sure

[IF Q18≠6] [NEW PAGE]

19. [EBH_SAT2] Why did you give this rating? [OPEN END]
    a. [OPEN END]

[ASK ALL] [NEW PAGE]

20. [EBH_USE] Which choice below best describes how you use the electric baseboard heaters and/or their thermostat controls to warm your home? [SINGLE CHOICE]
    a. Room-zoned heating (only in certain rooms)
    b. Zoned heating (only on certain floors or larger sections of the home)
    c. Whole-home heating (all rooms and spaces at once)
    d. Other, please specify [ANCHOR; OPEN END]
    e. Not sure [ANCHOR; EXCLUSIVE]

[ASK ALL]

21. [EBH_AGE] About how old is your electric baseboard heating system? Please answer with your best guess. [SINGLE CHOICE]
    a. Up to 2 years ago
    b. Between 2 and 5 years ago
    c. Between 5 and 10 years ago
    d. Between 10 and 20 years ago
    e. More than 20 years ago

[ASK ALL]

22. [EBH_BROKEN] About what portion of your electric baseboard heaters are broken and/or in need repair? Please answer your best guess. [SINGLE CHOICE]
    a. None are broken [SKIP TO Q25]
    b. At least one, but not half
    c. About half
    d. More than half of them, but not all
    e. All are broken
    f. Not sure [ANCHOR; EXCLUSIVE] [SKIP TO Q25]

[IF Q22≠a OR f]

23. [EBH_REPAIRS] What types of repairs are needed? [OPEN END]

[IF Q22≠a OR f] [NEW PAGE]

24. [EBH_FIX] How do you plan to address the needed repairs? [SINGLE CHOICE]
    a. Do the repairs myself before the next cold weather season
    b. Get the repairs done by a professional contractor before the next cold weather season
    c. Do no repairs and continue to use the ones that work for as long as possible
    d. Do no repairs and plan to install a different heating system [SKIP TO Q26]
    e. Other, please specify [ANCHOR; OPEN END]
    f. Not sure [ANCHOR; EXCLUSIVE]

[ASK ALL EXCLUDING IF Q24=d]

25. [FUTURE_INSTALL] Would you consider changing from electric baseboard heating to a different home heating or heating/cooling system in the future? [SINGLE CHOICE]
    a. Yes, I would consider it
    b. Yes, I am currently considering it
    c. No, I would not consider it
    d. Not sure

[IF Q22=d OR Q25=a, b OR d]

26. [INSTALL_WHY] Why would you/are you considering changing to a different heating or heating/cooling system? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. To make my home more comfortable
    b. To add dehumidifying capabilities
    c. To upgrade my cooling to get rid of window A/C units
    d. To have additional or supplemental heating
    e. I need to have new, additional, or supplemental cooling
    f. My heating system is broken or not working well
    g. My cooling system is broken or not working well
    h. To take advantage of a utility rebate
    i. To take advantage of a federal tax credit
    j. To take advantage of Inflation Reduction Act rebates (the HOMES program)
    k. To save money on my heating costs
    l. To be more energy efficient
    m. To have zoned heating/cooling
    n. To reduce my impact on the environment
    o. Other, please specify [ANCHOR; OPEN END]

[IF Q25=c] [NEW PAGE]

27. [INSTALL_WHY_NOT] Why would/did you not consider changing to a different heating or heating/cooling system? [OPEN END]

[ASK ALL] [NEW PAGE]

28. [FUEL_CHOICE] If you were to consider changing to a different heating/cooling system, which of the following fuel source would you prefer to use to heat your home? [ROTATE; SINGLE CHOICE]
    a. I have no preference [ANCHOR]
    b. Natural Gas
    c. Electric
    d. Propane
    e. Oil
    f. Wood or wood pellets
    g. Other, please specify [ANCHOR; OPEN END]
    h. Not sure [ANCHOR; EXCLUSIVE]

[ASK IF Q28≠a, g, OR h]

29. [CHOICE_WHY] Why would you prefer [Q28 Response] heating? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Cheaper to use
    b. More energy efficient
    c. More environmentally friendly
    d. Safer than the other options
    e. Better heats the home
    Other, please specify [ANCHOR; OPEN END]
    Not sure [ANCHOR; EXCLUSIVE]

[ASK ALL] [NEW PAGE]

30. [ELEC_COST] Please rate your agreement with the following statements on a scale of 1 to 5 where 1 is "Do not agree at all" and 5 is "Strongly agree". [ROTATE; MATRIX]

Statement	1 Do not agree at all	2	3	4	5 Strongly agree	[6] Not sure [EXCLUSIVE]
a. If my electric bill goes up, I feel like I must do something to reduce it.						
b. I feel like I have control over how my household uses electricity.						
c. I feel like I have control over my electric bill.						
d. I keep my home at a comfortable temperature in cold weather.						
e. I am easily able to pay my electric bill each month.						

Heat Pumps

[ASK ALL]

31. [35.HP_ED] The next few questions ask about heat pumps.
    A heat pump is an electric heating and cooling system installed on the inside and outside your home. A heat pump uses refrigerant to transfer heat. In warmer months, it pulls heat out of indoor air to cool your home, and in cooler months, it pulls heat from the outdoor air and transfers it indoors.

