Contractor-informed Strategies to Enable Emergency Heat Pump Adoption in LMI Homes: Designing for Urgency and Equity

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ABSTRACT

When heating systems fail during the heating season, homeowners, particularly in low- and moderate-income (LMI) households, face urgent decisions that often result in like-for-like fossil fuel replacements rather than heat pump conversions. To better understand how program design can support electrification in these scenarios, the study team collected contractor perspectives across New York State as part of New York State Energy Research and Development Authority (NYSERDA)'s Emergency No Heat Data Pilot. Through three roundtables, contemporaneous project-data collection, and 53 HVAC contractor interviews, the study team learned how contractors navigate emergency replacements, decision frameworks, and the operational barriers shaping heat pump adoption.

Contractors described complex interactions among customer urgency, program requirements, and workforce readiness. Key barriers included electrical capacity limitations, program weatherization requirements, program pre-approval timelines, and labor availability. Incentive programs such as EmPower+ and NYS Clean Heat were recognized as valuable to make electrification financially viable for many, especially in the LMI market. Conversions were more likely when customers were already aware of or interested in heat pumps, or in homes where the conversion is more straightforward due to simpler distribution system options or lower heating loads.

The study highlights key strategies to improve emergency response and better serve LMI households: strengthening contractor readiness through targeted training, simplifying participation for LMI households, and aligning incentive and weatherization pathways to enable faster, equitable electrification. Together, these actions can transform emergency system failures into opportunities for energy savings and decarbonization.

Introduction

Residential building electrification has emerged as a central strategy for reducing greenhouse gas emissions in the building sector. In many regions, heating systems that rely on fossil fuels remain a major source of building-related emissions. Transitioning these systems to high-efficiency electric technologies such as cold-climate heat pumps offers significant potential to reduce both greenhouse gas emissions and overall energy consumption.

New York's Climate Leadership and Community Protection Act requires greenhouse gas emissions to be reduced 40% below 1990 levels by 2030 and 85% below by 2050 (Climate Leadership and Community Protection Act (CLCPA) 2019). Buildings make up 28% of New

York State's emissions as of 2025, making widespread electrification of heating systems essential to compliance (New York State Department of Environmental Conservation 2025). As a result, state agencies and utilities have increasingly prioritized programs that support the adoption of efficient electric heating technologies.

The failure of an existing heating system presents a unique opportunity for homeowners to transition to efficient cold-climate heat pumps rather than invest in another fossil fuel heating system. Yet the majority of these projects today are lost opportunities for decarbonization, as customers choose to replace failed systems in-kind with a new fossil fuel heating system. Both time and cost considerations are obvious drivers of this choice, as a like-for-like fossil fuel replacements are typically less expensive and can be installed more quickly than heat pump systems.

Although electrification programs frequently emphasize financial incentives and consumer education, the conditions under which heating systems fail create a unique decision environment. Emergency heating failures often occur during periods of cold weather when restoring heat quickly becomes the primary concern for homeowners and for the contractors. Under these circumstances, homeowners rely heavily on contractors to diagnose the failure, recommend replacement options, and restore service as quickly as possible. The compressed timelines associated with emergency replacements may limit the feasibility of evaluating alternative technologies such as heat pumps, even when incentives or long-term operating savings make them attractive. Contractors therefore play a central role in determining whether a heat pump conversion is considered during emergency heating replacement situations. Contractor recommendations may be influenced by factors such as equipment availability, workforce capacity, installation complexity, and familiarity with heat pump technologies. In addition, building characteristics – such as electrical capacity, heating load, and building envelop performance – can affect whether a heat pump installation is technically feasible within the time constraints of an emergency replacement.

Despite the importance of these time-sensitive decisions, relatively little research has examined how emergency replacement conditions influence heating system technology choices. To better understand this challenge, the New York State Energy Research and Development Authority (NYSERDA) launched an Emergency No Heat pilot focused primarily on the Low- and Moderate-Income (LMI) housing market while also including Market Rate projects. The pilot examined residential heat pump retrofit opportunities triggered by heating system failures during heating season ("emergency no heat") and sought to identify where conversion opportunities are lost, as well as the characteristics of projects that successfully convert to heat pumps.

