Permitting Barriers in Residential Electrification

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CADMUS

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List of Acronyms

Acronym	Description
ADU	Accessory Dwelling Unit
AHJs	Authorities Having Jurisdiction
BayREN	Bay Area Regional Energy Network.
CCA	Community Choice Aggregator
CEC	California Energy Commission
CPUC	California Public Utilities Commission
CF1R	Certificate of Compliance (Residential)
CF2R	Certificates of Installation
CF3R	Certificates of Verification
CZ	Climate Zone
DIY	Do it Yourself
ECC	Energy Code Compliance
EV	Electric vehicle
GO-Biz	Governor's Office of Business and Economic Development
HERS	Home Energy Rating System
HP HVAC	Heat Pump Heating, Ventilation, and Air Conditioning
HPWHs	Heat Pump Water Heaters
HSPF2	Heating Seasonal Performance Factor 2
LEP	Limited English Proficient
MCA	Minimum Circuit Ampacity
MOCP	Maximum Overcurrent Protection
NCB	Newly Constructed Buildings
NEC	National Electrical Code
NEEA	Northwest Energy Efficiency Alliance
SB	Senate Bill
SEER2	Seasonal Energy Efficiency Ratio 2
SPUR	San Francisco Bay Area Planning and Urban Research Association
UEF	Uniform Energy Factor
FV&DT	Verification and Diagnostic Testing

1. Executive Summary

1.1. Introduction

Cadmus conducted a residential electrification equipment permitting study on behalf of MCE to evaluate how heat pump heating, ventilation, and air conditioning (HP HVAC) and heat pump water heaters (HPWHs) are permitted across jurisdictions within MCE's service area. As MCE expands residential electrification programs, permitting processes play a significant role in project timelines, contractor participation, and customer adoption of clean energy technologies. To support this expansion, MCE needs a clear understanding of municipal permitting and inspection practices across the 38 communities in its service area. This study evaluates permitting practices in MCE's service area using prior research, review of local requirements, and input from permitting authorities and electrification contractors to identify inefficiencies and opportunities to streamline timelines while maintaining safety and code compliance.

The study's conclusions and recommendations aim to equip MCE with actionable insights to reduce barriers to residential electrification through the following:

- Recognizing inefficiencies in current practices and providing recommendations for streamlining practices
- Strengthening relationships with municipalities
- Improving contractor engagement

Cadmus formulated its conclusions and recommendations to position MCE as a collaborative partner in advancing more efficient, consistent, and electrification-supportive permitting practices that enable broader adoption of clean energy technologies.

1.2. Conclusions and Recommendations

Cadmus identified several interrelated findings from the literature review, jurisdictional research, and interviews with contractors and permitting authorities. Collectively, the findings indicate that permitting challenges for heat pump technologies are driven less by the technical complexity of the technologies themselves and more by structural variation, administrative fragmentation, uneven contractor capacity, and inconsistent implementation across jurisdictions.

To present these findings and position MCE for coordinated action, Cadmus organized the conclusions into four categories:

1. Structural Variation Across Jurisdictions
2. Administrative Processes and Digital Infrastructure
3. Application Quality and Contractor Capacity
4. Agency Capacity and High-Impact Policy Barriers

Structural Variations Across Jurisdictions

- Permitting practices vary widely across MCE's 38 service-area communities. While several jurisdictions, including Pinole, Contra Costa County, and Martinez, demonstrate fast, predictable, and electrification-supportive permitting processes with clear requirements and consistent review standards, other jurisdictions experience longer timelines, inconsistent interpretation of requirements, and limited clarity in review feedback.
- This regional fragmentation results in duplicated effort for contractors operating across multiple municipalities. Although variation creates inefficiencies, authorities having jurisdiction (AHJs) expressed openness to coordinated guidance and regional collaboration.

Administrative Processes and Digital Infrastructure

- Administrative differences, including permitting portals, application workflows, documentation requirements, and fee structures, create more friction than technical code requirements.
- Adoption of digital tools is uneven across municipalities, with no standardized platform or shared system. While online portals and automated checks can improve application completeness and processing speed, fragmentation of digital systems requires contractors to navigate multiple platforms, increasing transaction costs and learning curves.
- Long applications and high permit fees present persistent barriers in some jurisdictions.