    While the amount of savings varies for each household, heat pumps replacing electric baseboard heaters can reduce heating bills by hundreds or more than a thousand dollars a year. [TEXT]

[ASK ALL] [NEW PAGE] [DISPLAY IMAGES OF HEAT PUMPS]

32. [36.HP_AWARE] How familiar are you with heat pumps? [SINGLE CHOICE]
    a. Never heard of them before today.
    b. Familiar, but haven't thought about installing one in my home.
    c. Familiar and considered installing one in my home.
    d. Familiar and did install one in my (current or past) home.

e. Other, please specify [ANCHOR; OPEN END]

[ASK ALL]

33. [HP_RESOURCES] What resources, if any, would you use to learn about purchasing/installing a heat pump in your home? [ROTATE; MULTIPLE CHOICE]
    a. Contractor or builder
    b. YouTube videos or channels
    c. Websites, blog, or other online sources
    d. My friends, family members, or neighbors
    e. Rhode Island Energy
    f. Members of my church or religious community
    g. Home improvement store (like Home Depot, Lowes)
    h. Neighborhood/community group
    i. Home improvement magazines
    j. Other, please specify [ANCHOR; OPEN END]
    k. Not sure
    l. None [ANCHOR; EXCLUSIVE]

[ASK ALL] [NEW PAGE]

34. [38.HP_RANK] Which of these benefits of switching to a heat pump are most interesting to you? Rank your top five choices where 1 is most interesting and 5 is fifth most interesting. [ROTATE; RANK TOP FIVE]
    a. Saving money on electric heating bills
    b. Upgrading old equipment
    c. Replacing broken equipment
    d. Making my home more comfortable year round
    e. Getting equipment that was more energy efficient
    f. Saving energy
    g. Being more environmentally friendly
    h. Reducing maintenance costs
    i. Cooling my home in the summer
    j. Other, please specify [ANCHOR; OPEN END]

[ASK ALL] [NEW PAGE]

35. [HP_POCKET] The cost of purchasing and installing heat pumps can range between a few thousand dollars to tens of thousands of dollars based on the size of the home, number of thermostats needed, available supply, and other factors. Imagine you were considering installing a heat pump that cost about $15,000 (includes the equipment and installation costs). About what amount would you be willing to pay out of pocket? [SINGLE CHOICE]
    a. All of it
    b. More than half
    c. About half
    d. Less than half
    e. None of it

[ASK ALL] [NEW PAGE]

36. [HP_INCENT] There are funding resources available like rebates, zero-interest loans, and tax credits. Imagine you were eligible for a $2,500 rebate to help cover the costs of that $15,000 heat pump installation. Would a $2,500 rebate be enough to motivate you to make the improvement? [SINGLE CHOICE]
    a. Yes
    b. No
    c. Not sure

[ASK ALL]

37. [HP_FUTURE_INSTALL] Based on your current understanding of heat pumps and available funding resources, would you consider installing one in your home in the future? [SINGLE CHOICE]
    a. Yes [SKIP TO Q52]
    b. No
    c. Not sure [SKIP TO Q52]

[IF Q37=b]

38. [HP_NO_MOTIVE] Why would you not consider installing heat pumps in your home in the future? [ROTATE; MULTIPLE CHOICE]
    a. Upfront costs
    b. Not enough long-term electric bill savings
    c. Do not like the look of the equipment
    d. Concerned about how well it will keep my home warm on cold days
    e. Too much hassle to change my equipment
    f. Do not plan to live in my home much longer
    g. Contractor recommended not to install the equipment
    h. Other, please specify [ANCHOR; OPEN END]

Participation Barriers

[Purpose of section: Explore challenges and barriers customers face when it comes to installing heat pumps including how customers approach home improvement projects, awareness of and interest in RI Energy programs, and familiarity with and interest in heat pump technology.]

Home Improvements

[ASK ALL]

39. [HIMP_MOTIVE] The next few questions are about home improvement projects more generally. When it comes to choosing which home improvements to work on, what considerations are most important to you? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Having the latest technology
    b. Having smart technology (for example, thermostat, sound speaker, doorbell camera)

c. Replacing broken equipment
d. Upgrading old equipment before it breaks
e. Design or aesthetics
f. Comfort (making my home comfortable)
g. Having a safe home
h. Increasing the value of my home
i. Saving water and/or energy
j. Reducing my impact on the environment
k. Finding the best deals or lowest prices
l. Lowering my electric bill
m. Making what I have last as long as possible
n. Not wasting money on new equipment I don't need

[ASK ALL] [NEW PAGE]

40. [25. HIMP_PLANS] Do you plan to do any of the following home improvements in your current home in the **next 12 months**? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Upgrade a cooling system (central air conditioning, heat pump)
    b. Upgrade a water heater
    c. Install a smart/wi-fi enabled thermostat
    d. Update the style of a room (kitchen, bath, bedroom, etc.)
    e. Install water-saving devices (low-flow showerheads, toilets, faucet aerators, etc.)
    f. Buy or replace an appliance (refrigerator, freezer, clothes washer/dryer, etc.)
    g. Install insulation in the ceiling or walls
    h. Install or replace windows (skylights, storm windows, etc.)
    i. Check for and repair air leaks around the house
    j. Construct a major renovation or add-on to the house
    k. Other, please specify [ANCHOR; OPEN END]
    l. None [ANCHOR; EXCLUSIVE]

Program Awareness

[ASK ALL]

41. [27.PROG_AWARE] RI Energy offers programs and resources like rebates and zero-interest financing to help more customers make home improvements to save energy and money, improve comfort, and make their homes better. There are also resources available from other organizations.

