Zero-NOx Space Heating Technologies

Potential Temporary Loss of Space Heating | Final

prepared for

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Executive Summary

This report assesses the potential impacts of temporary loss of space heating for Bay Area residents in small residential buildings (i.e., single-family and small multi-family households) arising from emergency replacements related to implementation of the Bay Area Air District's Rule 9-4: Nitrogen Oxides from Fan Type Residential Central Furnaces. Beginning in 2029, the rule will prohibit the sale or installation of NOx emitting residential furnaces under 175,000 British Thermal Units (BTU) per hour and combination heating and cooling units under 65,000 BTU/hour. This means that when an existing gas furnace fails unexpectedly, its replacement will be a zero-NOx system (most commonly a heat pump HVAC system) which may involve longer installation timelines than a standard gas furnace-to-gas furnace replacement. This report analyzes the difference in installation times between a replacement gas system and a Rule 9-4 compliant heat pump system, how often those additional days without heat may coincide with periods when residents need heat, whether households are equipped to manage additional days without heat, and what technologies are available to provide short term heat during installation.

The report draws on four areas of analysis: a heating needs assessment, a replacement timeline assessment, a review of temporary heating solutions and their costs, and a survey conducted in May 2026. Key findings from each are summarized below.

Heating Needs Assessment

Heating needs across the nine-county Bay Area are highly variable. Based on historical temperature data, Bay Area residents may use or want to use space heating from 39 to 75 percent of the year (roughly 142 to 274 days annually) depending on location, elevation, and proximity to the coast. Coastal and higher-elevation areas experience the greatest heating needs, while inland, lower-elevation areas experience the least. For the most vulnerable populations, particularly older adults, even moderate cold (60 - 65° Fahrenheit (F)) can pose health risks.

Heating System Replacement Timelines

Replacement timelines for heating systems can vary significantly depending on the system being installed and the condition of the building itself. A standard gas furnace-to-gas furnace replacement currently takes approximately 17 days from system failure to restored heat, reflecting the time to schedule a contractor and complete installation. A gas furnace-to-heat pump HVAC replacement without a service upgrade adds approximately two additional days, for a total of roughly 19 days.[1] For the small share of households requiring a utility service upgrade, timelines can extend to several weeks or a month or more. While most installations will be able to be completed within shorter timeframes, projects that require service upgrades may result in longer durations without heat and thus have the greatest potential need for interim heating support.

Temporary Space Heating Options and Costs

While heating may be needed through a significant portion of the year in some Bay Area locations, and changing from a gas furnace to a Rule 9-4 compliant HVAC can take on average 2 additional days, temporary heating solutions are broadly available. The first temporary heating option identified through discussions with installers is the short-term repair of the existing system that is being replaced due to its age, inefficiency, or reliability concerns. In some cases, a small repair (e.g., replacing a minor component,

[1] Opinion Dynamics. California Residential Fuel Substitution Workforce Readiness Study. September 27, 2024. Accessed at: https://opiniondynamics.com/ca-residential-fuel-sub-workforce-readiness

repairing a loose wire) could restore furnace functionality over the short to medium term while new equipment can be ordered and additional installation steps like wiring/electrical work can be performed to address long-term functionality. Other temporary heating options include portable electric resistance heaters, electric blankets, and similar devices are widely accessible and relatively low-cost. These are primarily designed for single-room or supplemental use, not whole-household heating. Households may need multiple devices to maintain adequate comfort in larger or poorly insulated households, increasing both cost and electrical load. Availability can also be impacted during cold-weather periods when demand spikes. Some contractors offer interim heating support or attempt to restore partial system functionality during replacement, but this practice is not currently universal.

Resident Survey

To better understand the heating needs of Bay Area residents, a Resident Survey (survey) was conducted. Survey findings reveal a variety of heating needs and preparedness for heating loss. Of 244 Bay Area residents surveyed in May 2026, 64 percent of respondents already have a form of backup heating while 35 percent reported having no backup heating. Among residents who do have backup heat in their household, 52 percent considered their backup fully or partially satisfactory for short periods. Overall, about 40 percent of respondents felt very or somewhat prepared to manage a loss of heating, while 43 percent said they felt very or somewhat unprepared, and the remaining 17 percent felt neutral or were not sure. Nearly half said they could tolerate going without heat for two days or fewer. When respondents had concerns over a loss of heat, health and safety concerns were the most prominent. Approximately half of respondents cited risks to occupant health, and over 40 percent flagged concerns about elderly, children, or medically vulnerable household members. The most commonly requested forms of support were access to temporary heating equipment (52 percent), practical assistance such as contractor referrals (38 percent), and financial assistance (35 percent).

Integrated Assessment of Temporary Heating Loss

In general, the impact of Rule 9-4 on temporary heating loss is expected to be minimal. Changing from a gas furnace-to-gas furnace replacement to a heat pump HVAC is expected to extend average installations by only two days. Furthermore, several options exist for temporary space heating, including temporary repair of the gas furnace, electric space heaters, electric blankets, and portable window heat pumps. Many of these options are low cost and widely available at both local and online retailers.

The most significant challenge of temporary heating loss is for those households facing emergency furnace replacement which requires an electrical service upgrade or other substantial work. While projects requiring service upgrades represent a minority of cases, they carry the highest risk of extended heating disruption. Lower-income households, elderly residents, and those with medically vulnerable members face compounding challenges in these situations and are likely to need the most support.

Three programmatic approaches are identified as having the potential to meaningfully reduce heating disruption related to Rule 9-4 implementation. Temporary equipment loaner programs, modeled on existing library tool-lending programs, could provide households with low-cost access to portable heaters during heating losses. Pre-wiring and electrical readiness incentive programs could encourage households to complete service upgrades and panel improvements proactively in their household, before emergency replacement scenarios arise. Contractor coordination programs could support more consistent interim heating solutions across the industry, reducing variability in customer experience during replacement projects. Together, these approaches represent a complementary set of interventions that could help protect Bay Area households from the impacts of temporary heating loss related to Rule 9-4 implementation.

1 Introduction

In March 2023, the Bay Area Air District (Air District) adopted amendments to Rule 9-4: Nitrogen Oxides from Fan Type Residential Central Furnaces which governs point of sale nitrogen oxide (NOx) emission standards for space heating systems. Under the 2023 amendment, NOx emitting furnaces under 175,000 British Thermal Units (BTU) per hour, and combination heating and cooling units under 65,000 BTU per hour manufactured after January 1, 2029, will no longer be available for purchase or installation in the Bay Area. These thresholds impact small furnaces and combination heating and cooling units typically used in small residential and commercial spaces. Due to the wide-ranging impacts of this potential technological shift, the Air District has convened a multi-stakeholder Implementation Working Group (IWG) to inform the Air District and the public about implementation challenges and solutions for the amended rules. This report serves to inform the IWG process by assessing the potential impacts of temporary loss of space heating during emergency replacements and identifying programmatic approaches to reduce those impacts for small residential buildings (i.e., single-family and small multi-family buildings) in the Bay Area.

1.1 Why Temporary Heating Loss Is a Potential Concern

Rule 9-4 establishes point-of-sale NOx emission standards for residential central furnaces and applies at the time of equipment replacement or installation. The 2023 amendments set a zero-NOx emissions requirement beginning in 2029, meaning that when a gas furnace fails and must be replaced, the replacement will be a zero-NOx system, which is most commonly a heat pump HVAC. For some households, this transition will occur not through a planned upgrade but as an emergency replacement when a furnace fails unexpectedly during a period when the household is relying on heat, and the homeowner or renter must arrange for a compliant replacement as quickly as possible. Unlike a planned electrification project, these situations leave limited time for preparation, potentially impacting how long the household goes without heat.

Heating in households is a critical feature for occupant comfort, health, and safety. The need for heating is demonstrated by the California State Building Standards which require access to heat for all rental units.[2] While emergency furnace failures are not a new impact due to Rule 9-4 (as detailed in Section 1.4, gas to gas replacements could take 17 days on average), it is generally understood that changing from a gas furnace to a heat pump requires additional labor and equipment that may extend installation timelines. Three factors inform whether a temporary loss of heating would be exacerbated by Rule 9-4.

- First, what is the additional length of time that a household might go without heat when installing zero-NOx heating (compared to a gas furnace)?
- Second, what is the level and frequency of heating required?
- Third, what are the adequate temporary heating solutions and how prevalent are they?

This report is structured around answering key questions about these three factors, and providing a summary of the expected impacts of Rule 9-4 on temporary heating loss due to furnace replacement.

1.2 Report Structure

This report is organized around the following areas of analysis:

[2] https://www.law.cornell.edu/regulations/california/25-CCR-34

- **Heating Needs Assessment**: Estimates how often temporary loss of space heating may be a comfort or health concern across the Bay Area, using historical temperature data to identify the number of days per year when residents may use or need heat.
- **Replacement Timeline Assessment**: Evaluates how long households may be without heating following system failure during Rule 9-4 implementation, comparing installation timelines for zero-NOx heat pump systems against current gas furnace-to-gas furnace replacement practices, including scenarios involving service upgrades.
- **Temporary Heating Solutions and Costs**: Reviews the range of temporary space heating options currently available in the Bay Area and evaluates their cost, accessibility, and suitability for residential emergency use.
- **Resident Survey**: Summarizes findings from a May 2026 Resident Survey (survey) of 244 Bay Area residents on household preparedness, perceptions of heating loss, existing backup resources, and preferences for programmatic support.
- **Programmatic Considerations and Gaps**: Synthesizes findings across all analyses to identify gaps in current temporary heating solutions and outlines potential programmatic approaches that could reduce the impacts of temporary heating loss related to Rule 9-4 implementation.

2 Heating Needs Assessment

This section estimates how often temporary space heating may be desired for comfort or needed for health and safety across the Bay Area by analyzing historical temperature conditions. The assessment identifies the average number of days a year when space heating may be desired or needed. This estimate serves as the period when temporary loss of space heating related to Rule 9-4 implementation may be a concern.

2.1 Methodology Overview

This assessment uses two types of historical daily temperatures in the Bay Area from Daymet, a high-resolution, spatial dataset of weather variables from 1980 through the end of the most recent full calendar year: daily mean temperatures (calculated as the daily maximum plus the daily minimum, divided by two) and daily minimum temperatures.[3] Daily temperatures from Daymet from 2014 through 2024 have been used to capture recent weather trends in the Bay Area while controlling for multi-year climate patterns. These historic daily temperatures are used to analyze temperature trends against two different thresholds: a comfort and health threshold and a freezing threshold.

2.1.1 Comfort and Health Threshold

The comfort and health threshold analysis uses established methodologies to estimate heating needs to satisfy indoor comfort preferences and minimize health risks for vulnerable populations. This analysis calculates Daymet's historic daily mean temperatures (i.e., daily maximum temperature plus the daily minimum temperature, divided by two) for every 11km by 9km area in the Bay Area. The daily mean temperature is then compared to a reference temperature to determine if heating is required to maintain comfort and health.

