



Permitting Requirements for Zero-NOx Appliances

Bay Area Air Quality Management District

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1 Introduction

This whitepaper aims to provide a summary of the permitting requirements associated with the installation of zero-NOx appliances in compliance with amendments to Bay Area Air Quality Management District (BAAQMD) Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Natural Gas-Fired Furnaces (Rule 9-4), and Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Water Heaters (Rule 9-6). Rule 9-4 will affect the future sale of NOx-emitting water heaters and boilers, starting with appliances at the rated heat capacity of 75,000 British Thermal Unit (BTU)/hour or less. NOx-emitting water heaters affected by Rule 9-6 primarily refer to water heaters sized up to 74 gallons, serving approximately five people. This size of water heaters generally reflects single-family, low-rise multifamily, and small-commercial uses. NOx-emitting water heaters manufactured after January 1, 2027, up to this 75,000 BTU/hr threshold will not be able to be sold or installed in the Bay Area. Exceptions provide an allowable “sell-through” period for older units meeting the current ultra-low NOx requirements.

Rule 9-4 will affect the future sale of NOx-emitting furnaces designed to be a source of interior space heating with a heat input rate of 175,000 BTU/hour or less, and combination heating/cooling units with an electric cooling rate less than 65,000 BTU/hour. NOx-emitting furnaces and central furnaces manufactured after January 1, 2029, cannot be sold in the Bay Area. However, like water heaters under Rule 9-6, there will be an allowable “sell-through” period where older units manufactured before the compliance dates meeting the current requirements can still be sold and installed. NOx-emitting appliances regulated under Rule 9-4 generally span natural gas-fired wall furnaces, unit heaters, and package units used in single-family to small-commercial settings. Current zero-NOx heat pump heating ventilation and cooling (HP HVAC) appliances available include heat pump rooftop package units for small-commercial and low-rise multifamily uses and ducted or ductless mini-split HP HVAC for single-family uses.

The only zero-NOx appliance options currently available on the market are electric (e.g., heat pumps, electric resistance storage, and on-demand tankless) water heaters. Overview of permitting challenges provided in the sections below will focus on heat pump water heaters (HPWH) as they are the most cost-effective (i.e., available rebates, bill savings) and energy efficient option of the zero-NOx water heating appliances.

The potential for permitting requirements to increase the timeline and/or cost of transitioning to zero-NOx appliances will be addressed in this whitepaper which includes a review of existing permitting processes within the Bay Area as well as an analysis of potential solutions to streamline the permit process for these appliances. These insights are based on interviews, surveys, and desktop research using best available sources in December-February of 2023/2024.

1.1 HPWH and HP HVAC Permitting Overview

Obtaining permits for zero-NOx appliance installation is a critical step in ensuring the legality, safety, and quality of installation and ultimately the well-being of building occupants and the community. Jurisdictions require a permit(s) for installation of many appliances, including HPWHs and HP HVACs, to ensure safety, code adherence, and alignment with zoning regulations.

The permitting process for NOx-emitting appliance installation under a “like-for-like” scenario is relatively straightforward in most jurisdictions, with most permitting being done with a same-day or

instant online permit. However, when switching from a NOx-emitting to a zero-NOx appliance, the installation process is different and could result in challenges which increase costs and extend timelines. The primary permit issue areas where NOx-emitting and zero-NOx permitting could differ and cause delays include:

- Permit Challenge 1 – Permit Application Process
- Permit Challenge 2 - Number and Type of Permits Required
- Permit Challenge 3 – Inspection Process
- Permit Challenge 4 - Plan Submittal Requirements
- Permit Challenge 5 - Noise impacts

1.2 Data Sources and Approach

To understand the current landscape of permit requirements throughout the Bay Area, Rincon Consultants, Inc. (Rincon) conducted interviews with several cities of various sizes and from different subregions within BAAQMD’s jurisdiction. Incorporating input from local government permitting and sustainability staff into the development of this whitepaper provides critical context for the current permitting requirements for zero-NOx appliances in the Bay Area. Direct information from Bay Area local governments also provides insight into the hurdles that staff, the public, and contractors may face when seeking to streamline zero-NOx permitting processes. In addition, Rincon summarized several other studies conducted on this topic, as well as permitting pilot projects that have aimed to streamline the installation of zero-NOx appliances.

Interviews

Rincon hosted interviews with staff at four different Bay Area jurisdictions: the City of San José, City of Santa Rosa, City of Livermore, and City and County of San Francisco. The interviews were conducted virtually in January 2024. Key topic areas of interest centered around zero-NOx and NOx-emitting space and water heating appliance permit requirements, plan submittal requirements, permit issuance and inspection timelines, inspection types, hurdles, and potential solutions. Interview results are integrated in each section under *Permit Issues Areas* below.

Surveys

In addition to interviews, Rincon developed and distributed a survey to permitting and sustainability staff at Bay Area cities and counties. The survey used a refined list of the questions from the interviews with a goal of providing a broader understanding of the approaches employed for permitting zero-NOx appliances around the Bay Area. The survey used questions relating to the common themes, hurdles, and potential solutions identified through interviews.