Application Quality and Contractor Capacity

- Most permitting delays are caused by incomplete or incorrect applications rather than code requirements themselves. Contractor knowledge gaps contribute to preventable errors, and inconsistent training across jurisdictions exacerbates these issues.
- Iterative review processes, particularly when feedback is unclear or inconsistent, extend timelines. The absence of a dedicated point-of-contact within some permitting authorities increases back-and-forth communication and uncertainty.

Agency Capacity and High-Impact Policy Barriers

- Staffing levels and workload fluctuations significantly influence review and inspection timing. Inspection scheduling constraints and inconsistencies in field interpretation increase contractor costs and idle time.
- Although administrative variation accounts for much of the friction observed, certain technical requirements, particularly noise and setback rules, present persistent, high-impact barriers when applied inconsistently. High permit fees and lengthy application requirements further compound these challenges.

Table 1 summarizes Cadmus' proposed short-term to medium- and long-term strategic initiatives by conclusion and identifies potential leads to spearhead each effort.

Table 1. Recommendations and Potential Leads

Conclusion	Recommendation	Potential Lead
Structural Variations Across Jurisdictions		
Short- to Medium-Term Initiatives	Host and facilitate permitting authority roundtables to share best practices and identify regional streamlining opportunities.	MCE, regional CCAs
	Work with contractors and AHJs to develop standardized permitting requirements, templates, checklists, and permit playbooks for electrification technologies across MCE's service area.	MCE, AHJs
	Coordinate regionally with other Community Choice Aggregators (CCAs) and organizations such as BayREN to ensure permitting studies and streamlining initiatives are complementary and collaborative rather than siloed.	MCE, regional CCAs
Long-Term Strategic Initiatives	Explore development of a Bay Area-wide or statewide permitting portal for residential electrification equipment, potentially in collaboration with other CCAs, BayREN, and the California Public Utilities Commission (CPUC).	CPUC, California Energy Commission (CEC)
	Encourage municipalities to treat permitting improvement as an ongoing performance management effort, incorporating contractor feedback and tracking progress over time rather than approaching improvements as one-time initiatives.	AHJs
Administrative Processes and Digital Infrastructure		
Short- to Medium-Term Initiatives	Support the development of predictable inspection windows and notification practices by sharing best-practice examples and case studies.	AHJs
	Provide online materials to facilitate coordination between contractors and permitting departments, including guidance documents, FAQs, contact information, and permit fee directories.	AHJs
	Link or host training materials on MCE's website to clarify documentation requirements and code updates for electrification technologies	MCE
	Review and potentially revise permitting application documentation and steps required to encourage contractor compliance and reduce unpermitted electrification installations.	AHJs
	Promote online permitting and express permit pathways by supporting AHJs in adoption and sharing successful examples from peer jurisdictions.	MCE, regional CCAs, BayREN
Long-Term Strategic Initiatives	Facilitate opportunities to advance greater regional consistency in permitting platforms or digital workflows.	CEC, regional CCAs
	Support municipalities in evaluating permit fee transparency and application simplification opportunities where appropriate.	Regional CCAs, AHJs

Conclusion	Recommendation	Potential Lead
Application Quality and Contractor Capacity		
Short- to Medium-Term Initiatives	Develop standardized checklists and submittal guidance to improve application completeness.	MCE, regional CCAs
	Share guidance materials that clarify common correction issues and documentation expectations.	AHJs, MCE
	Offer targeted contractor training focused on permit application requirements to reduce preventable errors, reinforcing AHJ processes rather than replacing them.	MCE, contractor associations
Long-Term Strategic Initiatives	Support improved communication pathways between contractors and permitting officials through accessible contact information and coordination resources.	AHJs, contractor associations
	Encourage jurisdictions to consider establishing electrification-focused permitting liaisons or dedicated points of contact where feasible.	AHJs
	Promote ongoing feedback loops between contractors and AHJs to refine permitting practices over time.	MCE, contractor associations, regional CCAs
Agency Capacity and High-Impact Policy Barriers		
Short- to Medium-Term Initiatives	Share examples of jurisdictions that have streamlined inspection scheduling or clarified interpretation standards.	MCE, regional CCAs, municipal planning departments
Long-Term Strategic Initiatives	Advocate for consistent noise and setback requirements with local permitting authorities, including city code officials and planning departments, to reduce design revisions and delays.	MCE, regional CCAs, CEC
	Strengthen engagement with municipalities by increasing visibility of MCE's electrification work through coordinated outreach, workshops, and technical assistance.	MCE
	Position MCE as a collaborative regional leader supporting permit streamlining and electrification goals while maintaining safety and code compliance.	MCE