    Which of resources had you heard of before today? Select all that apply. [ROTATE; MULTIPLE CHOICE]

    a. RI Energy rebates
    b. RI Energy zero-interest financing
    c. RI Energy free home improvement services for income-eligible households
    d. Inflation Reduction Act rebates (e.g. HOMES program)
    e. Programs or financial resources from other utility companies

f. Federal tax credits
g. Other, please specify [ANCHOR; OPEN END]
h. None of these [ANCHOR; EXCLUSIVE]

[IF Q41≠h]

42. [PROG_CONSIDERED] Have you ever considered applying for rebates, discounts, zero-interest loans, or free services or equipment for your home from RI Energy? [SINGLE CHOICE]
    a. Yes
    b. No
    c. Not sure

[IF Q42=a]

43. [PROG_PART1] Have you ever received rebates, discounts, zero-interest loans, or free services or equipment from RI Energy? [SINGLE CHOICE]
    a. Yes
    b. No
    c. Not sure

[IF Q43=a]

44. [PROG_PART2] Which of the following RI Energy resources have you received for improvements to your **current home** within the **past five years**? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Rebates for equipment
    b. Zero-interest loan for equipment
    c. Free home improvement services
    d. Free equipment upgrades
    e. Other, please specify [ANCHOR; OPEN END]
    f. None of these [ANCHOR; EXCLUSIVE]

[IF Q44=a, b, OR d] [POP-UP ON SAME PAGE]

45. [PROG_EQUIP] What equipment did you receive? [OPEN END]

[IF Q44=a, b, OR d] [POP-UP ON SAME PAGE]

46. [PROG_UPGRADE_MOTIVE] Would you have made the home improvement(s) without the resources you received from RI Energy? [SINGLE CHOICE]
    a. Yes
    b. No
    c. Not sure

[ASK ALL] [NEW PAGE]

47. [PROG_FUTURE_MOTIVE] What would motivate you to look into these RI Energy resources (rebates, zero-interest loans, or free services or equipment) in the future? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. To receive a rebate
    b. To save money on home improvement project costs
    c. To save money on electric bills
    d. To upgrade old equipment
    e. To replace broken equipment

f. Adding to a larger remodeling or renovation project
g. To make the house more comfortable
h. To get equipment that was more energy efficient
i. To save energy
j. To be more environmentally friendly
k. To reduce maintenance costs
l. Knowing the program was offered by RI Energy
m. Previous experience with other RI Energy program
n. Recommendation by a professional contractor
o. Recommendation by someone I know (family, friend, neighbor, etc.)
p. Other, please specify [ANCHOR; OPEN END]

[ASK ALL] [NEW PAGE]

48. [PROG_BARRIERS] Which of the following issues or concerns might keep you from looking into these RI Energy resources (rebates, zero-interest loans, or free services or equipment) in the future? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Being home during the day to meet someone for an appointment
    b. Having enough time to apply and participate
    c. Not needing these resources at this time
    d. Needing to know more about the resources
    e. Thinking these resources are not for me
    f. Being able to learn more about the resources by reading or talking to someone in the language I prefer (not English)
    g. Not being interested
    h. Other, please specify [ANCHOR; OPEN END]

Characteristics

[Purpose of section: Gather information about the characteristics of respondents and their homes to explore potential variations in experiences for different customer segments.]

Demographics

[ASK ALL SECTION QUESTIONS TO ALL]

49. [HOUSEHOLD] These next three questions are for statistical purposes only. Your responses are voluntary and will be kept strictly confidential. Including you, how many people in each of the age categories listed below live in your home? Please remember to include yourself in the count. If you prefer not to answer, please leave this blank, and go on to the next question. [CONSTANT SUM]
    a. Number of children under 18 years old: [NUMERIC OPEN END]
    b. Number of adults 18 to 45 years old: [NUMERIC OPEN END]
    c. Number of adults 45 to 64 years old: [NUMERIC OPEN END]
    d. Number of adults 65 or older: [NUMERIC OPEN END]
    Total: [AUTO SUM]

50. [INCOME] Which of the following categories best represents your current annual household income before taxes (including from all sources)? [SINGLE CHOICE]
    a. Less than $25,000
    b. $25,000 to less than $50,000
    c. $50,000 to less than $75,000
    d. $75,000 to less than $100,000
    e. $100,000 to less than $150,000
    f. $150,000 to less than $200,000
    g. $200,000 or over
    h. Prefer not to answer [EXCLUSIVE]
51. [SOCIOLOGY] Which of the categories below best describe you? Please select all that apply. [ALPHABETICAL; MULTIPLE CHOICE]
    a. American Indian or Alaska Native (for example, Mashpee, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, or Nome Eskimo Community)
    b. Asian (for example, Chinese, Filipino, Asian Indian, Vietnamese, Korean, or Japanese)
    c. Black or African American (for example, African American, Jamaican, Haitian, Nigerian, Ethiopian, or Somalian)
    d. Hispanic, Latino, or Spanish origin (for example, Mexican or Mexican American, Puerto Rican, Cuban, Salvadorian, Dominican, or Colombian)
    e. Native Hawaiian or Other Pacific Islander (For example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, or Marshallese)
    f. Middle Eastern or North African (for example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, or Algerian)
    g. White (for example, German, Irish, English, Italian, Polish, or French)
    h. Other, please specify [OPEN END]
    i. Prefer not to answer [EXCLUSIVE]

Home Characteristics

[ASK ALL SECTION QUESTIONS TO ALL]

52. [COOL] Thank you for your responses so far. These last questions ask a bit more about your home. Which of the following options best describes your home cooling system? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Central air conditioning with air ducts
    b. Ductless mini-split air conditioners
    c. Room/Window air conditioners
    d. Evaporative coolers
    e. None [ANCHOR; EXCLUSIVE]
    f. Other, please specify [ANCHOR; OPEN END]
    g. Not sure [ANCHOR; EXCLUSIVE]

[NEW PAGE]

53. [WH_FUEL] What fuel does your water heater use to heat water in your home? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Electric
    b. Natural gas
    c. Oil
    d. Propane
    e. Other, please specify [ANCHOR; OPEN END]
    f. Not sure [ANCHOR; EXCLUSIVE]
54. [WH_TANK] Is your hot water stored in a tank prior to use, or do you have an on-demand tankless water heater? [SINGLE CHOICE]
    a. Tank
    b. Tankless
    c. Not sure [ANCHOR; EXCLUSIVE]
55. [WH_TYPE] Which of the following options best describes your water heater? Select all that apply. [ROTATE; MULTIPLE CHOICE]
    a. Heat pump water heater
    b. Combination boiler water heater
    c. Condensing water heater
    d. Other, please specify [ANCHOR; OPEN END]
    e. Not sure [ANCHOR; EXCLUSIVE]
56. [WH_AGE] About how old is your water heater? Please answer with your best guess. [SINGLE CHOICE]
    a. Less than 5 years
    b. 5 to 9 years
    c. 10 to 14 years
    d. 15 to 20 years
    e. More than 20 years
    f. Not sure [ANCHOR; EXCLUSIVE]