Using contractor interviews, surveys, and virtual roundtables, this paper examines HVAC contractor perspectives on emergency heating replacements and outlines the pilot's findings and opportunities for the residential building with 1 to 4 units. The analysis identifies barriers that limit electrification, conditions that support successful heat pump conversions, and opportunities to improve program design. These findings can inform electrification strategies that support affordability, resilience, and broader decarbonization goals in the residential sector.

Methodology

The study ran over the course of the 2024 to 2025 heating season and used three methods of data collection: (i) contemporaneous project data submitted by contractors responding to emergency no heat calls; (ii) three virtual roundtable workshops held at the outset, midpoint, and end of the heating season; and (iii) interviews with HVAC professionals across New York State. Contractors were not required to participate in EmPower+ or any other State or utility program to participate in the study.

Contractor Surveys and Roundtables

TRC recruited 15 contractors across New York State to collect data on emergency no heat calls and invited principals from the same firms to participate in roundtable discussions. Contractor had to offer heat pumps, serve one to four family residences, and respond to emergency no heat calls to participate in the pilot. Contractors were asked to complete a contemporaneous survey for each emergency no heat project and received training prior to data collection. The survey captured process and context information related to the repair or replacement of heating systems, including home and project characteristics and whether equipment was replaced. It was administered using Qualtrics and analyzed using Microsoft Excel. TRC received 19 surveys from 4 contractors, including several incomplete submissions, which were insufficient to draw strong findings. This was primarily due to the timing of the pilot implementation towards the end of the heating season.

Three virtual roundtables were held on February 26, April 29, and July 16, 2025, using Microsoft Teams. The first session introduced the study and refined the survey tool. The second focused on contractor processes during emergency no heat calls and barriers to heat pump adoption. The third incorporated preliminary survey findings and prior discussion. TRC presented a generalized timeline of emergency no heat calls and a conceptual framework identifying where adoption barriers arise, and contractors discussed potential solutions. Ten of the 15 firms attended at least one roundtables. Due to insufficient survey responses, TRC initiated interviews with contractors using the same screening criteria.

Contractor Interviews

The primary data source for this study consists of semi-structured interviews with HVAC contractors operating in New York State. TRC conducted 53 interviews to supplement the survey and roundtable findings, including interviews with 11 firms that also participated in the initial survey effort. Participants were identified through internal TRC contacts and contractor networks, including the Building Performance Contractors Association of New York and the New York Geothermal Energy Organization. Recruitment focused on contractors offering cold-climate heat pumps and serving 1 to 4 family homes across all regions of the state.

Interviews explored contractor experiences with emergency heating system failures, including decision-making processes, installation timelines, equipment availability, workforce considerations, and other factors influencing heat pump recommendations during time-sensitive replacement situations. Interviews lasted 30 to 45 minutes, were recorded with permission, and were analyzed using a systematic coding framework in Dedoose, grounded in the research

objectives and refined iteratively. Most interviews were independently coded by two team members, with discrepancies resolved collaboratively to support a reliable synthesis of contractor perspectives.

Existing Program Landscape

Because program requirements emerged as a major theme in contractor interviews, this section provides brief background on the primary programs referenced by participants. Contractors most frequently discussed EmPower+, NYS Clean Heat, and the Home Energy Assistance program (HEAP) when describing barriers and opportunities associated with emergency heat pump adoption.

EmPower+

EmPower+ is NYSERDA's energy efficiency program for low- and moderate- income (LMI) households. The program supports weatherization and electrification measures, including heat pumps, but requires contractor participation, project approval, and compliance with program eligibility requirements. Contractors referenced these requirements when discussing project timelines and implementation challenges.

Home Energy Assistance Program

HEAP provides financial assistance to eligible households for heating equipment repair and replacement. While HEAP can support emergency heating system replacements, it generally does not fund heat pump conversions. Contractors described HEAP as an important first step for income-qualified households experiencing emergency no-heat situations.

New York State Clean Heat

NYS Clean Heat program is a utility-operated market rate incentive program for whole-home cold-climate heat pump solutions. Participating contractors submit projects for incentive reimbursement following installation. Contractors identified the program as an important driver of heat pump adoption, while also noting administrative and design requirements that can affect project timelines.