2. Methodology

Cadmus conducted the following activities as part of this study. Results of these activities are presented in the *Findings* section.

2.1. Literature Review

Cadmus conducted desk research focused on the following primary research objectives related to HP HVAC and HPWHs across jurisdictions within MCE's service territory:

- Understand existing residential permitting and inspection requirements in California and across the U.S.
- Identify best practices and barriers in municipal permitting processes across MCE's service area
- Understand permitting timelines and costs
- Identify opportunities to align permitting practices with electrification goals
- Identify best practices for contractor engagement

Cadmus consulted 42 unique sources, listed under the References tab of the *MCE Permitting Study Literature Review Summary* of a separately delivered Excel workbook. Twelve of these sources are research reports with objectives similar to this study. The literature review highlights key findings and lessons relevant to our analysis.

2.2. Cost and Timeline Data Analysis

While reviewing permitting timelines and costs, Cadmus identified gaps in the information available online for jurisdictions within MCE's service area. To address these gaps, Cadmus collected data using a combination of email and phone outreach to 36 permitting authorities. For each jurisdiction, we reviewed city websites to identify permit application types, estimated review timelines, and any guidance specific to HP HVAC and HPWHs. Where fee schedules were available, we identified and documented the relevant permit categories and associated costs. When information was not available online, we contacted jurisdictions by email, followed by phone outreach as needed. Please see the separately delivered *Permit Cost and Timeline Data Analysis* Excel workbook for the compiled cost and timeline data. As jurisdictions update their permitting costs and timelines, this workbook should remain a living document and be updated periodically.

2.3. Contractor Survey

To better understand the lived experiences of heat pump contractors across Marin, Napa, Solano, and Contra Costa counties, Cadmus conducted a contractor permitting survey in fall 2025. We sent an email with a survey link to 202 unique contractor contacts, which resulted in 44 partially completed surveys and 34 fully completed responses. The survey collected both quantitative and qualitative data on permitting practices, jurisdiction-specific experiences, common challenges, and contractor recommendations.

Questions covered permit timelines, documentation requirements, interactions with AHJs, installation workflows, and perceptions of the easiest and hardest jurisdictions. Cadmus analyzed responses to

identify trends, compared experiences across cities and counties, and highlighted systemic permitting barriers and effective practices.

2.4. Contractor Interviews

Following the contractor survey, Cadmus conducted six in-depth qualitative interviews with contractors in the MCE service area to better understand their permitting challenges. These interviews allowed contractors to elaborate on their experiences, provide concrete examples and anecdotes, and clarify the root causes behind pain points identified in the surveys. The qualitative interviews also helped identify additional opportunities to streamline permitting processes and inform recommendations.

2.5. Permitting Authority Interviews

Cadmus conducted nine interviews with permitting authorities across the MCE service area. Each discussion focused on understanding how jurisdictions currently process HP HVAC and HPWH permits, including intake practices, plan review steps, inspection workflows, staffing, and use of digital tools.

We asked participants to describe common challenges, frequent drivers of corrections or delays, recent process improvements, and any effective practices they have adopted. Interviews also explored broader needs, such as training, interagency coordination, and opportunities for regional consistency. We conducted all interviews virtually and synthesized detailed notes to identify shared themes, key differences across jurisdictions, and practical opportunities to support more efficient electrification permitting in MCE's territory.

3. Findings

This section summarizes the findings from Cadmus' research and analysis: a literature review of existing research studies, contractor surveys, contractor interviews, and permitting authority interviews.

3.1. Literature Review

Cadmus began the study by conducting a literature review to investigate five primary research objectives related to heat pump technologies within MCE's service area. The findings for each objective are summarized below.