This analysis is similar to "heating degree days" which are used nationwide to study climate patterns and heating needs for different regions of the country.[4] In most calculations of heating degree days the reference temperature is subtracted from the calculated mean temperature to estimate the number of "heating degree days" to estimate the level of heating required to maintain comfort. For example, the number of heating degree days is the difference between the mean temperature (for example, 29° Fahrenheit, F) and a reference temperature (for example, 60°F) for a total of 31 degree days. However, for the comfort and health threshold analysis developed in this report, the total number of days where the mean temperature was below the reference temperature was summed. Using the hypothetical temperatures in the example above, the result would be one day.

The adjusted methodology used in this report serves as a simpler way to approximate indoor temperatures based on observed outdoor temperatures, given buildings' varying insulation and solar exposure conditions. The mean temperature also only considers outside temperatures. It does not consider internal heat sources like the number of people in the household, cooking appliances, or lighting. Therefore, this estimate is likely to be conservative.

For this comfort and health threshold analysis, 60°F was selected as the reference temperature to represent comfort preferences as well as health needs for vulnerable populations. This reference temperature was selected based on information from the National Institute on Aging, who notes that

[3] Oak Ridge National Laboratory. Daymet. Available at: https://daymet.ornl.gov/.

[4] Degree days indicate how much heating or cooling a location needs by comparing the daily mean temperature to a reference temperature and adding the degree differences over a specified time period. U.S. Energy Information Administration. Units and Calculators Explained: Degree Days. Available at: https://www.eia.gov/energyexplained/units-and-calculators/degree-days.php.

extended exposure to temperatures ranging from 60°F to 65°F can lead to hypothermia in older adults.[5] The number of days a year that the mean temperature is below the reference temperature are added together to indicate annual heating needs and averaged across all 11 years of Daymet data. Overall, this analysis aims to answer how many days a year Bay Area residents may choose to use their heat for comfort or to minimize health risks posed to vulnerable populations.

2.1.2 Freezing Threshold

The freezing threshold analysis provides the minimum threshold when heating would absolutely be required to keep buildings and residents safe, particularly to keep water pipes from freezing and to protect residents against more extreme cold. This analysis considers Daymet's historic daily temperature minimums for every 15 square kilometer in the Bay Area to identify the total number of days when temperatures fall below freezing (32°F) per year. Minimum temperatures rather than mean temperatures were used for this analysis to remain conservative. Additionally, 32°F was selected as the reference temperature to represent times when water pipes may freeze in outdoor temperatures. While water freezes at 32°F, pipes generally do not freeze until much lower temperatures, even in warmer regions with less building insulation.[6] This reference temperature is therefore conservative for this analysis.

The number of days a year that the minimum temperature is below the reference temperature are added together to indicate annual heating needs and averaged across all 11 years of Daymet data. Overall, this analysis aims to answer how many days each year residents may need to use their heat to prevent water pipes from freezing and protect residents against more extreme cold, providing a lower bound on temperatures at which point heating will be required.

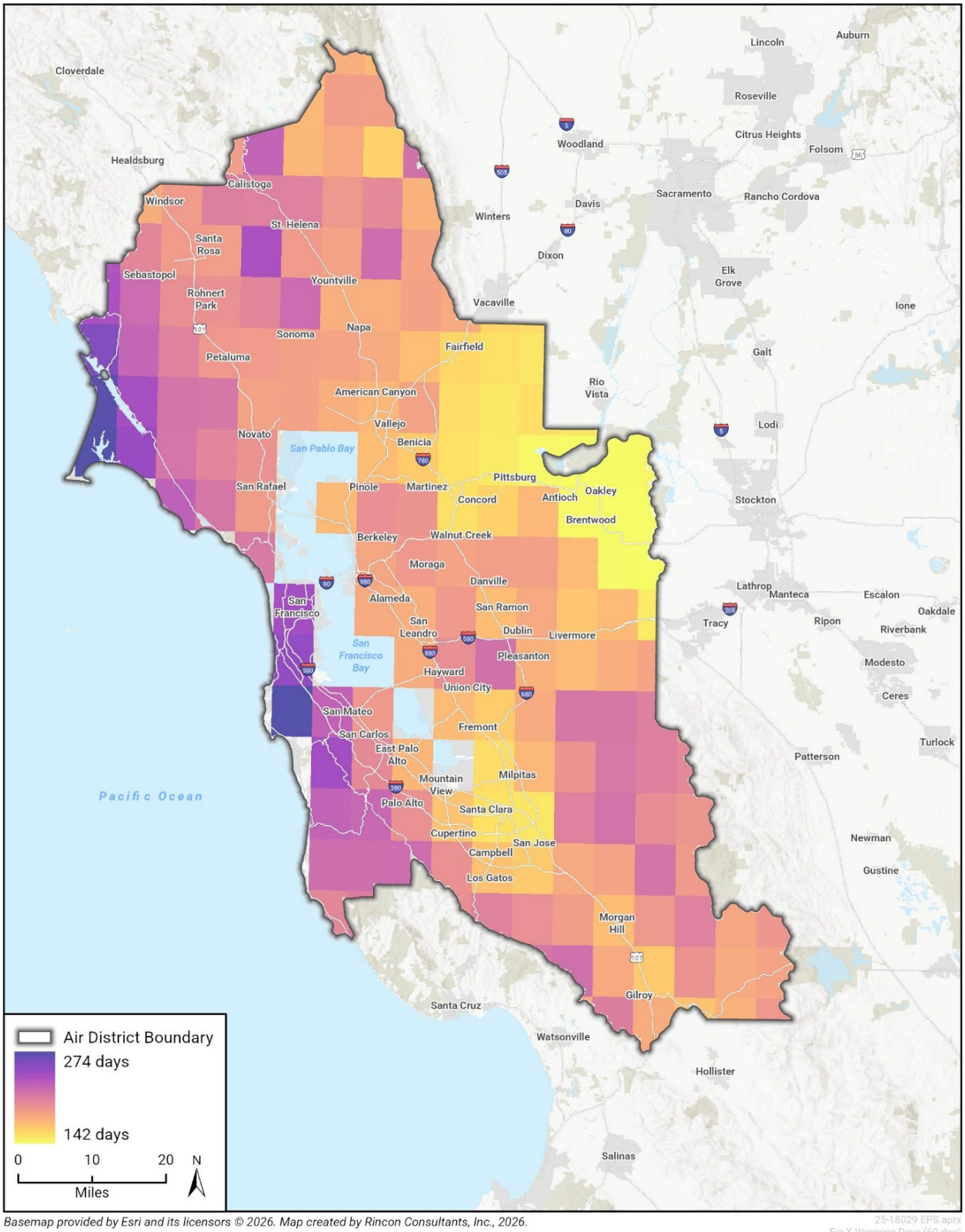
2.2 Annual Heating Needs in the Bay Area

Figure 1, below, presents the results of the comfort and health threshold analysis. The figure shows the number of days across the Bay Area that residents may choose to use their heat for comfort or to minimize health risks, particularly for populations vulnerable to cold temperatures. The heating needs under this analysis range from 142 to 274 days a year across the Bay Area. Areas along the coast and at higher elevation experience the most heating needs while inland and lower elevation areas experience the least heating needs under this analysis. The results of this analysis indicate that residents in the Bay Area may choose to use, or need to use, space heating for about 39 to 75 percent of the year on average. It is during these periods that temporary loss of space heating may be a concern for residents' comfort and health.

[5] National Institute on Aging. Cold Weather Safety for Older Adults. Available at: https://www.nia.nih.gov/health/safety/cold-weather-safety-older-adults#:~:text=Set%20your%20heat%20to%20at,consider%20wearing%20a%20head%20covering.

[6] https://www.energy.gov/energysaver/articles/turn-down-temperature-dont-let-your-pipes-freeze

Figure 1 Bay Area Average Annual Comfort and Health Heating Needs (<60°F)



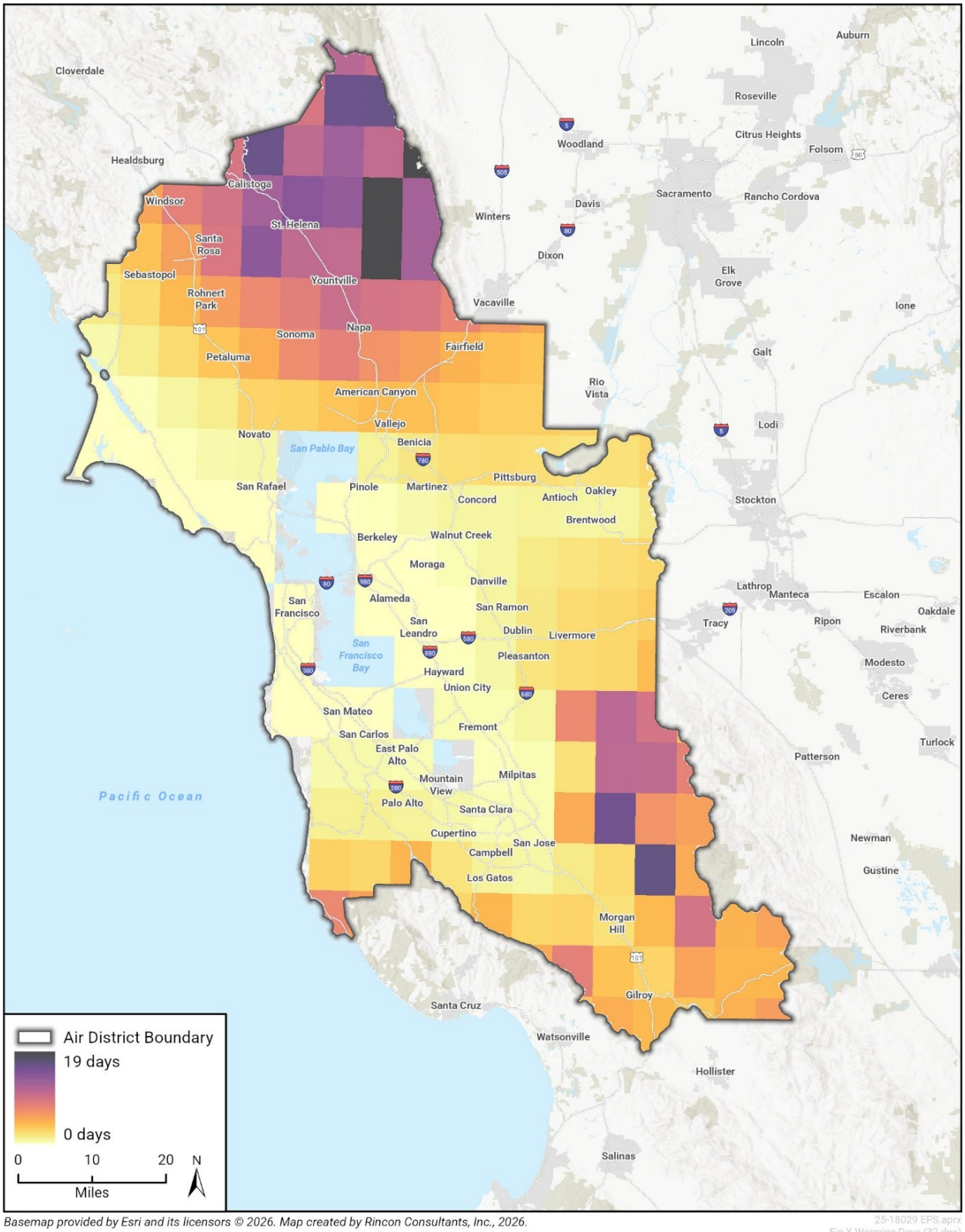
Basemap provided by Esri and its licensors © 2026. Map created by Rincon Consultants, Inc., 2026.