Findings

The primary goal of the research was to assess barriers to conversion to heat pumps in emergency no heat situations, identify parameters for successful conversion, and highlight opportunities for future adoption. Findings from surveys, roundtables, and interviews provide a consolidated view of contractor perspectives, structural challenges, and contextual conditions that influence the feasibility of heat pump installations in emergency settings.

Incidence of Emergency No Heat Calls and Replacements

Emergency no heat calls are frequently resolved through repair rather than replacement. Contractors described replacing components such as control boards to restore service quickly. When parts are unavailable or repairs are not economical, contractors may recommend full system replacement. Full replacement, however, is relatively uncommon. As shown in Figure 1, half of contractors reported that replacement occurs in fewer than 20 percent of emergency no heat calls.

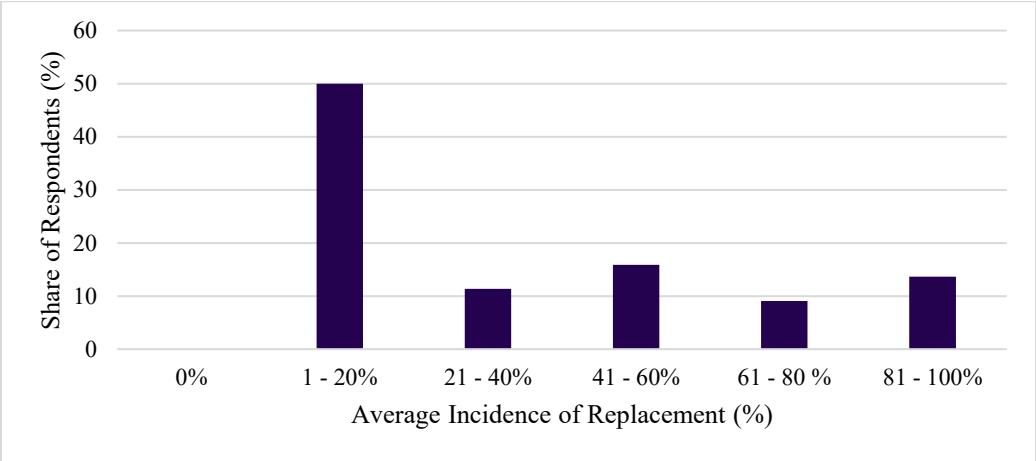

Figure 1. Average incidence of replacement by share of respondents.

When replacement does occur, contractors more frequently recommend like-for-like replacements of existing heating systems rather than heat pumps. Over half of interviewees reported that heat pumps are proposed in under 50 percent of replacement cases. Survey responses aligned with interview findings: 52 percent of homes opted for replacement in kind, 21 percent transitioned to heat pump systems, and 27 percent were repaired rather than replaced.

Emergency no heat situations require contractors to navigate distinct replacement pathways. Firms prioritize these calls through intake systems and dispatch technicians to assess and diagnose faulty equipment. Technicians provide a quote for repair when feasible, or recommend replacement if repairs are not possible or not economical. Contractors may gauge homeowner interest in heat pumps at this stage and, if applicable to the firm's structure, escalate the case to a sales representative. It is at this decision point that the pathways and timelines diverge.

For like-for-like fossil fuel replacements, contractors typically size equipment using the existing distribution system, assess available and accessible product stock, and provide a quote for a similar sized unit. Installation proceeds with removal and replacement of existing equipment, often requiring minimal or no design work beyond confirmation of compatibility, as shown in Figure 2.

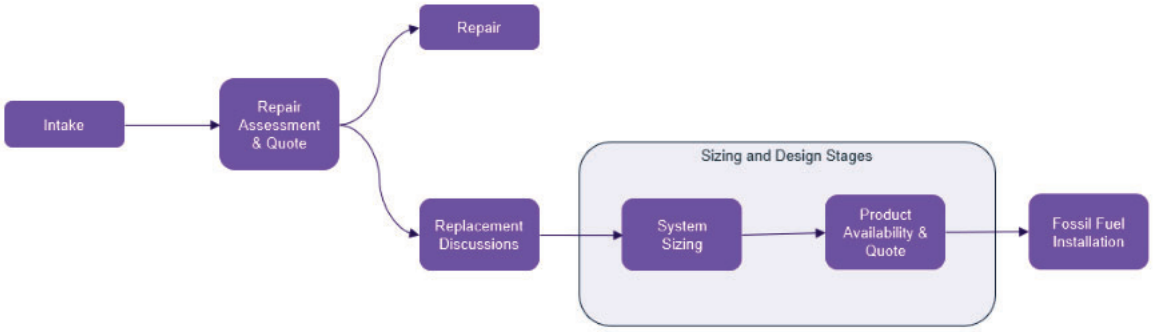

Figure 2. Typical no heat call process for a like-for-like replacement.