Existing Residential Permitting and Inspection Requirements

California's efficiency requirements for HPs diverge from national norms. In certain climate zones, HPs are required in new single-family homes and must comply through either prescriptive or performance pathways under §150.2(a) of the California Energy Code, while electric resistance heating is prohibited as a primary heating source for additions or alterations.[1] For HPWHs, California requires compliance with Uniform Energy Factor minimums and either Northwest Energy Efficiency Alliance Tier 3 performance or a qualifying communication interface.[2] By comparison, national codes focus primarily on baseline equipment performance, requiring minimum Seasonal Energy Efficiency Ratio 2 (SEER2) and Heating Seasonal Performance Factor 2 (HSPF2) values for HPs, and Uniform Energy Factor (UEF) minimums for HPWHs, without tiered performance requirements or communication interface mandates.[3]

These more stringent efficiency standards translate into a permitting framework that is more detailed and administratively complex than national models. While national permitting frameworks rely on less prescriptive codes, such as the National Electrical Code (NEC) 2020, International Residential Code 2021, and International Energy Conservation Code 2021, California's residential permitting and inspection requirements for HPs and HPWHs are shaped by the California Energy Code (Title 24, Part 6), which includes expanded documentation and compliance obligations.

As a result, single-family residential projects that require Field Verification and Diagnostic Testing (FV&DT) must demonstrate compliance through Energy Code Compliance (ECC)–registered documentation submitted prior to building department review. These documents must be registered with an approved ECC Provider and typically include a Certificate of Compliance (CF1R), Certificate of Installation (CF2R), and

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1 Inland Regional Energy Network. *I-REN Residential Add Alt HVAC Heat Pump Permit Guide*, https://www.iren.gov/DocumentCenter/View/264/I-REN-Residential-Add-Alt-HVAC-HP-Permit-Guide

2 BayREN and TECH Clean California. December 20, 2022. *2022 HPWH Building Code Assistance Sheet*, Bay Area Regional Energy Network. Individual Dwelling Units and Heat Pump Water Heaters - 2022 HPWH Building Code Assistance Sheet

3 10 C.F.R. § 430.32. 2026. "Energy and Water Conservation Standards and Their Compliance Dates" in Title 10—Energy, Chapter II, Subchapter D, Part 430, Subpart C, Electronic Code of Federal Regulations. https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-430/subpart-C/section-430.32

Certificate of Verification (CF3R). Depending on the project scope, one or more prescriptive forms may be required. This list is not exhaustive, and additional forms may apply:

- CF1R-ADD-02-E – Prescriptive Residential Additions Not Requiring ECC Field Verification
- CF2R-ADD-02-E – Prescriptive Residential Additions Not Requiring ECC Field Verification
- CF1R-ALT-05-E – Prescriptive Residential Alterations Not Requiring ECC Field Verification
- CF2R-ALT-05-E – Prescriptive Residential Alterations Not Requiring ECC Field Verification
- CF1R-ALT-01-E – Prescriptive Residential Alterations
- CF2R-ELC-01-E – Electric-Ready Requirements
- CF2R-MCH-33-H – Variable-Capacity Heat Pump Compliance Credit
- CF3R-MCH-33-H – Variable-Capacity Heat Pump Compliance Credit
- CF2R-PLB-02-E – Single-Dwelling-Unit Hot Water System Distribution
- CF3R-PLB-22-H – Verified Single-Dwelling-Unit Hot Water System Distribution

During construction, installers are responsible for completing all applicable Certificates of Compliance, Installation, and Verification for building envelopes, mechanical, plumbing, and electrical systems, as required by the project. Certain projects also require Home Energy Rating System (HERS) verification in addition to the applicable CF3R. HERS verification involves independent third-party testing and must be conducted in accordance with the California Energy Commission's 2025 Energy Code Compliance Documents—Forms for Single-Family Buildings.[4] Final approval in California is granted only when the enforcement agency confirms that the installation conforms to the approved plans and specifications, aligns with the approved CF1R, meets all applicable codes and standards, and includes all required CF2R forms that are submitted, signed, and registered. The Inland Regional Energy Network 2022 HVAC HP permit guide describes the outdoor unit noise limits, minimum setbacks, specific decibel restrictions, and other requirements local jurisdictions may impose.[5] This same guide explains how the California Energy Code is updated every three years to increase building energy efficiency, highlighting California's more extensive permitting and inspection requirements than those found nationally, with greater emphasis on energy performance, documentation, and third-party verification.