Closing

[ASK ALL SECTION QUESTIONS TO ALL]

57. [RI_COMMENTS] Thank you for taking the time to complete this survey! Do you have any comments for RI Energy? [SINGLE CHOICE]
    a. Yes, please specify [OPEN END]
    b. Not at this time
58. [EMAIL_VERIFY] The email address we have on file for you is [EMAIL]. Is this the best email address to reach you if we draw your name for one of the five $250 Tango gift cards? [SINGLE CHOICE]
    a. Yes
    b. No, the best email is (please specify) [OPEN END]
    c. Opt-out of the sweepstakes

[NEW PAGE]

59. [END_SURVEY_MESSAGE] Your responses have been submitted. On behalf of RI Energy, thank you! If you are interested in participating in one of RI Energy's programs, please visit their website (https://www.rienergy.com).

[CLOSE SURVEY]

Message: Thank you for sharing your feedback! Your responses have been submitted. Sweepstakes winners will be notified in the next 1-4 weeks.

ALL END survey message: On behalf of RI Energy, thank you for your time! Visit www.rienergy.com to learn more about ways to save energy and lower your energy bills.

Appendix F: Landlord Interview Methodology and Guide

This appendix reports the approach and guide researchers used when conducting interviews with landlords for the Rhode Island (RI) Energy Electric Heat Customer Characterization Study.

Overview

The study conducted three interviews with landlords, RI Energy customers who are rental property owners and managers (excluding public housing authorities). Through interviews, we gathered information to explore barriers to heat pump adoption including equipment and installation costs and concerns, previous experiences with heat pumps, implications for properties where tenants pay utilities, and other tenant concerns. We conducted these 45 to 60-minute interviews using Zoom or Teams online meeting platforms. We provided participants with a $200 Tango gift card incentive for their time. Tango gift cards are digitally redeemed by choosing from 100+ merchants, like Amazon, Target, and Walmart. Table 25 shows which sections of the interview guide address the research questions. The full interview guide follows, below.

Table 25. Landlord Interview Research Question Index

Research questions	Interview section
How do landlords' experiences vary by property type (market rate/income-qualified) or rent type (utility-inclusive/not)?	Property Management
What are the day to day challenges of property management according to landlords?	
What are landlords' perceptions of the pros and cons of including tenants' utility bills, specifically heating bills, in the cost of the rent?	
What are the barriers for landlords to installing heat pumps? Specifically: • Equipment: How aware are landlords of heat pump technology? • Interest: What is their interest in installing heat pumps? Have they considered switching to heat pumps in the past? If yes, why didn't they switch? • Incentives: What level of incentive or combination of funding/financing might convince landlords to convert to heat pumps? • Heating system changes: What are landlords' experiences with switching from one heating system to another, or switching from electric fuel to natural gas, oil, or propane?	Participation Barriers

Sampling

This study targeted rental property owners and managers (excluding public housing authorities) who rent out homes that primarily use electric resistance baseboard heating and aimed for a mix of market rate/income-qualified properties and landlord/tenant electric bill responsibility. We recruited landlords to participate in interviews and complete the pre-interview screener in two waves. In all, we received 22 pre-interview screener responses and conducted three interviews. The following sections describe sampling and recruitment in greater detail.

Wave 1: Online Rental Market Sample

The study recruited from the landlord contacts identified through the Online Rental Market Review (see Appendix A: Interim Research and Data Review Memo (Updated)). The web-scrapping and manual data collection tasks of the review resulted in 871 landlord and property management company contacts. After removing cases with duplicate property management companies, manager names, manager emails, and manager phone numbers, the final sample had 311 unique landlord contacts.

Wave 1 Response

The study received 22 pre-interview screener survey completes, which is a 7% response rate given a sample of 311 landlords. Of the 22 we screened, 10 were eligible. Six of these 10 scheduled an interview, and three of these six completed an interview (.09% response rate). The six others either no-showed or rescheduled and ultimately discontinued contact. While we initially sought out landlords with properties that use electric resistance heat, due to low response rate to this research, we relaxed that criteria and spoke with landlords with a variety of heat. Two of the landlords that shared heating type, indicated that their units are heated by natural gas.

Table 26. Landlord Interview Disposition

Description	Count	Percent (n=871)	Response Rate (RR) (n=311)
Total landlords in the list (population)	871	100%	-
Met study criteria [1] *106 with email, 205 no email*	311	36%	-
Sample pulled *106 with email, 205 no email*	311	36%	-
Valid sample pulled *Removed 24 invalid emails and phones*	287	-	92%
Total reached *Includes 38 declined participation*	**60**	-	**21%**
Total screened *Includes 12 interested, but ineligible*	22	-	8%
Total eligible	10	-	3%
Total scheduled	6	-	2%
Total interview completes	**3**	-	**1%**

[1] Landlords who met study criteria owned or managed rental properties with a mix of landlord/tenant electric bill responsibility and market rate/income qualified rate offerings. The list excluded public housing authorities. We also removed cases with duplicate property management companies, manager names, manager emails, and manager phone numbers. Reference the Appendix A: Interim Research and Data Review Memo for additional details on landlord list development.