The survey was sent to Bay Area local governments via the BAAQMD local government listserv, County of San Mateo Office of Sustainability Regionally Integrated Climate Action Planning Support (RICAPS), and County of Santa Clara building officials in January and February of 2024. Nine jurisdictions and two counties responded to the survey as a result of this outreach.¹

¹ County respondents include County of Contra Costa and County of San Mateo. Jurisdiction respondents include Gilroy, Los Gatos, Campbell, Hayward, Burlingame, Cupertino, Redwood City, and Milpitas. Department respondents included Building Safety, Public Works, Community Development (Building Division), Planning, and Sustainability from counties and cities described above.

The full results of this survey are attached in Appendix A - Survey Results. Survey results are also summarized in each section under *Permit Issues Areas* below.²

² Note that as there were two respondents from the City of Milpitas; survey data now reflects 11 total respondents instead of the 12 shown in the raw survey data in Appendix A.

2 Permit Issues Areas

2.1 Permit Challenge 1 - Permit Application Process

Challenge

Permits are required for the installation of HPWHs and HP HVACs in every jurisdiction. The process required to apply for these permits varies depending on the jurisdiction and the appliance type being installed. Once a permit application is submitted it needs to be reviewed and approved by staff before the construction can begin. This process of reviewing permits can also vary widely between jurisdictions resulting in different timelines ranging from instant online permits to several days for permit issuance depending on the jurisdiction. One concern with the zero-NOx appliance requirements is that permit issuance will take longer or be more expensive compared to NOx-emitting appliances, resulting in negative cost impacts or extended periods without a functional appliance. During the interview process, Rincon asked permit staff about the timelines and costs associated with zero-NOx appliance permitting and specifically if there were any differences between applying for a zero-NOx and traditional NOx emitting appliance.

Interview and Survey Results

Based on feedback from the interview process and the subsequent survey, Rincon discovered that many jurisdictions provide online or same-day online permit issuance processes for HPWHs and HP HVACs, which required similar or the same level of detail and cost as traditional NOx emitting appliances.

However, there are situations where respondents felt that an in-person application and/or longer period of issuance was required. For example:

- The City and County of San Francisco requires a building permit application in addition to a traditional trade permit if a project requires modification of ducting or work that extends beyond direct replacement, such as moving a wall or building a platform. In these instances, applicants are required to complete in-person building permit applications that are usually issued the same day.
- The City of San José requires applications and plan review for HPWH and HP HVAC permits in multifamily units to be completed in-person, as there are more technological and logistical challenges associated with installation of appliances in multiple units.

Furthermore, based on feedback from the survey, 6 out of 11 respondents noted permit issuance timelines of more than one day. This timeline presents a disincentive for customers to apply for permits when their appliance breaks, potentially opting for a faster installation without a permit. Unfortunately, this could compromise the quality and/or safety of the installation.

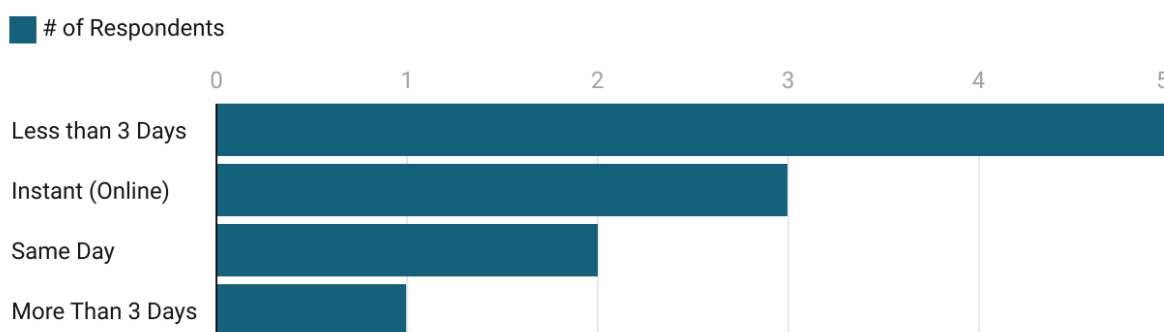
One concern with streamlined permit applications that some respondents voiced during the interviews is the potential for non-code compliant installations. Especially in cases when plan submittals are not required, inspectors could face increased issues during final inspection such as non-code compliant installations. Permit application processes have generally been developed in response to these issues, aiming to increase the amount of review prior to permit issuance.

However, as noted above, this adds time for installation and could, therefore, disincentivize permit applications.

Survey Question: What is the typical turnaround time for issuance of electric water and space heating appliance permits when replacing a gas appliance?

Survey Results: Many jurisdictions have same day, or instant (online) permit issuance (5 out of 11) while 5 out of 11 of survey respondents have turnaround times of between two and three days. 1 out of 11 respondents (City of Gilroy) projects a permit turnaround time of more than three days as shown in Figure 1. This indicates that most surveyed local governments are able to approve a permit in a relatively short period of time, minimizing gaps in service that may be especially relevant for an emergency replacement of a hot water heater.