Figure 3 illustrates a typical workflow for heat pump installations during a no heat call. Compared with like-for-like fossil fuel replacements, heat pump installations often require additional design and coordination steps. Contractors perform a home takeoff for an initial estimate of heating and cooling loads to roughly size a system. After estimating the heating and cooling loads, contractors assess existing electrical service and panel space. For ducted systems, they evaluate whether existing air ducts are reusable; where ducts are unsuitable or don't exist, contractors may recommend ductless systems, duct upgrades, or mixed ducted and ductless configurations. Contractors may provide a preliminary cost estimate based on similar projects to obtain initial permission to proceed. Once authorized, information is transferred to a sales or design team to conduct a full Manual J calculation, properly size and select equipment, determine necessary electrical or duct upgrades, and prepare an official quote and invoice. Following contract execution, contractors proceed with permitting, scheduling electricians and coordinating with utility companies as needed before installation.

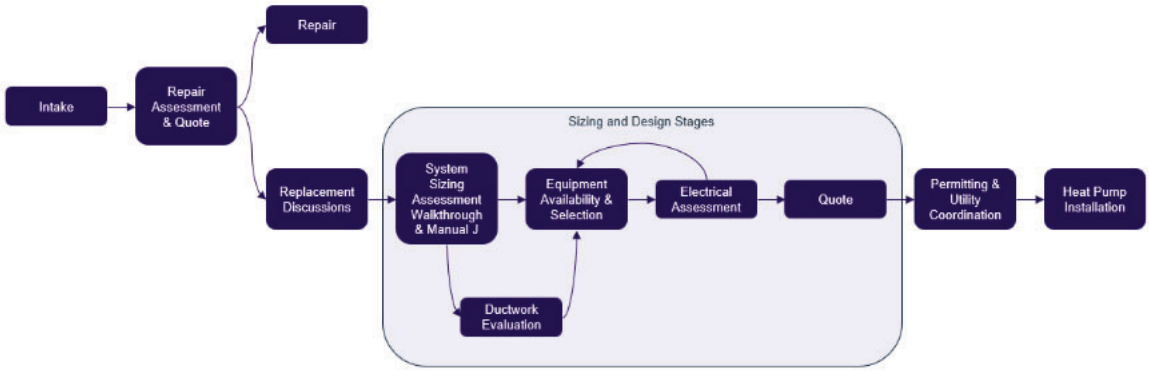

Figure 3. No heat call process for a heat pump replacement.

These different pathways are reflected in reported project timelines. Heat pump replacements require additional design work, technical expertise, and potential electrical or distribution upgrades. Interviewees consistently noted longer and more variable timelines for heat pump systems, as shown in Figure 4. Sizing and design for heat pump projects require a median of 8 hours, compared to 2 hours for like-for-like replacements.