Wave 2: Landlords with Heat Pumps

For the second wave of recruitment, we expanded study eligibility requirements to include landlords who had participated in the Multifamily (MF) or Income Eligible Multifamily (IEMF) program and received a heat pump to explore their experiences with the equipment. These landlords, by nature of being past program participants, were more likely to participate in the study. RI Energy provided 132 cases of customers who participated between October 1, 2021 to December 31, 2023, of which four had installed a heat pump and were eligible for the study (were not public housing authorities). We recruited these customers by email and phone with up to four attempts each, thereby exhausting the sample.

Wave 2 Response

No customers responded to the outreach, which is to be expected with a small sample (four cases).

Other Landlord Sample Generation Efforts

Landlords without heat pumps. The study explored expanding eligibility criteria to include landlords who participated in the MF or IEMF program, were offered a heat pump, but chose not to install one. Information about equipment that was offered but not selected for projects was

unavailable in RI Energy's tracking system at the time of this study. RI Energy was unable to provide any cases for this sample.

Landlords from the customer survey snowball sample. The study embedded a landlord referral question into the pre-survey for customers. The question asked renter respondents (renters were ineligible for the survey) if they would like to refer their landlord for an interview and then prompted the respondent to enter their landlord's name, email, and phone number. We received limited responses, and this did not result in any scheduled interviews.

Landlords affiliated with associations. We reached out to landlord affiliated associations to request that they send the survey to their members. One association expressed interest verbally but did not send out the survey.

Recruitment

We recruited landlords for interviews through email and by phone where the contact information was available. We used invitation language like the following example.

Recruitment materials

The information below presents an example of an email interview invitation.

Subject: Rhode Island Energy needs your input!

Sender: [EMAIL]Hello [NAME],

My company, ILLUME Advising, is conducting research for Rhode Island (RI) Energy to learn about ways to better help rental property owners and managers with opportunities to save money and energy on their utility bills. We'd like to hear from you!

We'd like to offer you a **$200 Tango gift card** for about 45-60 minutes of your time. Tango gift cards are digitally redeemed by choosing from 100+ merchants, like Amazon, Target, and Walmart. The interview will be a video call, and any information you provide will be kept confidential**.** If you are interested, please click on the survey link below to determine your eligibility and tell us a few times that work best for you in the next week or two. We will schedule the interview around your availability.

> **Click here to take the survey** **[SURVEY LINK: ${l://SurveyLink?d=Take the Survey}]**
>
> Or copy and paste the URL below into your internet browser: **[${l://SurveyURL}]**

Thank you for your time, we look forward to speaking with you!

[RESEARCHER NAME]

Please contact [RI Energy Staff] at [email] should you have any concerns about this research. Follow the link to opt out of future emails: **[${l://OptOutLink?d=Click here to unsubscribe}]**

Screener-Scheduler

We directed interested landlords to the short pre-interview survey shown below as part of the recruitment process. Landlords arrived to the pre-interview survey either through a link in an email invitation or a researcher administered the survey to them over the phone. The survey had multiple purposes, 1) to screen for their eligibility to participate, 2) to gather information about landlords heating systems, and 3) to efficiently begin the scheduling process for those eligible. Eligible landlords were property owners and managers who had the authority to make or recommend capital improvement purchasing decisions.

[LANDING PAGE]

[SCREEN_INTRO] Welcome! Thank you for your interest in this RI Energy study. Please answer the next few questions to confirm your eligibility to participate and share your availability. **[TEXT]**

[DISPLAY ON LANDING PAGE]

1. **[LANDLORD]** Are you an owner or property manager of multifamily building rental property in Rhode Island? **[SINGLE CHOICE; FORCED RESPONSE]**
    a. Owner [CONTINUE]
    b. Property manager [CONTINUE]
    c. Other [SKIP TO Q12 INELIGIBLE]

[IF Q1=a OR b] [NEW PAGE]

2. **[TYPE]** What types of buildings are the rental properties you own/manage? Select all that apply. **[MULTIPLE CHOICE]**
    a. Homes 1-4 units [CONTINUE]
    b. Small multifamily building(s) with 5-20 units [CONTINUE]
    c. Large multifamily buildings with 20+ units [CONTINUE]
    d. Other, please specify [OPEN END; ANCHOR] [CONTINUE]
3. **[HEAT1]** Which of the following types of heating systems best describe the heating systems in your rental property? Consider all your Rhode Island rental property. Select all that apply. **[ROTATE; MULTIPLE CHOICE; FORCED RESPONSE]**
    a. Electric baseboard heater(s) (heaters with heavy duty heating elements located along the baseboard areas of individual rooms or spaces) [CONTINUE]
    b. Electric heat pump (heating/cooling system with central air ducts or ductless mini splits) [CONTINUE IF a IS ALSO SELECTED, ELSE SKIP TO Q11 INELIGIBLE]
    c. Boiler [CONTINUE IF a IS ALSO SELECTED, ELSE SKIP TO Q11 INELIGIBLE]
    d. Fireplace [CONTINUE IF a IS ALSO SELECTED, ELSE SKIP TO Q11 INELIGIBLE]
    e. Wood or pellet stove [CONTINUE IF a IS ALSO SELECTED, ELSE SKIP TO Q11 INELIGIBLE]
    f. Furnace [CONTINUE IF a IS ALSO SELECTED, ELSE SKIP TO Q11 INELIGIBLE]
    g. Other, please specify [ANCHOR; OPEN END; SKIP TO Q11 INELIGIBLE]

h. Not sure [ANCHOR; EXCLUSIVE; SKIP TO Q11 INELIGIBLE]

[IF Q2=a] [NEW PAGE]

4. **[DECIDER]** We'd like to speak to someone involved in making or recommending capital improvements for rental properties, for example, upgrading a heating system. Are you involved in those decisions? **[SINGLE CHOICE; FORCED RESPONSE]**
    a. Yes [CONTINUE]
    b. No [SKIP TO Q7]

[IF Q4=a] [NEW PAGE]