Figure 1 Survey Results: Typical Turnaround Time for Issuance of Electric Water and Space Heating Appliance Permits



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Solution

The instant or same-day issuance of permits for the majority of HPWHs and HP HVAC projects can streamline the permitted process by providing immediate approval and authorization for installation and has been successfully implemented by several jurisdictions in the Bay Area. This approach minimizes the need for prolonged waiting periods, allowing applicants to proceed with their plans promptly. Instant or same-day permit issuance can also result in cost savings for both applicants and regulatory bodies. A streamlined issuance process can encourage permit compliance. If obtaining a permit is a straightforward and efficient process, applications are more likely to adhere to requirements, which will minimize unpermitted work and associated safety risks.³

The City and County of San Francisco is aiming to streamline the issuance of permit applications through hiring additional staff. Increased staff capacity can decrease the typical turnaround time for permit issuance. Based on discussions with City staff during the interviews, it was noted that providing information sheets on the requirements of a code compliant installation helped increase the quality of installations.

³ County of San Mateo. 2021. Heat Pump Water Heater Permit Requirements and Costs in San Mateo County. https://www.smcsustainability.org/wp-content/uploads/2021-San-Mateo-County-HPWH-Permit-Project_Final-Report.pdf

By providing cut sheets, specifically on heat pump requirements, jurisdictions could streamline the application process while supporting quality installations. Some jurisdictions noted that a resource like this would be helpful, especially if provided to the jurisdiction.

2.2 Permit Challenge 2 - Number and Type of Permits Required

Challenge

With a traditional NOx-emitting appliance replacement (especially for water heating) only a plumbing permit is generally required, since the work does not generally require electrical or building improvements. However, switching to a heat pump may require an additional 240-volt circuit or other modifications to be installed. Because of this, the number and type of permits required for the installation of HPWHs and HP HVACs varies throughout Bay Area jurisdictions. Requiring multiple permits for a single appliance installation has the potential to increase costs and complexity for installing zero-NOx appliances.⁴

Interview and Survey Results

During the interview process, Rincon identified several approaches to permitting zero-NOx appliances within the Bay Area.

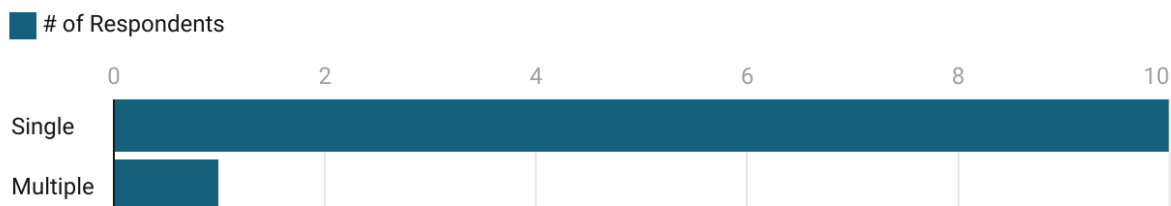
- The cities of Livermore and Santa Rosa require one trade permit for the installation of HPWHs and HP HVACs. For these jurisdictions, the permit requirements are the same for gas and electric appliances.
- The City of San José requires a multi-trade permit (i.e., electrical, plumbing, and mechanical, depending on the circumstance), these permits are combined into one application. The multi-trade permit functions mainly to inform the inspector of what work was completed. If certain modifications are required for the appliances, a building permit application may also be required.
- The City and County of San Francisco requires up to four permits (i.e., mechanical, electrical, plumbing, and building) for the installation of HPWHs and HP HVACs. The number and type of permits required are somewhat specific to San Francisco, as very few interviewees or survey respondents required this number of permits. However, this may be attributed to the city's residential building stock, which is older than most with 80 percent of single-family homes built before 1950. Existing gas water heaters are often located in an interior where plumbing, electrical, and building work is necessary to meet modern codes. Similar issues may arise in Bay Area cities with older building stock, including the City of Berkeley. Requiring multiple permits also often leads to increased costs, as there is often a fee associated with each permit.

⁴ County of San Mateo. 2021. Heat Pump Water Heater Permit Requirements and Costs in San Mateo County. https://www.smcsustainability.org/wp-content/uploads/2021-San-Mateo-County-HPWH-Permit-Project_Final-Report.pdf

Survey Question:⁵ Does your jurisdiction require a single permit for an electric water heating or space heating appliance installation or multiple permits when replacing a gas appliance?

Survey Results: 10 of 11 respondents require a single permit, while one respondent (City of Campbell, comprising nine percent) requires multiple permits as shown in Figure 2.

Figure 2 Number of Permits Required to Replace a Gas Space or Water Heating Appliance with an Electric Appliance



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Solution

Streamlining the permit process to require a single permit for the installation of HPWHs and HP HVACs can significantly reduce the level of effort and costs for applicants. The City and County of San Francisco, which currently requires up to four permits, is currently looking to develop a single permit for HPWHs and HP HVACs, where there is *de minimis* building and electrical work required. If work extends beyond direct replacement, such as moving a wall or building a platform, a single permit may not suffice. Creating a combined permit with a flat rate for up to four items (i.e., mechanical, electrical, plumbing, and building) would create a streamlined process and decrease the costs to applicants. City and County of San Francisco staff noted that the success of a single permit process will be dependent on public education and awareness. It is critical that contractors are aware of when a single permit is sufficient and when plan review remains necessary. The ability to issue a streamlined permit and allow one trade (for example plumbers) to complete incidental tasks for other trades (such as electrical) associated with the installation of zero-NOx appliances is covered as part of the Business and Professions Code. Section 7059 subdivision (a) of the Business and Professions Code, and California Code of Regulations section 831 notes that it is appropriate for contractors to perform or subcontract for any incidental work associated with other trades if it is essential to completing their project (such as an appliance installation). The code states:

Nothing contained in this section shall prohibit a specialty contractor from taking and executing a contract involving the use of two or more crafts or trades, if the performance of the work in the crafts or trades, other than in which he or she is licensed, is incidental and supplemental to the performance of the work in the craft for which the specialty contractor is licensed.⁶

Therefore, cities that currently require multiple permits for zero-NOx appliance installation should consider streamlining to a single permit or combination-permit to promote permit compliance and decrease costs/timelines.