25-18029 EPS.aprx
Fig X Warming Days (60 deg)

Figure 2, below, presents the results of the freezing level threshold analysis. The figure shows the number of days across the Bay Area during which the minimum recorded temperature was 32°F or below. At these temperatures residents may require heat to protect their households' pipes from freezing and protect residents from extreme cold. While water freezes at 32°F, pipes generally only begin freezing after six hours below 20°F or over 12 hours when between 20°F and 32°F. Therefore, this analysis is considered conservative.

Using this conservative 32°F threshold, the heating needs under this analysis range from zero to 19 days across the Bay Area. Northeast and southeast areas experience occasional heating needs while more central areas around San Francisco Bay and along the coast experience no heating needs under this analysis. The results of this analysis indicate that residents rarely (i.e., up to five percent of the year, on average) need to use their heat for building safety and people's safety against extreme cold. It is during these infrequent periods that temporary loss of space heating may be a particular concern.

Figure 2 Bay Area Average Annual Building Safety Heating Needs (<32°F)



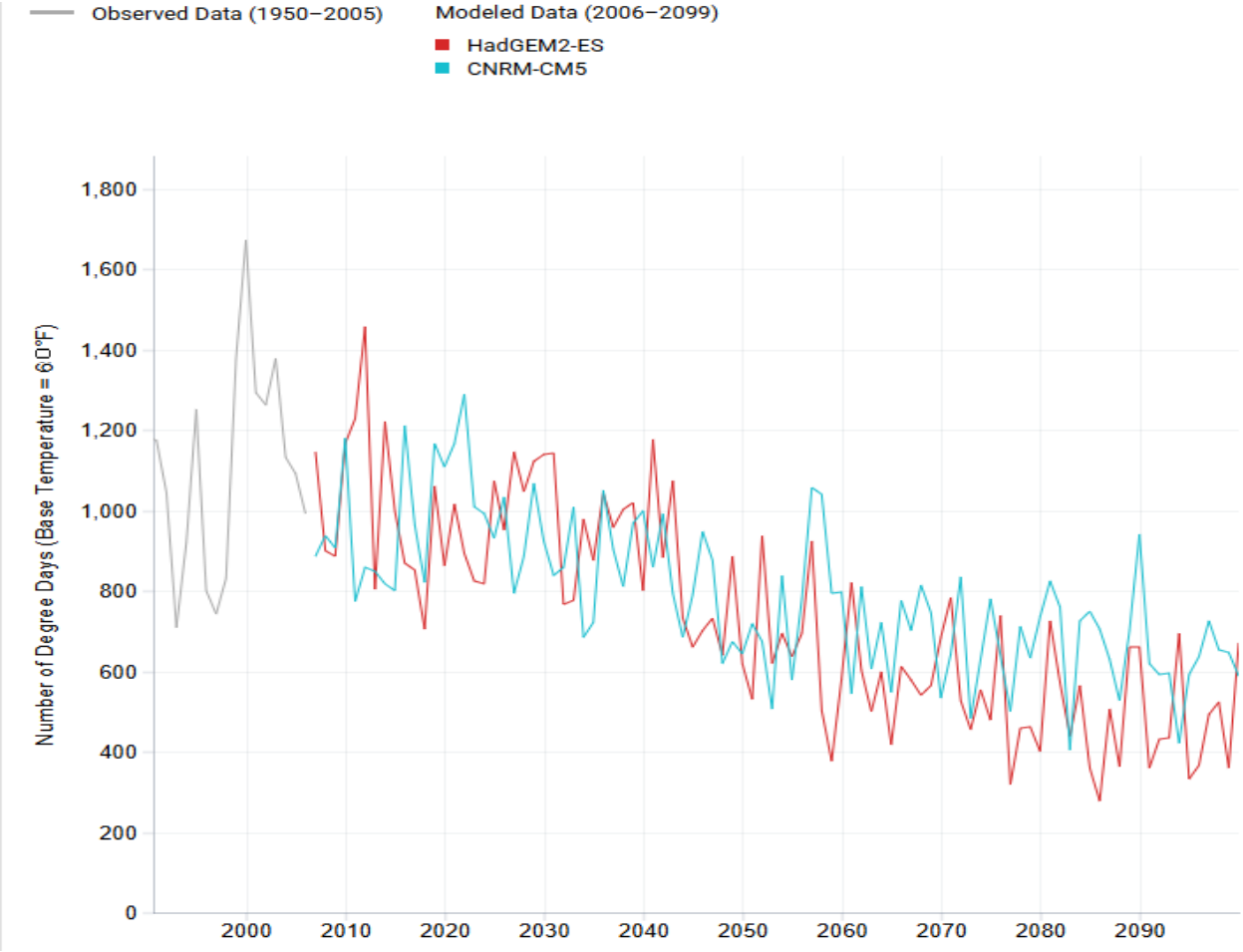
Basemap provided by Esri and its licensors © 2026. Map created by Rincon Consultants, Inc., 2026.

25-18029 EPS.aprx
Fig X Warming Days (32 deg)

2.3 Future Climate Considerations

The above heating needs analyses are based on historical data. However, due to climate change, the Bay Area is expected to experience warmer temperatures resulting in less heating need on average in the future. Figure 3, below, shows an example of how these expected changes will impact heating needs. The figure shows the number of annual heating degree days (i.e., amount of heating needed in a year) in the Bay Area from 1990 through 2099 according to Cal-Adapt.[7] The data uses 60°F as the reference temperature for needing heat and uses Representative Concentration Pathway 4.5 as the greenhouse gas emissions scenario for warming (based on the Intergovernmental Panel on Climate Change's Fifth Assessment Report). The data indicate a decrease in heating degree days from 1,172 heating degree days in 1990 to 630 heating degree days in 2099, about a 46 percent decrease in expected annual heating degree days. While these data cannot be applied directly to the comfort and health threshold analysis and freezing threshold analysis above, they indicate that future heating needs will be lower than historic heating needs.

Figure 3 Heating Degree Days in the Bay Area from 1990 through 2099



Source: Cal-Adapt. Heating Degree Days. Available at: https://v2.cal-adapt.org/tools/degree-days/#climatevar=hdd&scenario=rcp45&lat=37.78125&lng=-122.40625&boundary=locagrid&thresh=60&units=fahrenheit.

[7] Cal-Adapt. Heating Degree Days. Available at: https://v2.cal-adapt.org/tools/degree-days/#climatevar=hdd&scenario=rcp45&lat=37.78125&lng=-122.40625&boundary=locagrid&thresh=60&units=fahrenheit.

2.4 Key Takeaways

The heating needs assessment indicates that potential temporary loss of space heating (regardless of fuel type) may be a concern for residents' comfort and vulnerable populations' health for about 39 percent to 75 percent of the year and up to 5 percent of the year for safety against extreme cold. Due to climate change, these heating needs are expected to decrease into the future. This analysis also indicates that there are significant periods of the year without heating needs, making proactive planning to replace heating systems ahead of failure a key strategy to reduce the impact of temporary heating loss (regardless of heating system fuel type).

3 Heating System Replacement Timelines

This section estimates how long households may be without space heating following system failure during Rule 9-4 implementation by evaluating typical timelines for replacement system installations. Because Rule 9-4 applies to replacement scenarios, the analysis focuses specifically on how installation timelines for zero-NOx systems (i.e., heat pump HVAC systems) may differ from current like-for-like gas furnace replacement timelines. The analysis considers both the time required to complete installation work and the time between system failure and the start of installation, which together determine the duration of the temporary loss of heating.

To establish a baseline comparison, the analysis first considers traditional gas furnace-to-gas furnace replacement timelines, which generally involve straightforward equipment changeouts with limited additional electrical work. The analysis then evaluates gas furnace-to-heat pump HVAC replacement scenarios, including both simpler replacements that do not require electrical service upgrades and more complex ones that do. Service upgrades refer to replacing the main electrical infrastructure that delivers power from the utility grid to a property so the property can use more electricity. Comparing these scenarios helps identify the extent to which Rule 9-4 may extend installation timelines relative to current replacement practices and when temporary heating needs may become more significant.

3.1 Methodology Overview

Installation timelines were estimated using a combination of data sources, including program data from Technology and Equipment for Clean Heating (TECH) Clean California,[8] contractor outreach, and supplemental desktop research. The analysis evaluates three primary replacement scenarios to reflect conditions relevant to Rule 9-4 implementation: (1) gas furnace-to-gas furnace replacement, which serves as a baseline comparison representing current standard practice before Rule 9-4, (2) gas furnace-to-heat pump HVAC replacement without a service upgrade, and (3) gas furnace-to-heat pump HVAC replacement requiring a service upgrade. These scenarios capture a range of installation complexities and provide a basis for understanding how Rule 9-4 may affect replacement timelines relative to current practices.

3.2 Installation Timelines

Gas Furnace-to-Gas Furnace Replacement (Baseline Scenario)

Gas furnace-to-gas furnace replacement represents the baseline scenario and reflects current standard replacement practice for most households with existing gas heating systems. These projects generally involve relatively straightforward equipment changeouts with limited additional electrical work or system modifications. It should be noted that replacing a gas furnace in California still requires a permit, compliance with Title 24 efficiency standards, and a mandatory duct sealing or leakage test. Based on a survey conducted by Opinion Dynamics on heating installation steps in California, a reasonable total timeline from system failure to restored heating is approximately 17 days for this scenario.[9] This timeline includes both the time required to initiate installation following system failure and the duration of the on-

[8] TECH Clean California is a statewide initiative to accelerate the adoption of clean space and water heating technology. The program has data on 9,850 heat pump HVAC installations from 2021 through January 2026 in single-family and small multi-family buildings across the Bay Area.
TECH Clean California. Available at: https://techcleanca.com/.

[9] Opinion Dynamics. California Residential Fuel Substitution Workforce Readiness Study. September 27, 2024. Accessed at: https://opiniondynamics.com/ca-residential-fuel-sub-workforce-readiness

site installation itself (see Figure 5 for more details). Timelines can vary depending on contractor availability and this timeline should be considered average.

Gas Furnace-to-Heat Pump HVAC Replacement

For households replacing a gas furnace with a heat pump HVAC system that does not require a utility service upgrade, installation timelines are slightly longer than the baseline gas furnace-to-gas furnace replacement scenario. This additional time is generally associated with electrical work, condensing unit installation, or duct reconfiguration occurring during on-site installation days.

To understand these installation timelines, TECH Clean California data from 9,850 heat pump HVAC installation projects in single-family and small multi-family households in the Bay Area were analyzed.[10] The projects were analyzed for on-site installation duration (in number of days) and differentiated by whether or not the installation required a panel upgrade and the project's prior space heating fuel type. Panel upgrades refer to panel replacements, panel optimization, or adding a subpanel. Some panel replacements (i.e., installing a larger panel) require service upgrades. While data is not available to differentiate projects by whether or not the installation required a service upgrade, not all households that upgrade to larger panels require service upgrades. Averages and medians were used to analyze installation duration of the projects. While the average timeline helps summarize the entire dataset, median duration helps remove outlier data points that may skew the average towards the minimum or maximum data points.