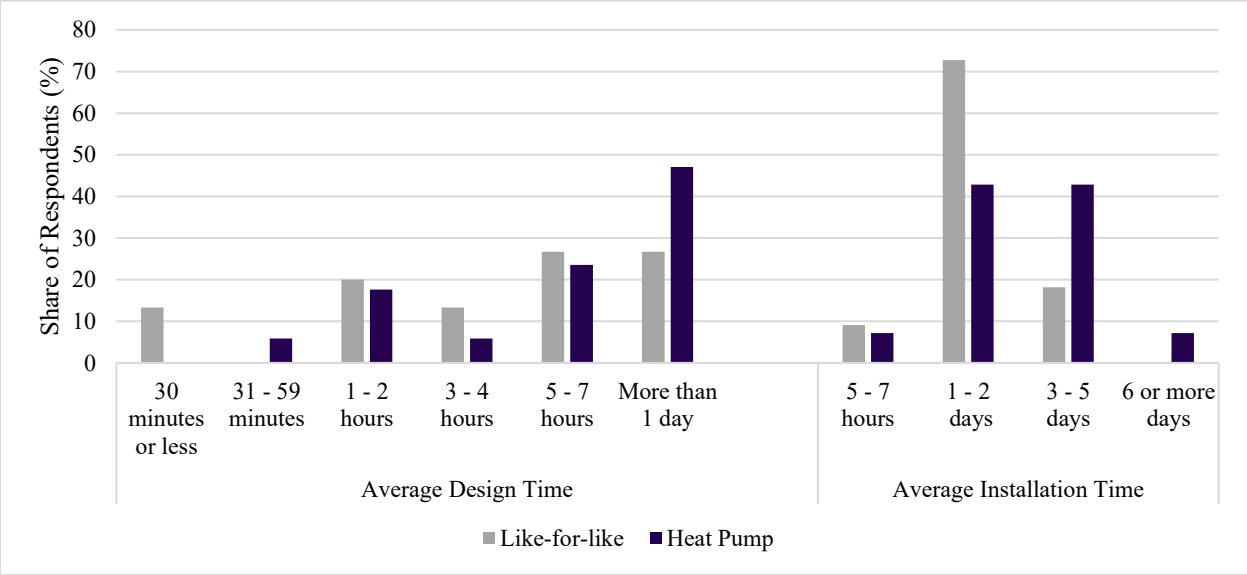

Figure 4. System replacement timelines during no heat emergencies.

Installation shows a similar pattern, with heat pump projects requiring a median of 13 hours versus 8 hours for like-for-like projects, as shown in Figure 5. Contractors also reported greater variability in heat pump project timelines, reflecting differences in building conditions, system complexity, and contractor practices.

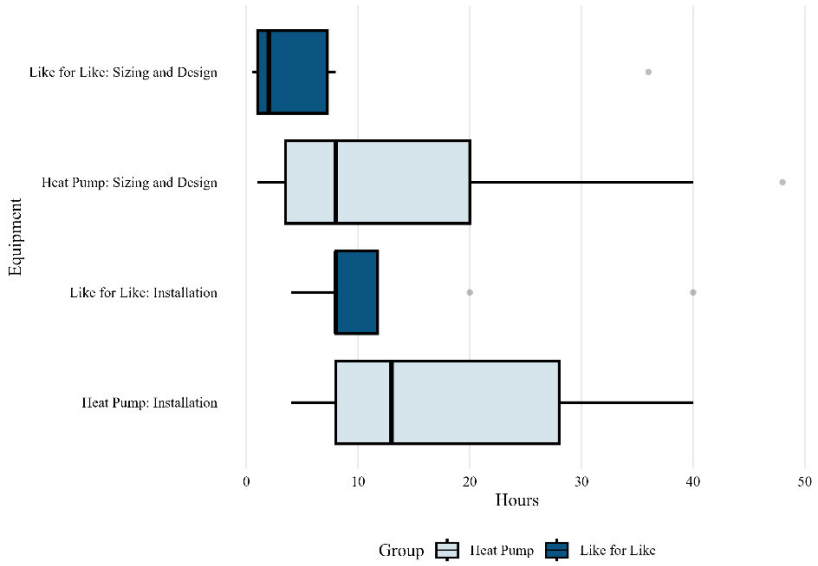

Figure 5. Reported project step duration by replacement type.

Taken together, contractor discussions suggest that heat pump replacements require approximately twice the combined timeline of like-for-like fossil fuel replacements, with an estimated total of 21 hours compared to 10 hours. Timeline therefore emerged as a central differentiator between successful heat pump conversions and replacement in kind. However, several contractors noted that they could complete heat pump conversions within timelines comparable to like-for-like replacements under certain conditions. Despite this capability, these contractors reported that heat pump conversions remained relatively uncommon during emergency no-heat situations, suggesting that factors beyond installation duration, including customer awareness, contractor practices, program requirements, and project complexity, also influence technology selection.

Barriers to Heat Pump Conversion in Emergency Replacements

In addition to the extended timeline discussed above, findings from contractor interviews, surveys, and roundtable discussions indicate that multiple barriers constrain heat pump adoption during emergency replacement situations. These barriers extend beyond equipment cost and reflect operational realities faced by contractors and households during emergency heating failures.