⁵ Note that that initially this survey question was two separate questions pertaining to two different appliance types (water heating appliances vs. space heating appliances). As survey responses were the same for both appliance types, responses have been combined into one figure.

⁶ California Code, Businesses and Professions Code. 2023. <https://codes.findlaw.com/ca/business-and-professions-code/bpc-sect-7059/>

2.3 Permit Challenge 3 – Inspection Process

Challenge

The inspection process occurs after all work has been performed and the appliance is functional and operating. While the inspection process does not impact the turnaround time for replacing a failed appliance, it does impact the total timeframe and complexity of projects for the jurisdiction, contractor, and the building owner. The number of inspections, turnaround time, and inspection type (virtual or in-person) for installing HPWHs and HP HVACs differs across jurisdictions in the Bay Area. Requiring multiple inspections (i.e., for mechanical, electrical, plumbing, or building, if relevant) can be inefficient for the inspectors and homeowners and incur higher costs associated with multiple inspection fees. Additionally, inspection turnaround times of several days may inconvenience homeowners and contractors as they work to complete projects. If the overall inspection process is longer, then contractors may be less willing to work with zero-NOx appliances. Homeowners may become frustrated and dissatisfied with the permitting process if inspections take an excessive amount of time, leading to fewer permitted projects.

Interview and Survey Results

- The City of Santa Rosa has developed a system to allow most inspections to be completed virtually, through video call. Santa Rosa has noted an increase efficiency associated with virtual inspections, which has reduced their inspection wait time overall.
- The cities of San Francisco, Livermore, and San Jose complete inspections in person. Livermore staff noted the primary concern for virtual inspections is the certainty that installations have been completed in a safe and compliant manner.
- Livermore and Santa Rosa have the capacity to complete most inspections within one or two days of the inspection request.
- The cities of San José and San Francisco, in recent years, have experienced inspection wait times of one or two weeks. In addition to longer wait times, the City and County of San Francisco also requires multiple inspectors, one for each permit pulled. This increases the complexity, time, and cost associated with each appliance installation.

Survey Question: Does your jurisdiction provide combination inspections for multiple permits, or do you require multiple inspections?

Survey Results: All jurisdictions require a single inspector, with none indicating that they require multiple inspectors.

Survey Question: Do you allow virtual/video inspections?

Survey Results: 2 of 11 respondents (Redwood City and City of Campbell) allowed virtual/video inspections, whereas 9 of 11 respondents did not, as shown in Figure 3.

Figure 3 Jurisdictions That Allow Virtual/Video Inspections

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Solution

Offering virtual inspections can cater to the diverse needs and preferences of homeowners and contractors. Virtual inspections can reduce travel time and logistical challenges for inspectors, increasing overall efficiency and decreasing the timeline for completing inspections. Minimizing the number of inspections needed for installation of HPWHs and HP HVACs can optimize the efficiency of the process, reduce unnecessary delays, and reduce costs associated with inspection fees. The City and County of San Francisco is exploring the development of a single-permit, single-inspection option in the near future for HPWHs and HP HVACs, to increase efficiency, decrease costs, and therefore encouraging permit compliance and applicant satisfaction.⁷

2.4 Permit Challenge 4 - Plan Submittal Requirements

Challenge

Along with a permit application noting the type of work, location, and appliance type/specifications, some jurisdictions also require a site plan. Site plans, often used for larger or more complex projects, include line drawings of key project attributes that relate to the building code. Site plan requirements for appliance permitting vary from jurisdiction to jurisdiction. In jurisdictions with plan submittal requirements, any differences between the installation and the plan set can cause a project to fail inspection, even when it is built to code. This can result in longer timelines and increased costs, even when installations were done correctly (but not consistent with the original plan submittal).

Interview and Survey Results

- The City of Santa Rosa does not require plans when submitting a permit application for either zero-NOx HPWHs or HP HVACs.
- The City of San José does not require plans for the permit application of HPWHs and HP HVACs in single-family homes but does require plans for larger multifamily buildings which can be more complex.
- The City of Livermore requires a simple single line drawing to be submitted as part of the appliance permit application. However, the line drawing does not include significant detail and installations are inspected based on code requirements, not drawing consistency.

⁷ Silicon Valley Clean Energy. 2021. Best Practices Guide for Streamlining Electrification Permitting. https://www.svcleanenergy.org/wp-content/uploads/2020/02/Best-Practices-Guide-for-Streamlining-Electrification-Permitting_Digital.pdf

The City and County of San Francisco requires plans in some instances. Specifically, a trade permit (electrical or plumbing) does not require plans if a contractor is registered with the City’s Department of Building Inspection, holds the appropriate trade license, and if the scope of work is limited to a single trade permit (e.g., electrical only or plumbing only).