5. **[ELIGIBLE_MESSAGE]** Great! You are eligible to participate. As a reminder, we're offering a $200 Tango gift card to those who complete the interview. To sign-up, please first share your preferred contact information. **[FORCED RESPONSE] [ONCE COMPLETE, CONTINUE]**
    a. First Name [OPEN END]
    b. Last Name [OPEN END]
    c. Phone [OPEN END]
    d. Email [OPEN END]

[IF Q5 HAS RESPONSE] [DISPLAY Q6 ON SAME PAGE AFTER Q5 RESPONSE IS ENTERED]

6. **[APPT1]** Which of these times do you prefer? We will confirm the appointment by email within 24 hours. **[SINGLE CHOICE] [ONCE COMPLETE, END SURVEY]**
    a. [Time1]
    b. [Time2]
    c. None of these, please contact me with more options

[IF Q4=b] [NEW PAGE]

7. **[REFERRAL]** Is there someone else who is involved in those decisions that you could refer to us? **[SINGLE CHOICE]**
    a. Yes and I can share their contact information [CONTINUE]
    b. Yes and I can schedule the interview on their behalf [SKIP TO Q9]
    c. No [SKIP TO Q11 INELIGIBLE]

[IF Q7=a] [DISPLAY Q8 ON SAME PAGE AFTER Q7=a IS SELECTED]

8. **[REFERRAL_SNOWBALL]** Thank you! Please enter their contact information below. We may send them an invitation to participate in the study. **[NAME AND EMAIL FORCED RESPONSE] [ONCE COMPLETE, END SURVEY]**
    a. First Name [OPEN END]
    b. Last Name [OPEN END]
    c. Phone [OPEN END]
    d. Email [OPEN END]

[IF Q7=b] [DISPLAY Q8 ON SAME PAGE AFTER Q7=b IS SELECTED]

9. **[REFERRAL_BEHALF]** Thank you! Please enter the contact information of the person who will participate in the interview below. **[NAME AND EMAIL FORCED RESPONSE]**
    a. First Name [OPEN END]
    b. Last Name [OPEN END]
    c. Phone [OPEN END]
    d. Email [OPEN END]

[IF Q10 HAS RESPONSE]

10. **[APPT1]** Which of these times do you prefer? We will confirm the appointment by email within 24 hours. **[SINGLE CHOICE] [ONCE COMPLETE, END SURVEY]**
    a. [Time1]
    b. [Time2]
    c. None of these, please contact me with more options

[IF Q1=c OR Q7=c] [NEW PAGE]

11. **[INELIGIBLE_MESSAGE]** Thank you for your interest. Unfortunately, you are not eligible to participate in this research at this time. **[ONCE COMPLETE, END SURVEY]**

Interview Guide

The interviews will be semi-structured conversations intended to guide the conversation around the topics that will be covered during the interviews. The research team will ask these questions as they are relevant to the conversation, but the team may not ask all questions, or phrase the questions the same way during each stage of the conversation.

Introduction (2 min)

[Purpose of section: This initial section includes a guide for the beginning of the conversation.]

Thanks so much for taking the time to speak with me today. As a reminder, we have about 45 to 60 minutes' worth of topics we'd like to discuss with you, including your business practices related to property management and equipment upgrades, such as heating, ventilation, air conditioning (HVAC) systems, and water heating systems. The information you share with us will be used to help Rhode Island Energy understand the needs and interests of rental property owners and managers like you and find ways to provide beneficial energy services and efficiency programs.

Also, for note taking purposes, I would like to record this interview. All recordings and notes will be kept confidential, and we will not reveal your identity in our final report or any final deliverables.

- Can I record this interview? [Wait until they consent to press record.] [IF NO, do not record but take notes; ELSE begin recording]

- Just to confirm, I do have your consent to record this conversation?
- Do you have any questions before we begin?

Property Management

[Purpose of section: Provide a better understanding of property management general experiences and challenges, perceptions on including the cost of electricity or other utilities as part of the rent rate, and property type (market rate/income qualified) and rent type (utility-inclusive/not) variation.]

Property Characteristics (3 min)

I'd like to begin by asking you a few background questions.

12. How long have you owned/managed rental property in Rhode Island?
13. About how many rental properties do you own/manage in Rhode Island? How many buildings? Units?
14. What is the approximate age range of your building(s)?
15. What fuel type(s) do your properties use for space heating (e.g., natural gas, electric, fuel oil, propane)? Water heating?
    a. **[IF MORE THAN ONE FUEL TYPE]** About what percentage of your properties use electric fuel? Your best estimate is fine.
16. What types of cooling systems, if any, do your properties use (for example, central air conditioning with air ducts, ductless mini-split air conditioners, room/window air conditioners, evaporative coolers)?
17. **[IF NO COOLING SYSTEMS]** About how many of your properties/units have no cooling systems? Your best estimate is fine.

Rent and Utilities (5 min)

18. Do you offer income-based rental units at any of your properties? [**IF NEEDED**: Also known as low-income housing, project-based housing, or facility-based housing. Housing may or may not be federally subsidized.]
19. **[IF NO]** Do you currently have any tenants using Rhode Island Housing Choice (Section 8) Vouchers at any properties that do not offer subsidized units?
20. Who is responsible for paying the electric bill in your units with electric heat? You, your tenants, a mix of both?
21. Under what circumstances would you choose to include the electric bill in the rent rate versus not?
22. **[IF NOT ADDRESSED]** In your opinion, what, if any, are the benefits of [including/not including] the cost of utilities, specifically the electric/heating bill, in the price of rent? The drawbacks? **[PROBE: RENT AFFORDABILITY FOR TENANTS]**

Operations (8 min)

Next, I will ask you about your day-to-day operations and practices regarding property maintenance, replacement, repairs, and upgrades.