Upfront cost emerged as the most frequently cited barrier. Contractors noted that emergency replacement decisions often occur under significant financial stress, particularly for households lacking savings or access to financing. Even when incentives are available through programs such as NYS Clean Heat or EmPower+, customers frequently perceive the upfront cost of heat pump systems as significantly higher than like-for-like fossil fuel replacement. In emergency contexts, homeowners particularly tend to prioritize rapid restoration of heating and predictable costs. Contractors reported that customers are often unwilling to explore incentive and loan-support program eligibility for heat pumps during an emergency, particularly when lower cost fossil fuel replacement options are readily available.

Equipment availability and contractor capacity also play an important role in contractor recommendations. Like-for-like replacements are often facilitated by readily available stock of furnaces or boilers that can be installed within a short timeframe. In contrast, heat pump systems may require specific equipment configurations or components that are not immediately available, particularly during peak heating season. Additionally, contractors noted that heat pump installations require additional design expertise, experienced crew members, and coordination across multiple trades. Firms with limited experience installing heat pump systems may be less likely to recommend them during emergency situations where quick service restoration is the priority.

Another critical barrier involves **building readiness**. Heat pump installations often require enabling work that is not necessary for like-for-like replacements. Interviewees frequently cited electrical capacity limitations, panel upgrades, duct modifications, and building envelope conditions as factors influencing feasibility. These upgrades can introduce additional permitting requirements, coordination with electricians, and extended project timelines. Additionally, contractors noted that homes with limited electrical capacity or incompatible distribution systems are significantly more difficult to convert during emergency replacements. In these cases, fossil fuel replacement is often viewed as the fastest and least disruptive option.

Finally, **limited customer awareness** of heat pump technologies also affects decision-making during emergency replacements. Many homeowners are unfamiliar with heat pump systems or available incentive programs at the time their heating system fails. Without prior knowledge or preparation, homeowners may default to familiar technologies recommended by contractors. Since emergency decision-making often occurs under significant time pressure, contractors noted that it leaves little opportunity for customers to evaluate alternative technologies or explore available incentives.

Conditions Enabling Heat Pump Conversion in Emergency Replacements

Although end use customers were not directly surveyed, contractor interviews provided insight into the downstream decision-making processes affecting heat pump conversion during emergency replacements. While structural barriers often limit electrification in emergency contexts, interview findings also revealed several conditions under which heat pump conversions were more likely to occur. Through interviews and roundtable discussions, successful conversions typically occurred when customer interest, building readiness, and contractor capability aligned.

C**ustomer interest and advocacy for heat pumps**. Customer interest was cited by 29 interviewees as a key factor enabling electrification during emergency replacements, particularly when homeowners had prior familiarity with heat pump technologies or had previously considered electrification options.

Electrical infrastructure readiness. Adequate electrical capacity and available panel space were identified by 29 interviewees as critical factors that can enable heat pump installation without requiring costly or time-intensive upgrades. When homes are already equipped with

sufficient electrical infrastructure, contractors were more likely to recommend heat pump systems even under emergency conditions.

Household financial stability. Eighteen interviewees noted that homeowners with access to savings or financing were more willing to consider heat pump systems despite higher upfront costs relative to like-for-like fossil fuel replacements. In addition, 16 interviewees emphasized that favorable operating costs relative to the existing fuel type could influence customer willingness to adopt heat pumps, particularly in cases where electricity prices were competitive or long-term savings were expected.

Building envelope further shaped conversion outcomes. A high-quality building envelope was cited by 13 interviewees as reducing heating load and improving the performance of heat pump systems. In such cases, improved envelopes could also facilitate eligibility for complementary programs such as NYS Clean Heat and EmPower+, thereby improving overall project feasibility.

Contractor characteristics also influenced the likelihood that heat pumps would be recommended during emergency calls. Interviewees noted that company size, technical expertise, workforce availability, equipment stocking practices, and experience navigating incentive programs affected whether contractors felt confident proposing heat pump systems during emergency situations. Firms with established heat pump installation practices and familiarity with incentive program requirements were generally more willing to present electrification options to customers.

Notably, the availability of temporary heat did not significantly alter decision-making. Many contractors provide temporary heating solutions at no additional cost topically by deploying loaned plug-in electric resistance space heaters. Those who do not often expect customers to purchase them even for like-for-like replacement projects. Some homes also have built-in backup heat sources, such as wood, gas, or propane fireplaces. These interim solutions reduce immediate urgency pressure and allow technical, financial, and programmatic considerations to shape replacement decisions.