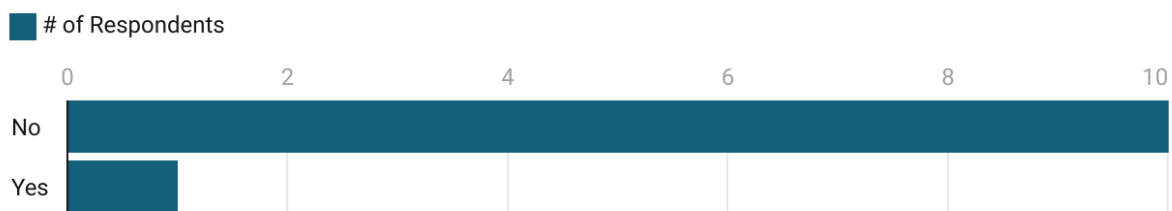
Most surveyed local governments do not require a plan submittal for water heating appliance permit applications. Space heating appliance plan requirements are nearly evenly split, with slightly over half (55 percent) of respondents not requiring a plan for appliance permit application.

Water Heating Appliances

Survey Question: Does your Jurisdiction Require a Plan Submittal for Water Heater Appliance Permit Applications?

Survey Results: 1 out of 11 respondents (City of Milpitas)⁸ responded Yes, whereas 10 out of 11 responded No. Nearly all local government respondents do not require a plan submittal for water heating appliances, as shown in Figure 4.

Figure 4 Jurisdictions Requiring a Plan Submittal for Water Heater Appliance Permit Applications



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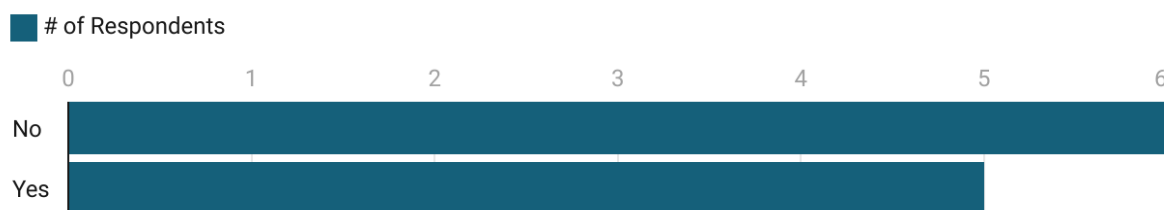
Space Heating Appliances

Survey Question: Does your Jurisdiction Require a Plan Submittal for Space Heating Appliance Permit Applications?

Survey Results: 5 of 11 respondents do require a plan submittal for space heating appliance permit applications (Yes), whereas 6 of 11 do not require a plan submittal (No;), as shown in Figure 5. This indicates that installation of space heating appliances requires comparatively more paperwork and planning than water heating replacement.

⁸ In the City of Milpitas (1) city employee selected Yes, and another selected No. All other respondents selected No. This discrepancy likely resulted from different responses for space and water heating. As a conservative estimate, the City of Milpitas Yes selection has been selected for both.

Figure 5 Jurisdictions Requiring a Plan Submittal for Space Heating Appliance Permit Applications



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Solution

To streamline the permitting process, jurisdictions should clearly and concisely communicate the plan requirements in a pre-application checklist to minimize confusion or incorrect documentation. Jurisdictions may also consider simplifying the plan requirements, minimizing the level of effort needed for the permit application process. They may also consider minimizing plan reviews, where feasible, and leaning more on inspections to ensure code and safety compliance. Minimizing plan review requirements can decrease the level of time and effort for applicants as well, potentially increasing overall permit compliance.⁹ Furthermore, cities should ensure that projects do not fail inspections if the installation does not meet the drawing submittal but is code compliant. Code compliance is what allows for a safe and efficient installation, not consistency with a submitted plan.

2.5 Permit Challenge 5 - Noise impacts

Challenge

HPWH and HP HVACs can produce noise at varying levels that can be a nuisance to homeowners or their neighbors. Noise from these appliances is created by the fans and compressors, similar to existing air conditioning condensing units. HPWHs and HP HVACs often operate between 45 and 60 decibels. Noise concerns are of particular concern for HP HVAC, which requires that noise-producing condensing units be located outside, which may be impacted by local regulations around setback limits (distance from property boundary) and noise.¹⁰

Interview and Survey Results

- City and County of San Francisco staff shared that noise is a significant issue associated with installation of HPWH and HP HVACs. In San Francisco, there are often small or no setbacks for older housing stock. As many homes have no setback and/or side yard, a condenser near a property line may be very close to a neighboring house. The City's Department of Building Inspection has received numerous complaints because of noise from condenser units.

⁹ Silicon Valley Clean Energy. 2021. Best Practices Guide for Streamlining Electrification Permitting. https://www.svcleanenergy.org/wp-content/uploads/2020/02/Best-Practices-Guide-for-Streamlining-Electrification-Permitting_Digital.pdf

¹⁰ City of Vancouver. 2020. Heat Pumps & Noise. <https://vancouver.ca/files/cov/heat-pump-noise-guide.pdf>

- The City of San José has experienced complaints regarding noise from HP HVACs as well. The City has requirements that HP HVACs may be placed in the rear setback and must maintain a five-foot setback from the rear property line. The City has a noise threshold of 55 decibels at the property line.
- Other cities interviewed, including Livermore and Santa Rosa, have not experienced significant concerns or complaints around the noise of HPWHs and HP HVACs. It could be that these cities are less dense or that they have a high incidence of air conditioning units already, which generate similar levels of noise.