23. On a day-to-day basis, how would you describe your key tasks as an owner/property manager?
24. In your opinion, what challenges do you face most as a landlord?

    [PROBES] [USE THE FOLLOWING PROMPTS TO PROBE FOR MORE INFORMATION AS NEEDED. THESE ARE LABELED AS "PROBES" THROUGHOUT THE GUIDE.]

    a. Seasonal tenant turnover or months with most turnover
    b. Managing tenants and their ability to pay rent on time
    c. Managing other business finances
    d. Local or federal regulations
    e. Electricity costs or costs of other utilities
25. How might these challenges affect your ability as a landlord to pursue additional property upgrades (e.g., installing new plumbing, upgrading a heating or cooling system, or a remodeling project)?

Capital Improvements (12 min)

26. We're interested in how you make capital improvement decisions for your rental property. Think of a recent improvement you did on a Rhode Island property (e.g., installing new plumbing, upgrading a heating or cooling system, or a remodeling project). Please walk me through what that process was like from the point of deciding to make the improvement to after the project was complete.
27. What was the improvement? What equipment was involved?
28. Why did you decide to make the improvement? [PROBE FOR UPGRADE, REPLACE AT FAILURE, AND LIKE-FOR-LIKE REPLACEMENT]
29. What funding or financing options did you consider and/or use [PROBE FOR FUNDING SOURCE (FEDERAL, STATE, RI ENERGY, OTHER) AND TYPE OF FUNDING (REBATE, TAX CREDITS, OTHER)]? Why?
30. What could have gone better? Why?
    a. **[IF NOT ADDRESSED]** What might you do differently next time?
31. How do you prioritize which improvements you'll make next? What factors do you consider?

    [PROBES]

    a. Equipment cost
    b. Tenant comfort
    c. Tenant demand
    d. Saving money on utility bills
    e. Time for maintenance and repairs in units between tenants
    f. Age of equipment
    g. Tax benefits
    h. Aesthetics
    i. Ability to improve an entire building at once

j. Season or time of year
k. Energy savings
l. Return on investment including timing, future repair costs, amount of energy savings
m. Familiarity or comfort level with new equipment or technologies

Participation Barriers

[Purpose of section: To understand property owners'/managers' awareness, perspectives, and concerns related to electric baseboard heaters and heat pumps, including incentive amounts.]

Electric Baseboard Heaters (12 min)

32. In the scheduling survey, you mentioned that at least some of your rental property uses electric baseboard heating. What are the pros and cons of electric baseboard heating, based on your own experience or perceptions?

    [PROBES]

    a. Impacts to the electric bill if any
    b. Ease or frequency of equipment maintenance
    c. Ease or frequency of equipment repairs
    d. Ability to easily switch to a different heating/cooling system if desired (may require installing air ducts)
    e. Renters' interest/attitudes toward occupying a unit with electric baseboard heating

33. Imagine that you were replacing electric baseboard heaters in your rental property. What would you want the new system to do better than the existing electric baseboard heaters?

    [PROBES]

    d. Use a different fuel like gas or propane
    Use different technology (such as a furnace or heat pump)
    Use less energy
    Lower energy bills
    Lower maintenance/operating costs
    Higher property value
    Support lower tenant rent rates
    Provide cooling or improved cooling to the unit
    Be more reliable
    e. **[IF NOT ADDRESSED]** Have you ever switched from electric heating to a heating system that uses a different fuel like gas or propane? Why or why not?
    [IF NOT ADDRESSED] Would you ever consider switching heating fuels in the future? Why or why not?

34. What might keep you from switching to heating fuels in your rental properties?

35. Have you ever replaced electric baseboard heating with another electric heating system in any of your rentals? If so, what type?
36. What other factors would be important to consider when selecting a new heating system?

Heat Pumps (8 min)

37. A heat pump is an all-electric heating and cooling system that pulls warm air from the outside in to heat a home and pushes warm air from the inside out to cool a home. It has both an outdoor unit (heat exchanger) and an indoor unit (central air distributor connected to air ducts). How familiar are you with heat pumps as a home/building heating/cooling system?

[PROBES]

f. Equipment/technology
Electricity usage relative to electric baseboard heat (energy savings)
Incentives for heat pumps

g. **[IF NOT ADDRESSED]** What experiences or perceptions do you have about heat pumps?
[IF NOT ADDRESSED] Have you ever switched from electric baseboard heating to a heat pump in a rental property? Why or why not?

h. Would you ever consider installing a new heat pump into a rental property with electric baseboard heating in the future? Why or why not?
What might keep you from switching to a heat pump? **[PROBE FOR COST]**
What types of information might you want to know about heat pumps before considering installing a new one into a rental property with electric baseboard heating? **[PROBE FOR EFFECTS ON RENT RATES, ARREARAGES, UTILITY BILLS AND TENANTS USE OF COOLING]**

Program Awareness (5 min)

38. RI Energy offers incentives like rebates and zero-interest financing to help rental property owners/managers with energy efficient equipment upgrades like heat pumps, or energy saving weatherization upgrade incentives up to $4,000 on 1-4 unit rental properties. These upgrades help landlords save energy and money and improve the comfort and safety of tenant living spaces.
39. Before today, were you aware that RI Energy offered incentives like these?

i. **[IF NOT ADDRESSED]** Have you ever **considered** or **applied for** a RI Energy incentive for a rental property upgrade? Why or why not?

j. **[IF NOT ADDRESSED]** Have you ever **received** a RI Energy incentive for a rental property upgrade? Why or why not?
[IF YES] How much of an impact did the incentive have on your decision to do the improvement project? Would you have done the project without it?

k. **[IF NOT ADDRESSED]** Would you consider applying for a RI Energy incentive for a rental property upgrade in the future? Why or why not?