As shown in Table 1, for heat pump HVAC projects without panel upgrades, the median installation duration is approximately two days, with the average duration closer to five days. The average duration is likely higher than the median due to the upwards skew from outlier projects that included other home renovation work. Across all projects without panel upgrades (9,669 projects), the minimum installation duration was one day and the maximum was 561 days. While the TECH data does not describe why such extreme outliers were present, it was not due to service or panel upgrades since they occurred in the "no panel upgrade" dataset. It is possible that these projects included larger home renovations that drove those longer installation times.

Based on the data, a majority of installations (9,669 projects) were completed without a panel upgrade as part of the installation project. Less than two percent (181 projects) of the recorded single-family and small multi-family heat pump HVAC installations in the Bay Area needed panel upgrades. For the less common heat pump HVAC projects requiring panel upgrades, median installation durations remain relatively short, at three days, with the average duration being substantially higher—closer to ten days. The average duration is higher than the median duration due to an upwards skew from outlier projects. Outlier projects might have included other home renovation work or panel replacements that required service upgrades. Across all projects with panel upgrades (181 projects), the minimum installation duration was one day and the maximum was 214 days. This data indicates that most heat pump HVAC projects requiring panel upgrades are completed on longer timelines (i.e., one to five days longer) than those without panel upgrades.

[10] TECH Clean California. "TECH Working Data Set Single-family". Accessed February 2026 at https://techcleanca.com/public-data/download-data/.

Table 1 TECH Clean California Single-family and Small Multi-family Heat Pump HVAC On-Site Installation Duration in the Bay Area by Panel Upgrade Need and Prior Fuel Type

Prior Space Heating Fuel Type	Count of Heat Pump HVAC Projects	Average Installation Duration (Days)	Median Installation Duration (Days)
No Panel Upgrade Required	**9,669**	**5**	**2**
Electric Resistance	73	7	2
Natural Gas	9,546	5	2
Other	40	9	3
Propane	10	6	4
Panel Upgrade Required	**181**	**10**	**3**
Natural Gas	178	11	3
Other	2	3	3
Propane	1	3	3

Source: TECH Clean California. "TECH Working Data Set Single-family". Accessed February 2026 at https://techcleanca.com/public-data/download-data/.

Data includes installations in single-family households and small multi-family households. Data is filtered for heat pump HVAC installations within the Bay Area counties (i.e., Alameda County, Contra Costa County, Marin County, Napa County, San Francisco County, San Mateo County, Santa Clara County, Solano County, and Sonoma County).

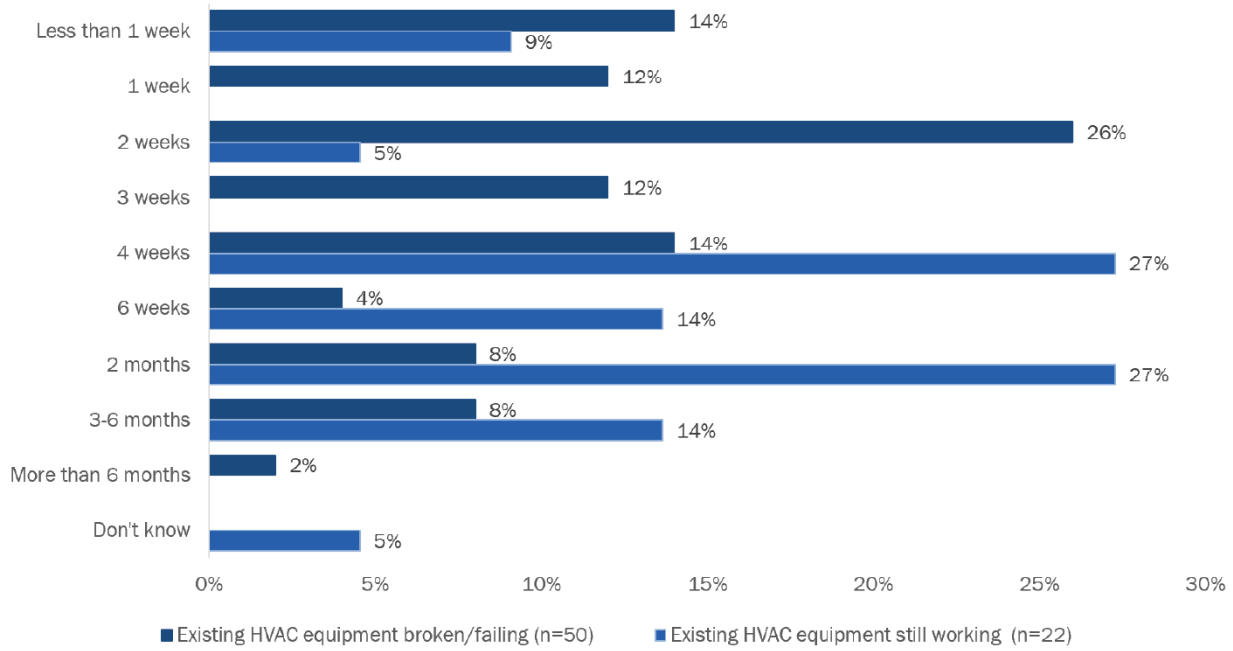
Outreach to a Bay Area contractor confirmed that most standard heat pump HVAC installations are completed within two to three days of on-site installation work. These on-site installation days are in addition to the time required to initiate installation following a system failure (e.g., contacting contractors, scheduling contractor visit, receiving contractor quote) which is assumed to be the same for a heat pump HVAC compared to a gas furnace-to-gas furnace replacement scenario.

Overall, the analysis suggests that replacing a gas furnace with a heat pump HVAC system typically adds approximately two additional days to the total replacement timeline relative to a gas furnace-to-gas furnace replacement. This equates to a total installation timeline of 19 days for a gas furnace-to-heat pump HVAC installation. In households that already have central air conditioning infrastructure or sufficient electrical capacity, heat pump HVAC installations can be relatively straightforward and are less likely to require electrical work or panel upgrades that extend the installation timeline.

While this analysis remains conservative in finding that emergency heat pump HVAC installations may take 19 days, California-specific data suggests they may be shorter when prioritized by contractors. According to a survey conducted in California by Opinion Dynamics, 52 percent of emergency heat pump HVAC installations were completed within 2 weeks (i.e., 14 days), as shown in Figure 4.[11]

[11] Opinion Dynamics. California Residential Fuel Substitution Workforce Readiness Study. September 27, 2024. Accessed at: https://opiniondynamics.com/ca-residential-fuel-sub-workforce-readiness

Figure 4 Heat Pump HVAC Completion Timeline by Replacement Scenario



Source: Opinion Dynamics. California Residential Fuel Substitution Workforce Readiness Study. September 27, 2024. Accessed at: https://opiniondynamics.com/ca-residential-fuel-sub-workforce-readiness.

Gas Furnace-to-Heat Pump HVAC Replacement with Service Upgrade

In some cases, households may require a utility service upgrade to support heat pump HVAC installation, particularly households with older grid connections or households pursuing broader electrification upgrades. In these situations, installation timelines can increase substantially beyond the baseline replacement scenario.

Contractor and industry feedback indicate that utility coordination, permitting, and electrical infrastructure work associated with service upgrades may take several weeks and, in some cases, up to one month or longer to complete. These projects typically involve additional coordination between contractors, electricians, local permitting agencies, and electric utilities, introducing substantially greater complexity and uncertainty into the replacement process. Although these more complex projects likely represent a small share of replacement scenarios, they are the situations most likely to result in extended temporary heating loss related to Rule 9-4 implementation. As a result, households requiring service upgrades may be more dependent on temporary heating solutions or interim measures while replacement work is completed.

3.3 Key Timeline Factors

While the above analysis identified reasonable timelines for each heating system replacement scenario, installation timelines can vary due to several key factors that can extend both the duration of on-site work and the time between prior system failure and installation.

One of the primary factors is contractor availability, particularly during peak seasons or periods of high demand.[12] Outreach to TECH Clean California contractors in mid-2023 indicates that customers may wait approximately one week on average for installation to begin, with timelines extending to up to two weeks

[12] Opinion Dynamics. Time 1 Market Assessment Final Report. February 2024. Available at: https://opiniondynamics.com/time-1-market-assessment-final-report/#4-4-customer-decision-drivers.

in some cases depending on scheduling constraints and workload. These scheduling constraints likely affect both gas furnace-to-gas furnace and gas furnace-to-heat pump replacement scenarios.

Equipment availability can also affect timelines, particularly for specific heat pump HVAC models or components that may be subject to supply chain constraints. Although not always a primary driver for standard installations, delays in sourcing equipment can extend project timelines, especially when specialized systems or higher-efficiency models are required. Based on the previous IWG Market Assessment report, equipment availability is not a major factor for most installations.[13]

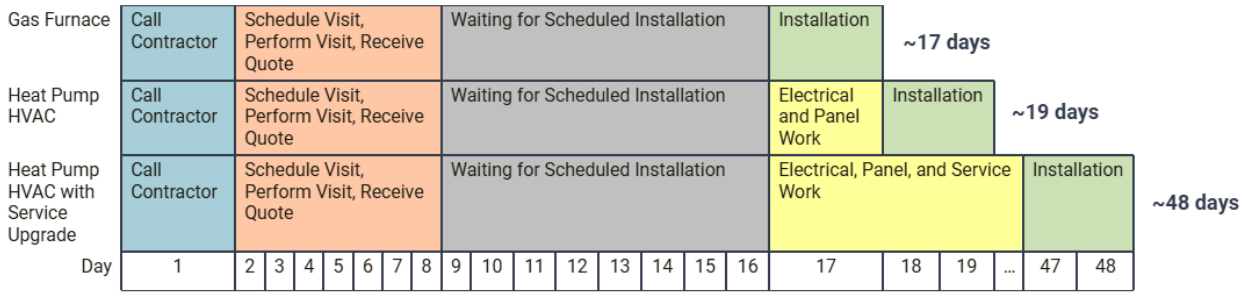
The main driver for heat pump HVAC installation delays is the need for electrical work like new circuit installation, panel upgrades,[14] and service upgrades. These upgrades introduce additional coordination and labor, increasing the duration and sometimes the complexity of the installation process. Overall, less than two percent of heat pump HVAC installation projects in single-family and small multi-family buildings needed panel upgrades, according to TECH Clean California's data. While data is not available on service upgrades, not all households that install upgraded electric panels require service upgrades. Thus, it is likely that even fewer heat pump HVAC installation projects need service upgrades. Service upgrades will increase project complexity and can add up to a month or longer to the installation timeline.

3.4 Key Takeaways

Overall, these findings indicate that for most households, transitioning from a gas furnace to a heat pump HVAC system is unlikely to substantially extend replacement timelines compared to current gas furnace replacement practices. Heat pump HVAC installations are likely to only require two additional days compared to gas furnace-to-gas furnace installations due to additional electrical work and other changes like installing the outdoor condensing unit. However, households requiring service upgrades may experience considerably longer timelines and greater potential need for temporary heating support. Figure 5, below, summarizes the expected heating system installation timelines by replacement scenario. The heat pump HVAC scenario assumes the three-day median on-site installation timeline from the TECH Clean California data for heat pump HVAC projects requiring a panel upgrade. Service upgrades can significantly increase this installation timeline by several weeks to months but are likely required infrequently.