Noise ordinance/threshold compliance may be reviewed by planning departments (instead of the building department), which increases coordination and overall timeline for approval. Rincon covered this topic and several solutions, including screening tables and other policies, in Whitepaper Number 2 *Challenging Use Cases and Emerging Solutions for Zero-NOx Appliances*¹¹.

Across both space and water heating appliance types, most respondents said there were no issues in permitting. For the minority of respondents who selected *Other*, most referenced electrical capacity or permitting due to new electric appliance loads as a permitting and implementation hurdle. Noise was not named as a significant hurdle for permitting of either space or water heating appliances.

Water Heating Appliances

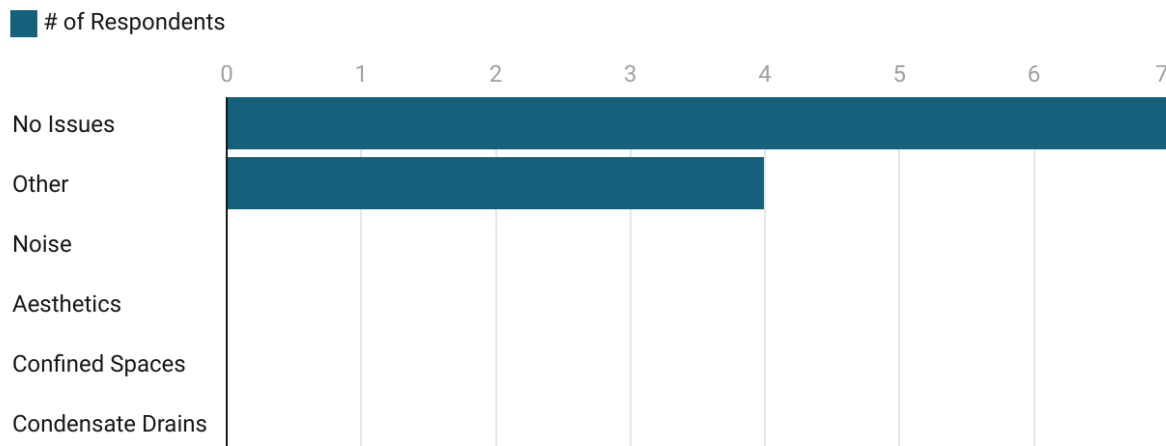
Survey Question: What hurdles have your jurisdiction and the public experienced with permitting electric water heating appliances?

Survey Results: No jurisdictions selected *Noise* as a hurdle for permitting electric water heating appliances.

For the four respondents who selected *Other* as a hurdle, most cited electric panel sizing a potential electric permit and location selection regarding existing new utilities. One cited condensate drain pits for heat pump hot water heaters as a potential permitting hurdle (but under *Other*).

¹¹ Under Consultant Work Products section at: <https://www.baaqmd.gov/community-health/building-appliances-rule-implementation/building-appliances-implementation-working-group>.

Figure 6 Hurdles for Water Heating Permitting



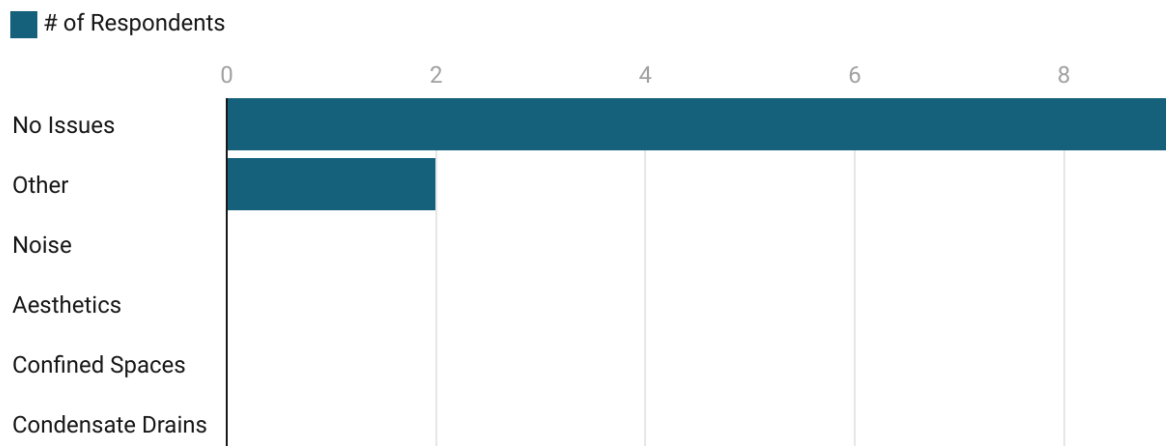
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Space Heating Appliances

Survey Question: What hurdles has your jurisdiction and the public experienced with permitting electric space heating appliances?

Survey Results: No jurisdictions selected *Noise* as a hurdle for permitting electric space heating appliances. The two that marked *Other* indicated that the hurdle was related to electrical capacity.