Proposed Policy and Program Recommendations

Our findings indicate that several avenues can be pursued to increase the proportion of heat pump conversions in emergency no heat situations in New York. Based on the results of this study, the team developed the following recommendations:

- Overcome Information Gaps in Emergency Heating Markets
- Encourage Proactive Heating System Assessment and Customer Education
- Strengthen Cross-Program Coordination for Emergency Heating
- **Error! Reference source not found.**
- Expedite Electrical Capacity Resolutions

These programmatic and regulatory suggestions are complimentary and can be pursued together. Each intervention addresses several potential challenges presented in this paper.

Overcome Information Gaps in Emergency Heating Markets

The compressed decision-making timeline of heating emergencies creates a market coordination failure in which contractors capable of rapid heat pump installations exist but lack efficient mechanisms to signal availability and expertise to homeowners, while homeowners lack time to pursue qualified heat pump professionals during emergency no heat situations and are often presented with only fossil fuel replacement options by the less capable contractors they do reach. By creating a badge or marketing signal indicating contractors able to rapidly deploy heat pumps, homeowners can quickly find contractors equipped to install heat pumps in a succinct timeframe, while contractors gain recognition for their expertise. This mechanism signals to the market that heat pump replacements are valued in emergency no heat situations and presents a business opportunity. This mechanism could be incorporated into existing heat pump incentive programs, such as NYS Clean Heat and Empower+.

Encourage Proactive Heating System Assessment and Customer Education

Decision making under the duress of a no heat situation in mid-winter typically results in like-for-like replacement, even when the project and home are optimal for a heat pump conversion. The best opportunity to increase heat pump conversions of systems at the end of their useful life is to identify the need for heating-system replacement before the heating season, when there is time to make thoughtful decisions under less pressure.

Programs should develop Fall tune-up service protocols that include a heat pump readiness assessment and customer education. The service would be for fossil fuel fired heating systems with a professional service technician observing the system's operation to catch early indicators that the system is imminently approaching its end of life. The protocol would require that contractors must assess the home for heat pump readiness, provide literature and education on heat pump technology and benefits, make recommendations for home improvements necessary for an eventual heat pump conversion (such as electrical upgrades), and coach the customer to understand financing options and timelines for a conversion. If the contractor discovers a near-term system replacement need, they should prominently offer and encourage a heat pump solution, rather than only like-for-like. This approach allows homeowners to make informed decisions before emergency pressure limits heat pump options and enables them to prepare their home to convert during an anticipated failure. There is also an opportunity to target this service model towards homeowners that have had a prior emergency no heating event, and are susceptible to future failures – however, continued research on the recurrent failure of heating systems and behavioral drivers of system replacement is required.

Expand Customer Awareness and Education

Contractor interviews consistently highlighted the importance of prior customer awareness and interest in heat pumps. Homeowners who had previously researched heat pumps, discussed electrification options, or understood available incentives were more likely to consider a heat pump during emergency no-heat situation. In contrast, homeowners encountering technology for the first time during a heating emergency often prioritized familiar replacement options that could be installed quickly.

To address this, program administrators could expand customer education efforts before emergency situations occur. Public awareness campaigns, educational materials, utility

communications, and community outreach can help homeowners understand heat pump technology, available incentives, financing options, and the potential benefits of electrification. By increasing familiarity before a heating system failure occurs, homeowners may be better positioned to evaluate heat pump options when faced with urgent replacement decisions.

Strengthen Cross-Program Coordination for Emergency Heating

A myriad of programs work to support LMI homeowners and their contractors through emergency replacement funding and decision making assistance. Our interviews revealed that contractors navigate households across HEAP emergency repair funds, weatherization programs, and utility incentive programs - each with distinct timelines and requirements. This fragmentation results in prolonged replacement timelines for heat pumps beyond that of a like-for-like replacement, hindering low-income households access to heat pump adoption in emergency no heat situations.