Since additional days for heat pump HVAC installations are needed for electrical work and possible panel or sub-panel upgrades, preparing a home for electrification with pre-wiring before heating system failure can avoid additional days without heat. It is also worth noting that households with central air conditioning are less likely to require additional days for heat pump HVAC installations compared to conventional gas furnace replacements, since the system would already have a 240-volt circuit and associated panel capacity.

Figure 5 Heat Pump Installation Timelines by Replacement Scenario



[13] Bay Area Air District. Zero-NOx Space Heating Single-family and Multi-family Technologies Market Assessment. January 2026.

[14] Panel upgrades could include panel modifications, optimizations like smart circuit breakers, replacements, or adding a subpanel.

4 Temporary Space Heating Options and Costs

This section identifies available temporary space heating options in the Bay Area and evaluates their costs and potential roles in addressing temporary loss of space heating. In emergency replacement scenarios where households may be without heating for several days and for up to two weeks, temporary solutions can serve as a critical bridge to maintain indoor comfort and health. In addition to standalone temporary heating equipment, some contractors may also provide temporary solutions by restoring partial functionality of an existing heating system, when feasible, to maintain heat until installation of a replacement heat pump HVAC system can occur.

This section provides an overview of commonly available technologies, summarizes their typical costs and use cases, and assesses their practicality for residential applications. The analysis focuses on options that are readily accessible to Bay Area households through retail purchase or rental, as well as those that may be deployed through contractor or programmatic support.

4.1 Overview of Temporary Heating Solutions

Given that Bay Area residents may use space heating for 39 to 75 percent of the year (approximately 142 to 274 days annually), and that replacement timelines can range from approximately 17 days for a standard gas furnace-to-gas furnace replacement, 19 days or more for a gas furnace-to-heat pump replacement, and potentially several weeks to a month or longer in cases requiring a utility service upgrade, temporary heating solutions may be needed by some households for an extended period during the replacement process.

A range of temporary space heating options is currently available to address short-term heating needs in residential settings. The most common options are portable electric resistance heaters, which include ceramic (fan-forced), oil-filled radiant, and infrared or quartz heaters. These technologies are widely available and are relatively low cost, requiring only a standard electrical outlet. They are typically used to heat individual rooms or provide supplemental heating rather than serving as whole-home solutions.

In addition to standard portable heaters, higher-output electric fan or utility heaters are available and are often used in larger or less insulated spaces such as garages or workshops. These units provide more powerful heating but may require dedicated circuits and are more commonly available through rental equipment providers.

Portable or window-mounted heat pump units with heating functionality represent a more efficient, though less commonly used, temporary option. These systems transfer heat rather than generate it, making them more energy efficient than electric resistance heaters. However, they generally involve higher upfront costs and may require installation components such as window venting kits, which can limit their practicality for short-term emergency use.

Other supplemental options include personal heating devices, such as plug-in heaters and electric blankets, which provide localized warmth rather than heating an entire space. While these options are not substitutes for room heating, they can play an important role in maintaining occupant comfort during short periods without central heating, particularly during overnight hours.

Overall, temporary heating options vary significantly in terms of heating capacity, cost, portability, and ease of use. Most solutions are designed for partial or supplemental heating, meaning that households may need to use multiple devices or prioritize heating specific rooms during a period of temporary heating loss.

Appendix A provides a summary of common temporary space heating equipment available to Bay Area households, including typical upfront costs, rental availability, and key advantages and disadvantages. The summary is intended to support comparison across different types of equipment and to illustrate

how various options may be suited to different use cases. As shown, most lower-cost options are widely available for purchase but are not typically offered through rental providers, while higher-capacity equipment is more likely to be available through rental providers but may involve higher costs and logistical considerations.

4.2 Cost Considerations

Temporary space heating options vary in cost depending on the type of equipment. For most households, the lowest-cost options are portable electric resistance heaters, which typically range from approximately $20 to $120 for purchase depending on size and features. Infrared heaters and higher-capacity electric heaters generally fall within a higher price range of approximately $100 to $300, while portable heat pump units can cost between $400 and $1,200. Personal heating devices such as electric blankets represent the lowest-cost option, typically ranging from $25 to $100.

Rental options are more limited and are generally concentrated among higher-capacity electric heaters used for larger spaces. These units are typically available through equipment rental providers and may involve daily or weekly rental fees, in addition to potential delivery costs. For most common residential portable heaters, rental is not widely available, meaning households are more likely to rely on purchasing equipment during an emergency.

In addition to upfront costs, temporary heating options can increase household electricity usage, resulting in higher utility bills during the period of use. Electric resistance heaters, in particular, can be energy-intensive when used for extended periods or in multiple rooms. While portable heat pump units are more energy efficient, their higher upfront cost may limit their feasibility as a short-term solution. As a result, households may face a tradeoff between lower upfront costs and higher operating costs, depending on the type of equipment selected and the duration of heating need.

Overall, while many temporary heating options are relatively affordable on a per-unit basis, costs can accumulate if multiple devices are needed to maintain adequate comfort and health, particularly for larger households or longer-durations. These cost considerations may present a barrier for some households, especially in emergency situations where equipment must be obtained quickly.

4.3 Existing Contractor Efforts

Outreach to Bay Area contractors indicates that some HVAC contractors take steps to mitigate temporary loss of heating during system replacement, though practices vary across companies. In many cases, contractors aim to reduce customer discomfort by either providing temporary heating equipment or attempting to restore partial functionality of the existing system while a full replacement is scheduled. For example, one contractor noted that, when feasible and if the failure is not catastrophic, their policy is to get the existing system back up and running temporarily to maintain heat until installation of a new HVAC system can occur.

While contractor-provided support can help reduce the need for households to independently purchase or rent temporary heating equipment, it should not be assumed to be universally available. Households may still need to rely on their own temporary heating solutions, particularly in situations where contractors do not provide equipment, existing systems cannot be restored temporarily, or when installation timelines are extended.

4.4 Availability and Accessibility

The availability of temporary space heating equipment in the Bay Area is generally high for basic residential options, particularly for portable electric resistance heaters, which are widely sold through general retailers and online marketplaces. These products are typically kept in inventory year-round,

although availability can fluctuate during colder months when demand increases. More specialized or higher-capacity equipment, such as industrial-grade electric heaters or rental units, is also available but is more concentrated among equipment rental providers and contractor supply channels.

Despite overall availability, peak demand periods, particularly during cold weather months, can create localized supply constraints. Retailers may experience rapid depletion of lower-cost portable heaters, while rental providers may face increased demand for higher-capacity units used in construction or emergency heating applications. These constraints are likely most pronounced for in-person retail purchases and local inventories. In contrast, large online retailers with broader distribution networks may continue to have equipment available, although delivery times may still vary depending on regional demand and shipping conditions. In situations where local inventories are constrained, households may face limited immediate access to preferred equipment types, potentially requiring substitutions or delayed acquisition. This dynamic is consistent with broader patterns observed for seasonal heating/cooling equipment, where demand spikes can temporarily outpace retail and rental supply.

Distribution logistics also influence accessibility. Lower-cost portable heaters are generally easy to obtain through same-day retail purchase or rapid online delivery, making them the most immediately accessible option for households experiencing sudden heating loss. In contrast, higher-capacity rental equipment may require advance reservation and delivery coordination, which can introduce delays that are less compatible with emergency heating needs.

Suitability of temporary heating options varies significantly by housing type. In smaller households or apartments, a limited number of portable heaters or supplemental devices may be sufficient to maintain acceptable indoor temperatures in occupied rooms. However, in larger single-family households or poorly insulated units, multiple devices may be required to achieve desired coverage, which can increase both cost and electrical load. Additionally, older housing stock may have electrical limitations that constrain the simultaneous use of multiple high-wattage heaters. These availability and accessibility factors may prevent households from implementing temporary heating solutions to meet their desired level of comfort during periods of system failure or replacement.

5 Resident Survey

This section summarizes the methodology and results of a survey conducted to better understand Bay Area resident perspectives related to temporary loss of space heating. While the sections above focus on existing data and associated analysis, the largest variable relating to the impacts of temporary heating loss are the perspective of residents. The survey was designed to collect information on household preparedness, perceptions of heating loss, existing backup heating resources, and potential interest in programmatic support or alternative solutions. Survey results were used to help refine the findings of this analysis as well as to help inform the development of potential strategies to reduce impacts associated with temporary heating loss (see Integrated Assessment of Temporary Heating Loss below).

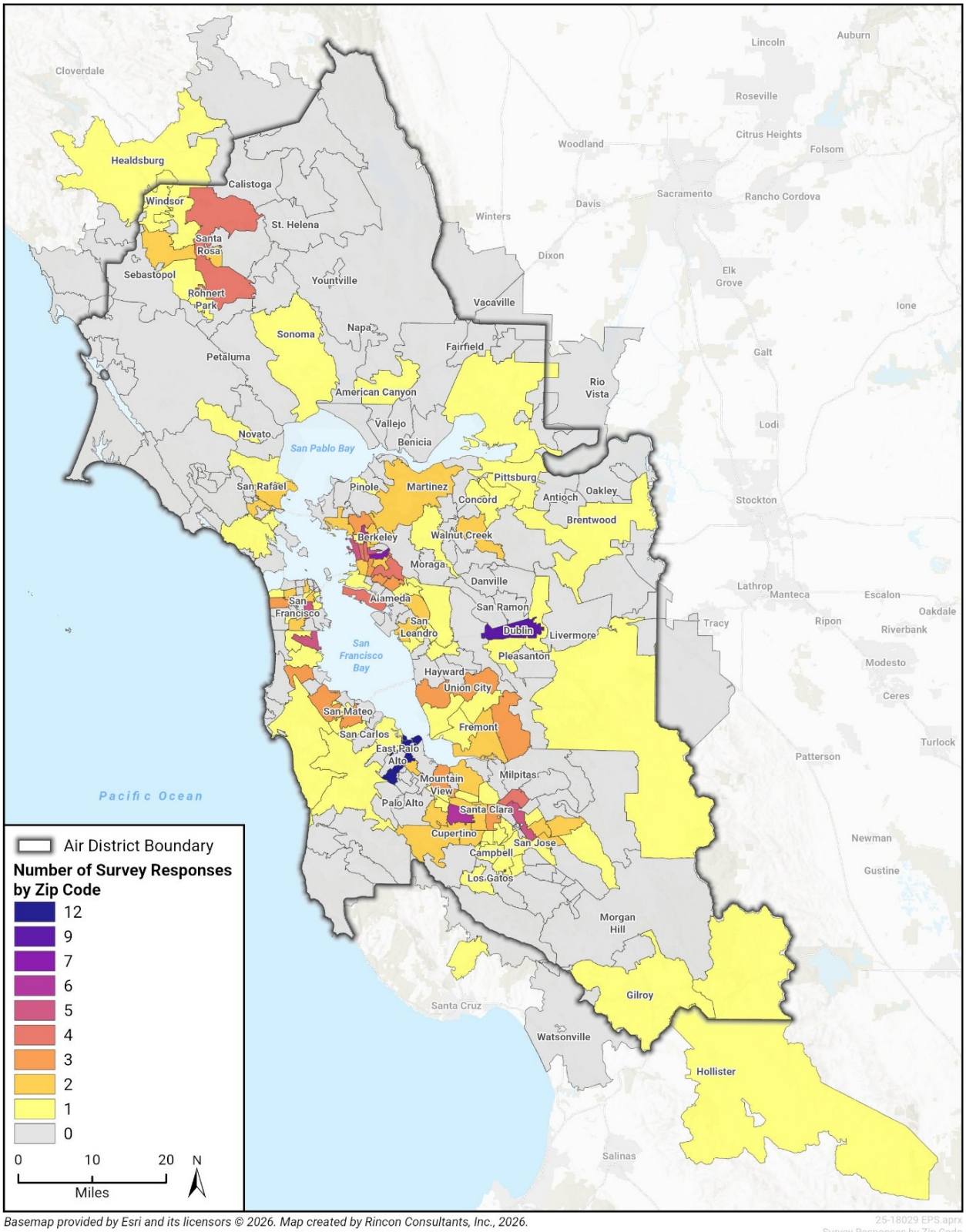
5.1 Methodology

Information was collected through an online survey administered to Bay Area residents between May 1 and May 21, 2026. The survey focused on residents living in single-family households and small multifamily buildings and included questions related to heating systems, awareness of Rule 9-4, existing backup heating resources, preparedness for temporary heating loss, and preferences for potential support measures. The survey was distributed through multiple channels to encourage broad participation across the Bay Area. Distribution methods included the Bay Area Air District's Implementation Working Group, partner organization networks (including BayREN and County networks), and the Air District's website, social media channels, and press releases.