Figure 7 Hurdles for Space Heating



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Solution

As HPWH and HP HVAC technologies have improved over time, they have become progressively quieter. However, while there are still noise concerns, jurisdictions may consider developing guidelines for condenser unit installation such as screening thresholds for appliance brand or type, or developing setback requirements and associated review processes for demonstrating compliance. Along with this, jurisdictions may look to require extra worksheets and/or inspections

to ensure HP HVACs comply with noise ordinances/thresholds. However, noise ordinances/thresholds often lead to longer application processing times, which may exacerbate issues with compliance. The City and County of San Francisco is considering implementing local restrictions on location of condensing units to minimize noise concerns. The City's Department of Building Inspection is proposing that condensing units be placed at the center of the property's backyard to minimize the noise nuisance to adjacent buildings. Cities and counties may consider shifting responsibility of noise ordinance/thresholds review to building departments, if it is currently being done by a different department, to streamline the process and minimize inefficiencies. In addition, developing guidance documents around noise requirement specifications, criteria that allow for easier approval (such as a 5-foot setback) and providing them to applicants at the beginning of the permit application process may provide clarity and minimize failed reviews and inspection delays.

3 Permitting Pilots

3.1 BayRen and TECH Clean California Permitting Pilot

The TECH Clean California and Bay Area Regional Energy Network (BayREN) are currently co-leading a permitting pilot program, launched in 2021, to support building departments by creating awareness and providing resources to overcome hurdles in creating one-day permit approvals for HPWHs.¹² Involved parties include building departments, local governments, contractors, designers, manufacturers, and other building and electrification professionals in California. Goals of the pilot program include the following:

- Identifying ways to simplify the permitting process for heat pump projects,
- Developing a model single-day permit for HPWH conversions that can be adopted by jurisdictions statewide,
- Training building departments on heat pump best practices to improve their familiarity and comfort with this technology.

As of January 2024, the pilot has developed three resources for building department use, based on feedback from extensive outreach and engagement. These resources can be found on the TECH Clean California [Website](#). The resources include the following:

- The *HPWH Technical Assistance Sheet* summarizes code requirements for HPWS, outlines what to look for on the compliance form and permit application and identifies what to check for in the field at the time of inspection.
- The *Electrical Load Estimator* assists with calculating the impact of a HPWH on a home's electrical load using two different approaches. It includes calculators that assist in calculating the Service Load of a dwelling, per Electrical Code 220.82, and the Maximum Existing Load, per Electrical Code 220.87.
- The *2022 HPWH Building Code Assistance Sheet* summarizes the California-level building code requirements for the installation of heat pump water heaters. It provides step-by-step guidance for permit applicants and building department staff to submit, review, approve, install, and inspect heat pump water heater alterations in single family homes.
- The Pilot Program has identified additional assistance around contracting training (hosted by TECH Clean CA), building department training (hosted by BayREN), and opportunities for general hands-on experience with HPWHs.

¹² TECH Clean California. 2024. <https://techcleanca.com/pilots/permitting-pilot/>

4 Additional Studies and Literature Review

The following sections provide a summary of the key findings from recent studies completed by Bay area jurisdictions to understand the hurdles and potential solutions associated with permitting HPWHs and HP HVACs.

San Mateo County – Heat Pump Water Heater Permit Requirements and Costs

San Mateo County staff's development the *Heat Pump Water Heater Permit Requirements and Costs Report* for heat pump water heat building permits in San Mateo County jurisdictions.¹³ San Mateo County staff gathered information from 18 County jurisdictions through a survey. Topic areas covered in the report include permit and document requirements, fees, insurance and inspection timelines, online permit processing, and electrical panel upgrades. Key findings include the following.

- Some jurisdictions require different permits for HPWHs (5 of 18), including electrical, plumbing, and mechanical, while others offered combination permits (13 of 18) (i.e., all types of permits combined into one application).
- Some jurisdictions required more extensive documents including a full site plan, load calculations, equipment manufacture specifications, energy compliance forms, their permit application itself, and a contractor declaration or owner/builder form.
- Some jurisdictions provide an over-the-counter and/or same-day process, while others do not, because specific documents are vetted by staff. Plan review timeline in San Mateo County is between two to 20 days, on average.
- Some jurisdictions do not allow applicants to use new water heaters prior to inspection, while others do. This decision can increase the overall process timeline significantly.
- Permit fees vary greatly between jurisdictions in San Mateo, with some cities charging between \$50 to \$1000 for a permit application. A standardized fee across San Mateo County jurisdictions would help maintain revenue and ensure jurisdictions can use a palatable application fee to appeal to residents.
- Often, installers charge a premium to apply for any electrical appliance permit, making the process more complex and expensive than NOx-emitting appliances.
- Almost all cities in San Mateo County have online permits available, with some non-automated.
- Permit requirements, documents, costs, inspection requirements, and wait times generally increase if an electrical panel upgrade is needed. This is particularly challenging if coordinating a PG&E inspection is needed.