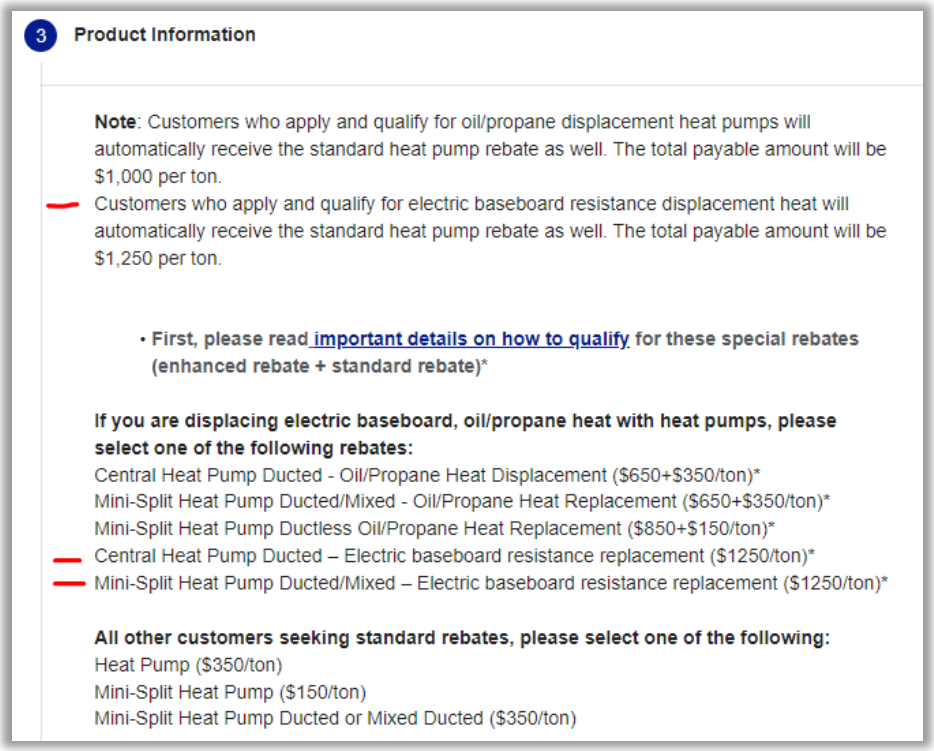
40. In your opinion, how might RI Energy motivate more property owners/managers to participate in the energy savings upgrade incentive program?

Willingness to Pay (3 min)

My next questions focus on funding improvement projects, specifically upgrading to heat pumps.

41. The cost of purchasing and installing heat pumps can vary greatly from building to building based on the number of units, whether there is existing duct work, the number of thermostats needed, and other building factors. The industrial supply chain and local economies can also affect these costs. Costs associated with purchasing and installing heat pumps can range between a few thousand dollars to tens of thousands of dollars. For the purposes of our conversation today, I will describe a scenario with made-up cost and rebate amounts, then ask you to put yourself in the position of the person deciding whether or not to make the upgrade. Now, imagine you were considering a heat pump installation in one 4-unit rental property that costs about $20,000 (includes the equipment and installation costs). About what amount would you be willing to pay out of pocket for this upgrade? **[PROBE FOR A PROPORTION ESTIMATE LIKE 25% OR 'ABOUT HALF']**
42. There are funding resources available like the utility rebates and incentives we mentioned, and other rebates, incentives, and tax credits.
43. Imagine you were eligible for a flat $2,500 rebate to help cover the costs of that heat pump installation. Would this incentive amount be enough to motivate you to make the improvement? Why or why not?
    a. **[IF NOT ENOUGH]** What about a per-unit rebate amount, like $1,000 per unit? Would that amount motivate you to participate? Why or why not? **[PROBE ON VARIOUS PER-UNIT AMOUNTS BASED ON INTERVIEWEE RESPONSE]**
    b. **[IF ENOUGH]** Would a lower incentive amount be enough? Why is that?
    c. **[IF NOT ADDRESSED]** About how much incentive would be enough?

[NOTE: THE SNAPSHOT BELOW IS FROM RI ENERGY'S ONLINE REBATE APPLICATION FORM. WE INCLUDE IT HERE FOR REFERENCE.]



3 **Product Information**

Note: Customers who apply and qualify for oil/propane displacement heat pumps will automatically receive the standard heat pump rebate as well. The total payable amount will be $1,000 per ton.

Customers who apply and qualify for electric baseboard resistance displacement heat will automatically receive the standard heat pump rebate as well. The total payable amount will be $1,250 per ton.

- **First, please read important details on how to qualify for these special rebates (enhanced rebate + standard rebate)***

If you are displacing electric baseboard, oil/propane heat with heat pumps, please select one of the following rebates:

Central Heat Pump Ducted - Oil/Propane Heat Displacement ($650+$350/ton)*
Mini-Split Heat Pump Ducted/Mixed - Oil/Propane Heat Replacement ($650+$350/ton)*
Mini-Split Heat Pump Ductless Oil/Propane Heat Replacement ($850+$150/ton)*
Central Heat Pump Ducted – Electric baseboard resistance replacement ($1250/ton)*
Mini-Split Heat Pump Ducted/Mixed – Electric baseboard resistance replacement ($1250/ton)*

All other customers seeking standard rebates, please select one of the following:

Heat Pump ($350/ton)
Mini-Split Heat Pump ($150/ton)
Mini-Split Heat Pump Ducted or Mixed Ducted ($350/ton)

Closing (2 min)

Those are all the questions I have for you. Would you like to add any other comments?

We really appreciate you taking the time to share your valuable insights in this industry. To thank you for your time, we would like to give you a $200 Tango gift card. Would you like to receive that gift card by mail or email? **[INTERVIEWER: RECORD AND CONFIRM CONTACT INFORMATION FOR SENDING THE INCENTIVE.]**

Thank you so much for speaking with us today.

Appendix G: References

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