Survey questions collected information on respondent zip code, housing type, ownership status, primary heating system, and existing backup heating solutions such as electric space heaters, fireplaces, or electric blankets. Additional questions assessed resident comfort and safety concerns during periods of temporary heating losses, how long respondents believed they could comfortably go without built-in heating, and what types of assistance would be most helpful during a period of temporary heating loss.

244 survey responses were collected from residents across the Bay Area, as shown in Figure 6. Survey results were analyzed to identify levels of preparedness and potential gaps in existing temporary heating options. Findings from the survey are intended to help inform potential programmatic solutions and customer support strategies related to temporary heating loss as related to Rule 9-4 implementation.

Figure 6 Survey Responses by Zip Code



Basemap provided by Esri and its licensors © 2026. Map created by Rincon Consultants, Inc., 2026.

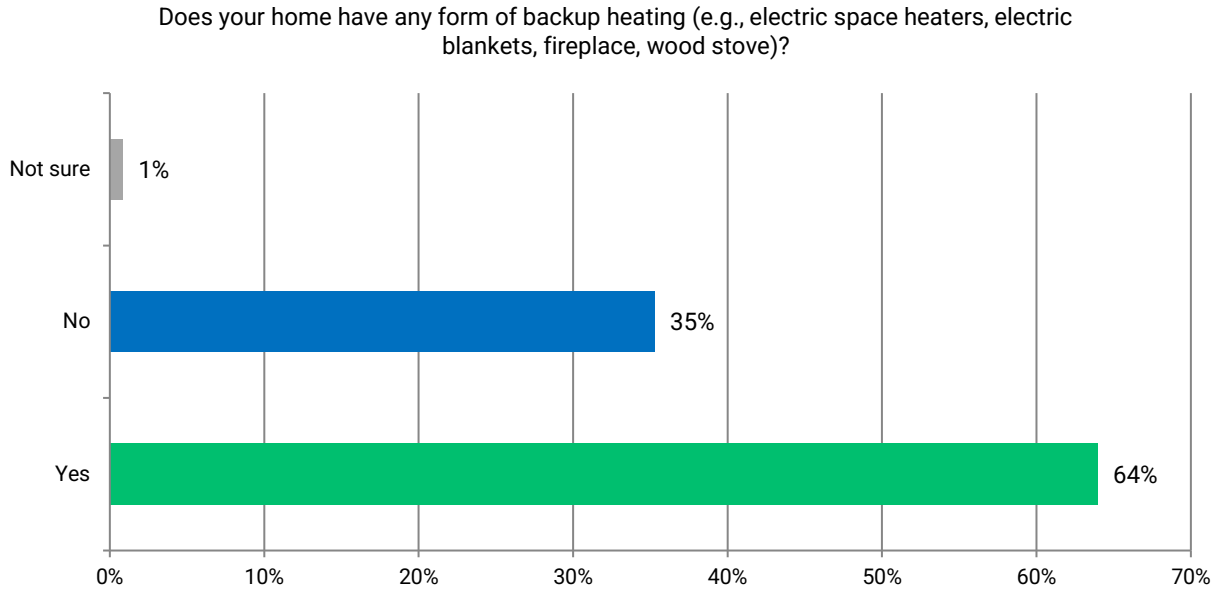
25-18029 EPS.aprx
Survey Responses by Zip Code

5.2 Results

The majority of survey respondents live in single-family households (69 percent), own their home (75 percent) and use built-in space heating (93 percent).

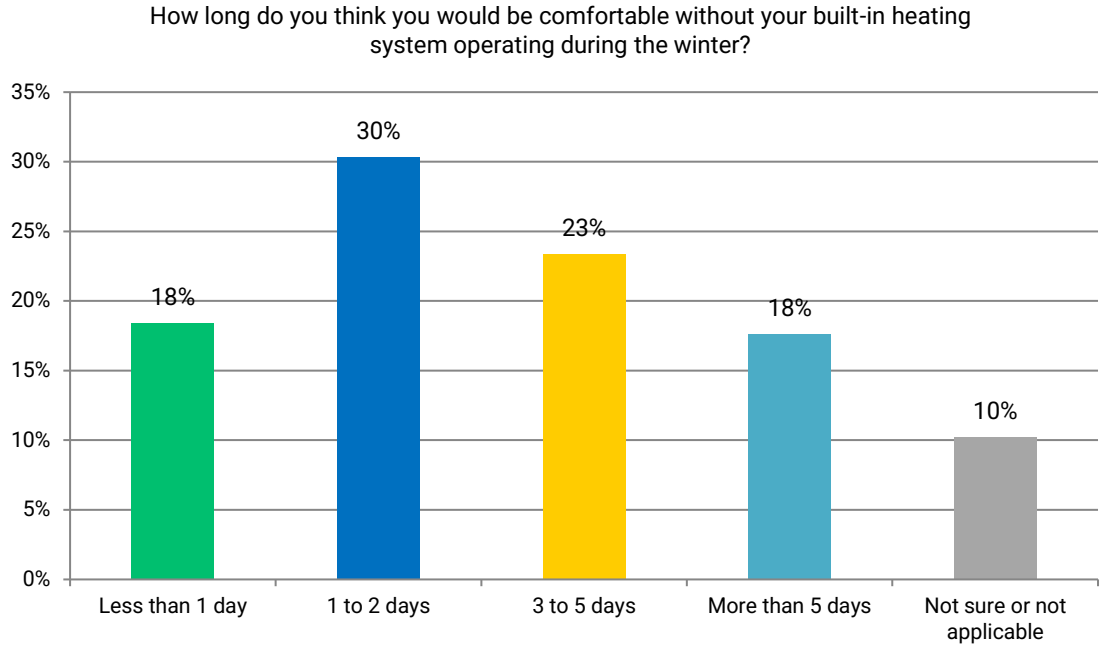
Survey responses show that many Bay Area households already have backup heating in addition to their furnace. As shown in Figure 7, approximately 64 percent of respondents reported having some form of backup heating (e.g., electric space heaters, electric blankets, a fireplace, or a wood stove) while 35 percent currently have no backup option.

Figure 7 Share of Survey Respondents with a Form of Backup Heating



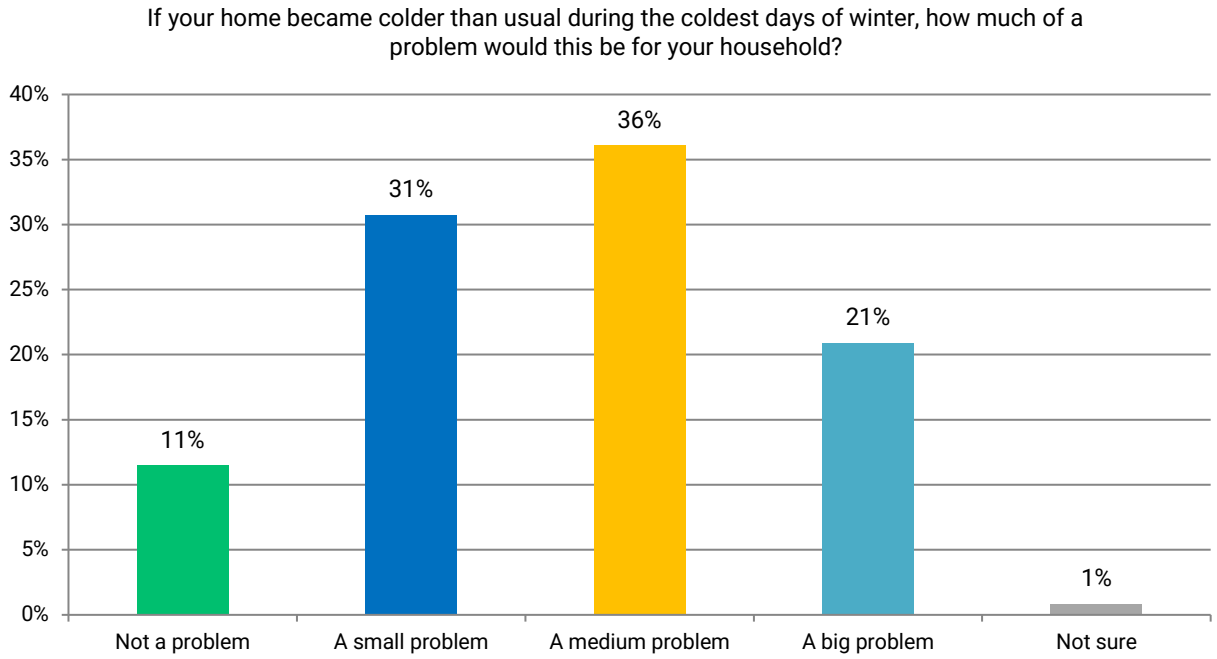
As shown in Figure 8, when asked how long residents would be comfortable without a functioning built-in heating system operating during the winter, the most common response was between one to two days (30 percent). A significant portion of respondents (42 percent) thought they would be comfortable for at least three days, while 18 percent could not go one day without heat.