¹³ County of San Mateo. 2021. Heat Pump Water Heater Permit Requirements and Costs in San Mateo County. https://www.smcsustainability.org/wp-content/uploads/2021-San-Mateo-County-HPWH-Permit-Project_Final-Report.pdf

Silicon Valley Clean Energy (SVCE) – Permit Modernization Phase 2: Baseline Assessment and Recommendations¹⁴

The *SVCE Permit Modernization Phase 2: Baseline Assessment and Recommendations Study* focuses on identifying opportunities and barriers in the permitting processes related to electrification technology. The study intends to inform efforts to streamline permit processes for SVCE members, with the overall goal of providing agency-specific recommendations to make permit processes easier and more cost-effective for member agencies. The analysis was based on desktop research and interviews with building department staff at SVCE member agencies of Campbell, Cupertino, Gilroy, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Morgan Hill, Mountain View, Saratoga, Sunnyvale, and Santa Clara County.

Key findings from the report across multiple jurisdictions include the following.

- Several agencies encountered challenges where specific permit types fail their initial inspection, primarily due to discrepancies between the proposed plans and the actual installed conditions. This results in a utilizing more staff time for additional inspections.
- Numerous agencies mandate a certain degree of plan submittal and plan checking for electrification measures, leading to an increased demand on staff. This is because local building departments bear the responsibility of ensuring the secure and proper installation of building systems and technologies. Given that many electrification and decarbonization measures involve emerging or less common technologies, some agencies express apprehension that eliminating this step and streamlining processes, or automating processes as seen in SolarApp+¹⁵, may overly burden inspectors with the identification of code violations and safety requirements.
- The main obstacle to implementing process changes or improvements, as highlighted by numerous agencies, is the constraints on staff.
- Several agencies in SVCE have noise ordinances or other compliance requirements that undergo reviews outside the building department. This contributes to delays and increases the chances of miscommunication.

¹⁴ Silicon Valley Clean Energy. 2021. Best Practices Guide for Streamlining Electrification Permitting. https://www.svcleanenergy.org/wp-content/uploads/2020/02/Best-Practices-Guide-for-Streamlining-Electrification-Permitting_Digital.pdf

¹⁵ <https://solarapp.nrel.gov/>. SolarApp+ is an automated permit processing program developed by the National Renewable Energy Laboratory. The software can run compliance checks and process building permit approvals for eligible rooftop solar systems.

5 Conclusion

Based on the interviews and survey completed for this whitepaper, the areas where permitting can have the largest impact on zero-NOx appliance installations include the turnaround time for permit issuance (same-day or instant permitting), the number of permits required (opting for a single or combined permit), clarifying noise impacts (providing screening thresholds if applicable), and reducing the complexity of the plan submittal requirements. While the inspection process could also be streamlined, jurisdictions should focus on streamlining the installation process to provide the appliance service as quickly as possible. Furthermore, many jurisdictions are already employing streamlining techniques in these areas to make zero-NOx appliance installations easier and comparable to a like-for-like replacement scenario.

5.1 Permit Streamlining Ideas from Interviewees

The following feedback was provided by cities during the interview process for increasing the effectiveness of permitting zero-NOx appliances.

- Some jurisdictions, like the City and County of San Francisco, host live information sessions and share information with customers via email newsletter and social media. There is still an immense need to improve public awareness of the latest technologies available.
- Jurisdictions shared that they would like some support from BAAQMD in developing easy guides on what the difference is between gas and electric water heaters and space heaters and what that means for permitting.
- City of Santa Rosa noted that a guidebook for zero-NOx appliances, similar to the California Solar Permitting Guidebook¹⁶, would be a beneficial reference for jurisdictions.
- Jurisdictions shared that there is a need to collaborate with other departments and even outside agencies where appropriate. For example, where there is a significant breakthrough related to sustainability, San Francisco's Department of Building Inspection and Environment Department collaborate on training sessions for staff and the public in order to roll out new requirements or procedures.

5.2 Survey Recommendations

The survey highlighted areas where public discourse may be overstating concerns around permitting. Noise impacts and the presence of multiple inspectors do not appear to pose any significant permitting hurdles according to survey respondents.

The survey results also identified significant opportunities to improve efficiency of permitting in cases where switching from gas to electric appliances is necessary. These opportunities or emerging practices could be more widely adopted that have been successful in streamlining the permitting process. These approaches include the following.

¹⁶ https://opr.ca.gov/docs/20190226-Solar_Permitting_Guidebook_4th_Edition.pdf

- More widespread adoption of same day or immediate online permitting and virtual/ video inspections
- Wider implementation of permit fee waiving when switching from gas to electric appliances
- Automatic permitting systems (being implemented by some jurisdictions)
- Providing upfront clarification on the implications for electric work (panel impacts, new circuits) and permitting when switching from gas to electric
- Informational handouts with important code information relating to heat pumps and their installation/operation

Local governments also submitted the following suggestions to streamline the permitting and implementation process that can be implemented by BAAQMD, or third-party entities, via the survey. These suggestions include the following:

- Clear homeowner-facing communications explaining how to electrify, with clear steps on how to navigate the permitting process (e.g., easily understood handouts for homeowners who want to convert from gas to electric appliances; checklists for easy permit approval);
- Programmatic solutions to help contractors and homeowners understand new electric loads from electric appliances and cost implications (e.g., gas loaner units for water heaters during a time of emergency replacement, and workforce training);
- Integration of existing permitting software (e.g., for solar app and e-trakit¹⁷) with heat pump installation.

¹⁷ E-Trackit is a commonly used online permitting software platform that allows contractors/homeowners to submit details and payment for online permits.

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