Coordination mechanisms that align emergency assistance programs with efficiency programs could address this barrier. Such approaches would need to preserve emergency response timelines while enabling households to access the appropriate funding streams and complete preparatory work like weatherization or electrical upgrades that many programs incentivizing heat pumps require. Vermont, for example, utilizes one application through which homeowners can access weatherization and emergency heating assistance. This could also include expanding emergency assistance programs to incorporate heat pump installations. Without coordination, low-income households will continue along existing programmatic pathways that default to like-for-like fossil fuel heating appliances.

Implement Distinct Program Architecture for Emergency Timelines

Create a dedicated emergency no heat heat pump track within heat pump incentive programs with reduced limitations on eligibility when applied through trusted qualified contractors. An expedited track will streamline processes and expedite the identification of eligible projects. By simplifying these processes, homeowners in LMI households can access funding for heat pumps more quickly, advancing building electrification equity goals.

Expedite Electrical Capacity Resolutions

Electrical capacity and panel constraints are difficult to remedy in a timely fashion. Limited electrical capacity and the need for coordination with utilities creates a significant barrier to heat pump adoption when homeowners face emergency no heat situations. Currently, the state is undergoing work to assess the scope of capacity limitations in New York’s building stock. To reduce the barriers faced by capacity limitations, the state should work with utilities to investigate avenues to streamline electrical service upgrades in emergency situations. This could include allowing qualified electricians to perform electrical service upgrades on above-group service equipment with power reconnected immediately and utility inspections at a later date. For example, Con Edison permits licensed electricians to perform panel and service entrance, including making the final connection to the overhead grid, on single family homes, with the upgrade reviewed by Con Edison. Further research is required to identify replicability across utilities as well as other procedural avenues to expedite capacity upgrades. On a similar note, the

state is undergoing research investigating the viability of heating electrification with a 100 Amp panel without service upgrades through the usage of smart panels via the Home Electrification; Low Power Solutions (HELPS) study. Providing education to contractors on alternatives solutions to capacity constraints in New York demonstrated by this study will help contractors navigate these barriers more easily.

Study Limitations

Several limitations should be considered when interpreting the findings of this study. Survey participation was limited, and contractor perspectives during roundtables may not fully represent the broader HVAC industry. From contractor interviews, not all interviewees were asked every question due to time constraints or relevance, and participation was voluntary, which may have led to overrepresentation of contractors more engaged with heat pump technologies or programs such as NYS Clean Heat and EmPower+. Responses reflect self-reported experiences and may be influenced by recall bias or individual perspectives. Additionally, the study focuses on the New York residential heating market, and conditions may differ in other regions. Future research could expand the analysis to additional markets and examine how regional factors influence emergency replacement dynamics.

Conclusion

Emergency heating system failures represent a unique and understudied decision environment within residential electrification. Unlike planned equipment upgrades, emergency no-heat situations occur under compressed timelines when restoring heat becomes the immediate priority for homeowners. In these circumstances, barriers that may be manageable in conventional heat pump projects: including customer awareness, contractor capacity, equipment availability, program requirements, and electrical upgrades, can become significant challenges to conversion.

This study suggests that emergency replacement challenges are not solely a technology adoption issue, but also a market coordination issue. Contractors, homeowners, utilities, and program administrators must make decisions within a narrow timeframe, often before information can be gathered, incentives can be processed, or enabling upgrades can be completed. As a result, projects that may otherwise be suitable for electrification frequently default to like-for-like fossil fuel replacement.

While contractors generally reported longer and more variable timelines for heat pump projects, timeline alone did not fully explain conversion outcomes. Some contractors reported being capable of completing heat pump installations within timelines similar to conventional replacements, yet heat pump adoption remained limited in many emergency situations. This finding suggests that customer readiness, contractor practices, program design, and project preparedness are also important determinants of technology selection.

These challenges are particularly significant for low- and moderate-income (LMI) households, which were a primary focus of this study. LMI customers often face additional financial, programmatic, and housing-related constraints that can further limit their ability to pursue

electrification during emergency replacement events. Consequently, emergency no-heat situations can become both missed decarbonization opportunities and barriers to equitable access to high-efficiency heating technologies.

The recommendations presented in this paper were developed to address the market and operational barriers identified through contractor interviews. By improving the ability of programs and market actors to respond to emergency replacement situations, policymakers and program administrators can better position heating system failures as opportunities for electrification rather than missed opportunities for decarbonization and equitable access to clean heating technologies.

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