Figure 8 Number of Days Survey Respondents Could Be Comfortable Without Heat



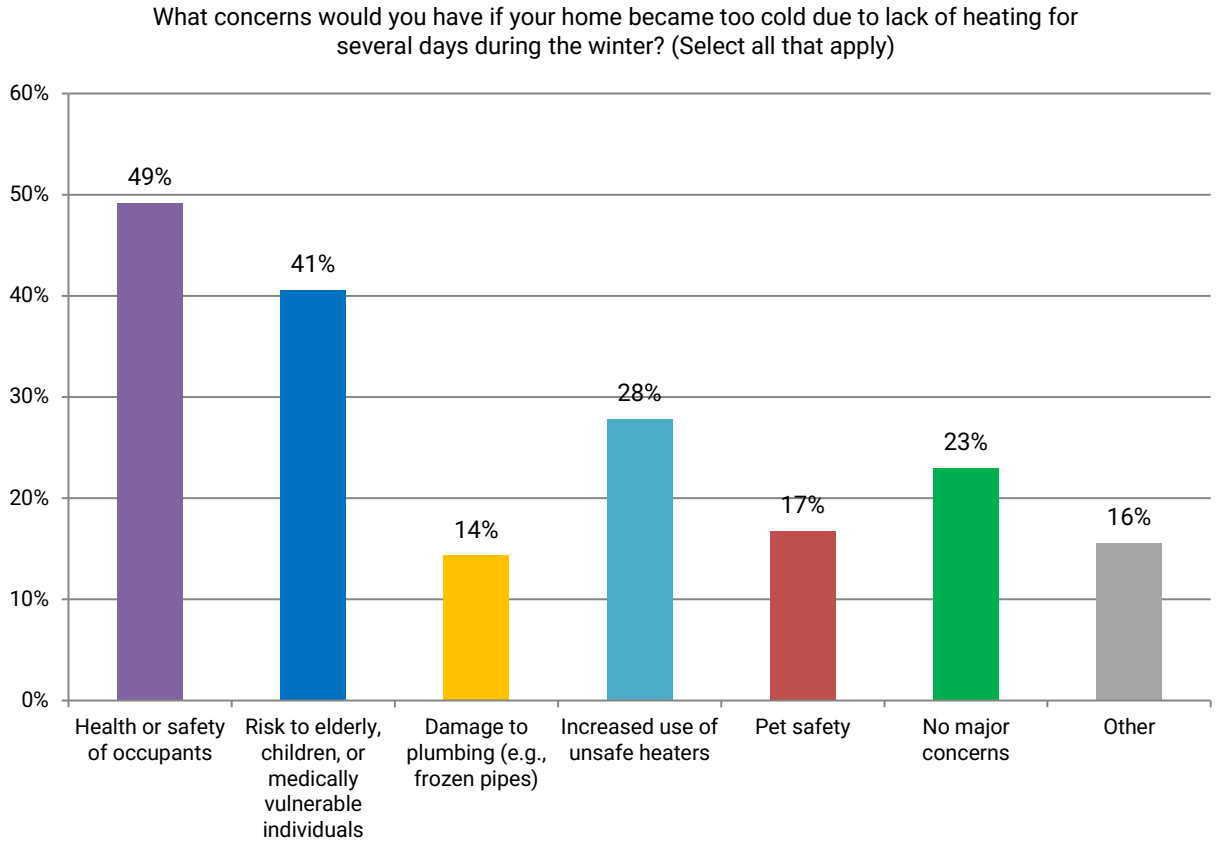
When asked how much of a problem it would be if their home became colder than usual during the coldest days of winter, the most common response was that it would be a moderate problem (36 percent). The second most common response was that it would be a small problem (31 percent). An additional 21 percent of responders stated that heating loss would be a large problem for their household while the least common response noted it would be no problem at all (11 percent) as shown in Figure 9.

Figure 9 Perceived Impact of Heating Loss



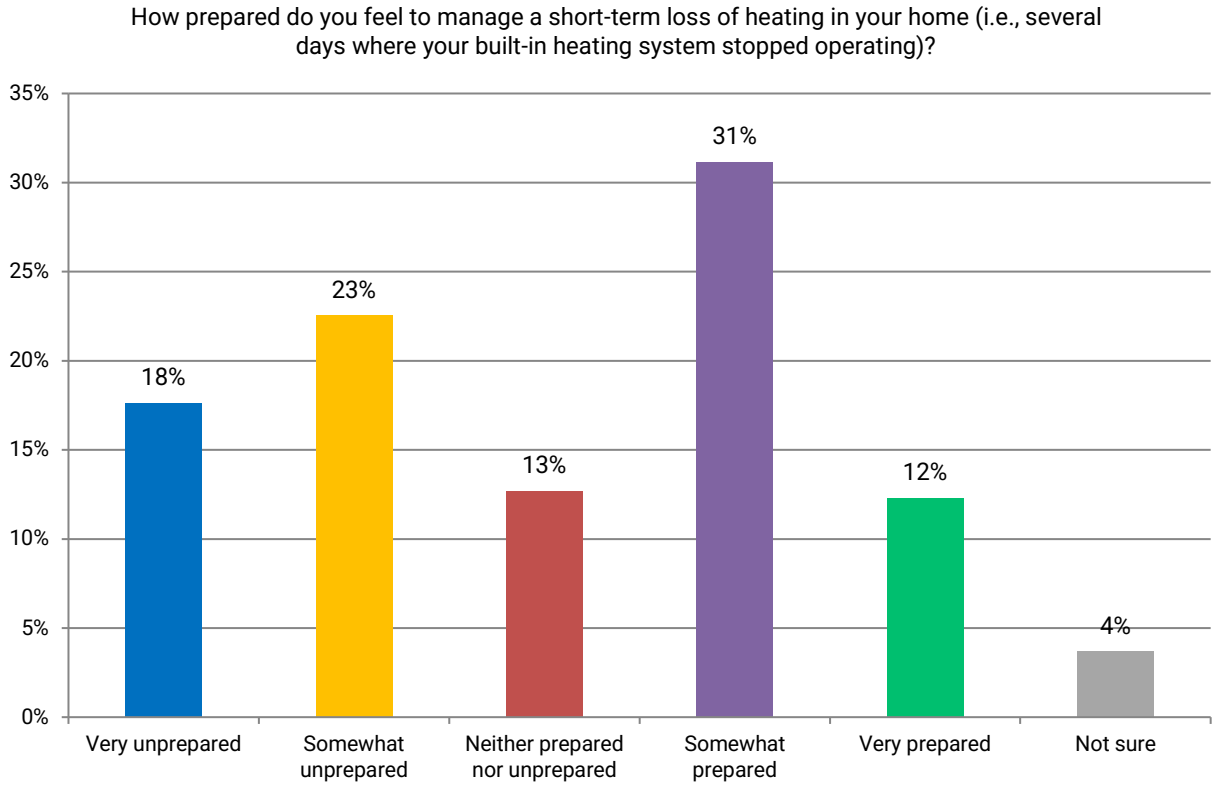
As indicated in Figure 10, concern about health and safety was the most commonly cited worry associated with a multi-day heating loss, raised by approximately half of respondents. The second most common response (41 percent) identified risks to elderly, children, or medically vulnerable household members, and roughly 28 percent were concerned about increased use of unsafe alternative heaters. Other concerns included pet safety and the risk of frozen pipes. Write-in responses highlighted additional impacts such as increased electricity costs from space heater use, difficulty working from home, discomfort for individuals with cold intolerance or chronic health conditions, and challenges for elderly residents maintaining adequate indoor temperatures.

Figure 10 Concerns About Heating Loss



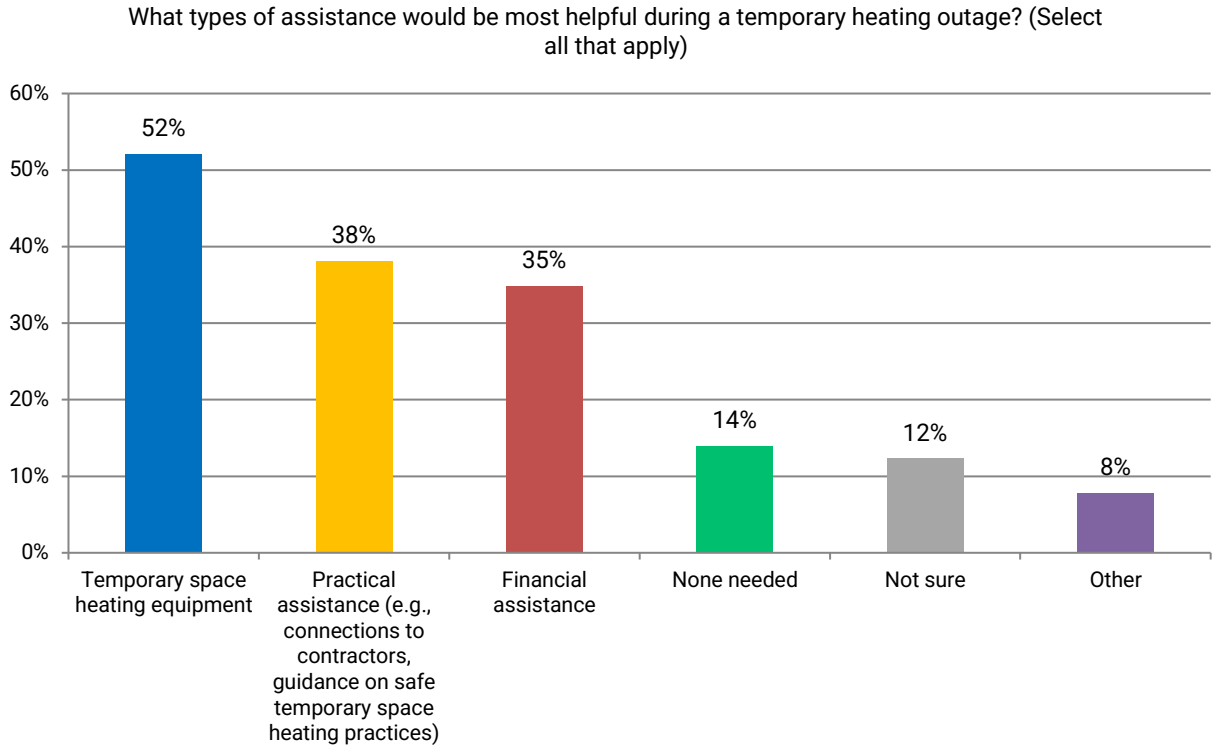
Self-reported preparedness was mixed, as depicted in Figure 11. Over 43 percent of respondents said they felt either very prepared or somewhat prepared to manage a short-term heating loss, compared to approximately 40 percent who felt somewhat or very unprepared.

Figure 11 Self-Reported Preparedness



When asked what types of support would be most helpful during a period of temporary heating loss, access to temporary space heating equipment was the most frequently identified need, cited by over half of respondents (52 percent), as demonstrated in Figure 12. Practical assistance, such as connections to qualified contractors and guidance on safe heating practices, was the next most common response (38 percent), followed by financial assistance (35 percent). About 14 percent of respondents said they would not need any assistance. Write-in responses reflected more specific needs, including priority contractor access for heat pump installation, support for elderly residents requiring temporary accommodation, and more equitable contractor pricing.

Figure 12 Desired Types of Assistance



These findings provide several considerations that are directly relevant to temporary heating loss and the implementation of Rule 9-4. First, a majority of respondents (65 percent) already have backup heating systems in place and over 50 percent of respondents thought that existing backup heating would be at least partially satisfactory should the built-in heating system stop working. However, 20 percent of respondents stated that backup systems alone would not be satisfactory to fully replace their built-in heating system during a failure.

Second, resident tolerance for heating loss is significantly shorter than the average gas furnace-to-gas furnace replacement. Nearly half of respondents said they could manage without built-in heating for two days or fewer while the average furnace replacement was found to be 17 days.[15] This finding indicates that general preparation for heating loss (or preemptive replacement of heating systems during warmer months) should be deployed regardless of compliance efforts related to Rule 9-4 implementation.

Third, the survey responses showed that the major concerns of heating loss are health and safety impacts to occupants in general as well as specific impacts to certain groups including the elderly, children, and medically vulnerable individuals. However, temporary heating, financial assistance, and even

[15] Opinion Dynamics. California Residential Fuel Substitution Workforce Readiness Study. September 27, 2024. Accessed at: https://opiniondynamics.com/ca-residential-fuel-sub-workforce-readiness

practical assistance such as information on temporary space heating options were all listed as popular solutions to short term heating loss challenges.

6 Integrated Assessment of Temporary Heating Loss

This section synthesizes findings from the heating needs assessment, replacement timeline analysis, temporary heating solutions assessment, and the community survey to evaluate the overall magnitude and implications of potential temporary heating loss related to Rule 9-4 implementation. The analysis indicates that temporary loss of heating may be a comfort concern and, for certain populations, a broader health concern 39 to 75 percent of the year, but is likely to only occur for relatively short durations in most emergency replacement scenarios. The increase in days of heating loss due to Rule 9-4 was found to be short on average, increasing total days without heat by two days compared to an average gas furnace-to-gas furnace replacement.

In most cases, the difference in installation timelines between gas furnace replacement and heat pump replacement appears to be relatively modest. Contractor feedback and TECH Clean California data suggest that standard heat pump installations can often be completed within a timeframe similar to gas furnace-to-gas furnace replacements, particularly when service upgrades are not required. As a result, for many households, transitioning from a gas furnace to a heat pump may result in only a limited increase in time without heating compared to a gas furnace-to-gas furnace replacement.

Finally, temporary space heating was found to be easily accessible and relatively low cost. In situations when the existing furnace cannot be temporarily repaired, space heaters, heated blankets, and other solutions can be deployed. Most survey respondents found these solutions to be satisfactory as a heating source for short time periods.

While these results indicate that temporary heating related to Rule 9-4 implementation are expected to be manageable in most cases, some households may experience more significant heating loss durations depending on timing and housing characteristics. The small number of households requiring service upgrades or structural changes could see timelines extending into months without heat in the case when the existing furnace cannot be repaired. These situations represent a smaller subset of projects but can substantially extend replacement timelines due to additional permitting and electrical work. In these cases, households may require temporary heating solutions for longer durations during the colder periods of the year.

6.1 Gaps in Current Solutions

Despite the overall finding that heating loss related to Rule 9-4 implementation will be minor in most scenarios, several gaps remain. While individual portable heaters are relatively inexpensive, households may require multiple units to adequately heat larger households or poorly insulated spaces, increasing both upfront costs and electricity usage. Higher-capacity or more energy-efficient temporary solutions, such as portable heat pump units, involve higher upfront costs and are less widely available. Availability constraints may also emerge during periods of high demand, such as cold weather events or widespread equipment failures, when lower-cost equipment may temporarily sell out or rental inventories may become constrained.

Another key gap relates to awareness and preparedness. Many households may not currently have backup heating solutions (35 percent of survey respondents don’t have a form of backup heating) or may not understand potential replacement timelines associated with emergency heating system replacement. Contractor outreach also suggests that interim heating support practices vary across companies, meaning that not all households can rely on contractor-provided temporary solutions.

Overall, the analysis suggests that while temporary heating solutions are likely sufficient for many periods of short-duration heating loss, targeted support may be beneficial for households facing longer

replacement timelines or financial constraints. More widely available support, such as equipment loaner programs or contractor coordination, may also be beneficial to minimize costs in short-duration situations where households do not already have temporary heating solutions and contractors do not provide them.

6.2 Programmatic Solutions

Several potential programmatic approaches could help reduce impacts associated with temporary heating loss related to Rule 9-4 implementation. These approaches are intended to address the primary gaps identified in this assessment, including affordability, preparedness, contractor coordination, and access to temporary heating equipment.

1. Temporary Heating Equipment Loaner Programs

One potential approach is the development of temporary heating equipment loaner programs through partnerships with local libraries. Similar to existing tool lending or energy efficiency kit programs, such as Oakland's[16], Berkeley's[17] and Sonoma's,[18] these programs could provide households with short-term access to portable electric heaters or electric blankets during emergency replacement situations. Loaner programs could help reduce upfront costs for households and provide rapid access to equipment during periods of temporary heating loss.

2. Pre-wiring and Electric Readiness Programs

A second approach is the expansion of pre-wiring and electrical readiness incentive and education programs to reduce the likelihood of extended delays associated with panel or electrical upgrades. Incentive programs offered through community choice aggregators (CCAs), BayREN, or other partners could encourage households to complete electrical readiness improvements in advance of equipment failure. Pre-wiring and panel readiness may help streamline future heat pump installations and reduce the likelihood of extended heating losses during emergency replacement scenarios. Programs could also encourage households to plan electrical readiness upgrades proactively during the summer months, when heating needs are lower, or near the anticipated end of a furnace's useful life rather than waiting for equipment failure. This type of advance planning could help households avoid emergency replacement situations that require more complex and time-intensive upgrades during colder periods.

Incentives could also be paired with customer education and planning programs to improve household preparedness for future heating system replacement needs. Outreach efforts could encourage residents to understand their household's electrical capacity, identify backup heating options, and plan for future electrification upgrades before emergency replacement situations occur. Educational materials could also help set expectations regarding replacement timelines and available support resources.

3. Contractor Coordination Programs

Another potential strategy is the development of contractor coordination or rapid response programs focused on minimizing heating disruptions during replacement projects. These programs could include contractor education related to interim heating practices, expedited emergency replacement pathways, or incentives for contractors to provide temporary heating equipment or temporary system restoration when feasible. Such programs could help reduce variability in customer experience and improve access to interim heating support.

[16] Oakland Public Library. Tool Lending Library. Available at: https://oaklandlibrary.org/otll/

[17] Berkeley Public Library. Tool Lending Library. Available at: https://www.berkeleypubliclibrary.org/locations/tool-lending-library

[18] Sonoma County Tool Library. Available at: https://borrowtools.org/

Implementation of these programmatic solutions would vary in complexity, cost, and deployment speed. Educational and outreach programs may be relatively low-cost and quickly deployable, while equipment loaner or incentive programs would require additional administrative coordination and funding. Equity considerations would also be important, particularly for low-income households, renters, older adults, and residents living in households with limited electrical infrastructure.

7 Conclusion

The adoption of Rule 9-4 represents a meaningful step toward reducing NOx emissions from residential space heating in the Bay Area. However, the transition to zero-NOx heating systems, particularly in emergency replacement scenarios, could increase the duration of temporary heating loss for some households. This report has examined those risks across four areas: how often Bay Area residents use or need heat, how long replacing failed gas furnaces with heat pump replacements may take, what temporary solutions are available and at what cost, and how prepared residents currently feel to manage a period of heating loss in their household. Based on the analysis, most households will not face a substantial increase in the duration of temporary heating loss due to Rule 9-4 implementation, relative to gas furnace-to-gas furnace replacement. This is due to a small average increase in days without heat (two days) and the prevalence of easily accessible and low-cost heating options.

In a subset of replacement scenarios, especially those requiring a service upgrade, the increase in days without heat could be substantial. These cases carry the longest and least predictable timelines (potentially a month or more) due to utility coordination and electrical infrastructure work. Households in this situation face the longest timelines for replacement of their primary heat source and could experience higher heating costs due to less efficient temporary space heating technologies. Furthermore, risks are uneven across the Bay Area: lower-income households face cost barriers to backup equipment; elderly residents and those with chronic conditions face greater health risks from cold exposure, and different regions experience lower temperatures than others.

The programmatic solutions identified in this report — temporary equipment loaner programs, electrical readiness and pre-wiring education/incentives, and contractor coordination initiatives — are well-matched to address these challenges. Together, they represent a practical framework for reducing disruption and supporting the implementation of Rule 9-4 while limiting impacts on resident safety and comfort.

Appendix A

Temporary Space Heating Equipment Summary

Temporary Space Heating Equipment Summary

Type	How They Work	Typical Use Case	Pros	Cons	Example(s)	Typical Cost	Rental Availability	Where to Rent
Ceramic (Fan-Forced) Heaters	Electric resistance heats a ceramic element; a fan blows warm air	Small rooms, quick heating, offices, bedrooms	Fast heating, lightweight, inexpensive	Can be noisy; heat dissipates quickly once turned off	• Honeywell UberHeat 5 Ceramic Heater • Lasko Ceramic Heater 754200	$20-$80	Not rented	N/A
Oil-Filled Radiant Heaters	Oil inside the unit is heated and radiates heat slowly	Continuous heating, bedrooms, longer-duration use	Quiet, retains heat after shutoff, safer surface temps	Slow to warm up, heavier	• 1,500-Watt Oil-Filled Radiant Electric Space Heater • Utilitech Oil-Filled Radiant Heater	$60-$120	Not rented	N/A
Infrared / Quartz Heaters	Emit infrared radiation that heats objects/people directly	Larger rooms, targeted heating, energy efficiency	Efficient for spot heating, quiet	Higher upfront cost	• Home Comfort Infrared Portable Heater • RedStone Infrared Cabinet Heater	$100-$300	Limited	Limited availability through equipment rental companies such as Sunbelt Rentals or United Rentals (primarily larger units)
Electric Fan / Utility Heaters (High Output)	High-wattage electric heating with strong fan output	Garages, workshops, construction sites, temporary large-space heating	Powerful, fast heating	Noisy, higher energy use	• Master Electric Fan Space Heater	$100-$200	Common	Widely available through Sunbelt Rentals, United Rentals, Herc Rentals, and some hardware stores
Personal / Plug-In Heaters	Small, low-watt heaters for direct proximity heating	Desk-level or individual use	Very low cost, portable	Limited heating capacity	• Handy Heater Plug-In Personal Heater • Living Zone Personal Ceramic Heater	$15-$40	Not rented	N/A

Type	How They Work	Typical Use Case	Pros	Cons	Example(s)	Typical Cost	Rental Availability	Where to Rent
Heat Pump Space Heaters	Use heat pump technology to transfer heat rather than generate it. Portable air conditioners or window-mounted units with a heating function.	Small apartments, single rooms, or situations where both cooling and heating are needed	More energy efficient than electric resistance heaters, dual-purpose	High upfront cost, installation required (window kit or window mounting)	• Midea Duo Portable Air Conditioner with Heat • Whynter ARC-14SH Portable Air Conditioner and Heater • Frigidaire Window Air Conditioner with Supplemental Heat	$400-$1,200	Not rented	N/A
Electric Blankets	Contain insulated electrical heating wires embedded in fabric that warm when plugged in; temperature controlled via a controller	Personal heating (beds, couches), nighttime use, low-energy supplemental heating	Very low cost to operate, highly energy efficient, portable, immediate warmth without heating entire room	Does not heat the room (only person), safety considera-tions (must follow use guidelines), limited to sedentary use	• Sunbeam Electric Heated Fleece Blanket • Sunbeam Heated Throw Blanket	$25-$100	Not rented	N/A