Barriers in Municipal Permitting

Barrier 1: Low Market Adoption Hinders Process Optimization

Low adoption of electrification technologies, particularly HPWHs, limits jurisdictions' ability to develop streamlined permitting systems and effective training programs. This is especially the case in underserved

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[4] California Energy Commission. Accessed January 25, 2026. *2025 Energy Code Compliance Documents – Forms for Single-Family Buildings*. 2025 Energy Code Compliance Documents - Forms for Single-Family Buildings

[5] Opinion Dynamics. 2022. *California Heat Pump Market Characterization and Baseline Study. Attachment C: OD–CPUC Heat Pump Market Study Report* (excerpts). 1011 - Attachment C - OD-CPUC-Heat-Pump-Market-Study-Report-final-4-2022.pdf

communities, where improperly permitted HPWHs disproportionately affect low-income households that may be unable to afford corrective work and are less likely to encounter inspectors familiar with HPWH technologies.[6] Because HPWHs represent only approximately 1.25% to 1.5% of California water heating systems, permit volumes remain extremely low, resulting in limited staff familiarity and insufficient data to support process improvements—particularly for building departments in lower-income areas that lack the resources or exposure to ensure consistent permitting quality.[7] During the TECH Clean pilot year, which focused on educating permitting offices on HPWHs to reduce permit delays and denials, only one HPWH permit was issued in the pilot partnership City of Pleasant Hill during all of 2022. This low level of activity further constrained data collection and reduced incentives to invest in specialized permitting pathways or training, and ultimately forced the pilot to shift its focus from working with a single jurisdiction to using recently available TECH Clean California data from jurisdictions statewide.[8]

Barrier 2: Permitting Staff Unfamiliarity and Staffing Constraints

As a result of low adoption, permitting staff often lack familiarity with heat pump technology requirements and rely on inconsistent interpretations of the California Building Standards Code, leading to unnecessary delays. For example, one jurisdiction erroneously required a drywell and pump for HPWH condensate based on combustion appliance terminology, according to the TECH Clean California Final Pilot report. Additionally, 28% of jurisdictions reported not distinguishing HPWHs from conventional electric resistance water heaters, resulting in missed electrical safety reviews, overlooked ventilation requirements, and incorrect condensate drainage standards, according to the TECH Clean Data Analysis and Recommendations for Next Steps report. These types of challenges are compounded by contractor unfamiliarity. The California Heat Pump Partnership notes widespread concern about adopting unfamiliar technologies and emphasizes the need for expanded training to build workforce capacity. Written guidance, such as permit manuals and code assistance sheets, has proven insufficient, as evidenced by the TECH Clean California Streamlining Permitting and Installation of Heat Pump Water Heaters Final Pilot report. The report states that only one of the 17 jurisdictions that requested resources demonstrated familiarity during follow-up assessments. It further states that staffing constraints further exacerbate these issues, as understaffed jurisdictions reported issuing permits quickly to avoid backlogs rather than through efficient processes, in some cases, bypassing essential safety or compliance checks. Consequently, faster permit issuance by smaller or lower-resourced departments does not necessarily reflect best practice models.[9]

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6 TECH Clean California. 2024. Streamlining Permitting and Installation of Heat Pump Water Heaters: Data Analysis and Recommendations for Next Steps. TECH Public Reporting, Permitting Pilot, TECH Public Reporting Permitting Pilot

7 TECH Clean California. 2024. Streamlining Permitting and Installation of Heat Pump Water Heaters: Final Pilot Report. TECH Public Reporting, Permitting Pilot, TECH Public Reporting Permitting Pilot

8 Ibid.

9 TECH Clean California Data Analysis Report, *op. cit*., 15.

Barrier 3: Navigating Multiple Permits Per Project

The TECH Clean California Streamlining Permitting and Installation of Heat Pump Water Heaters Final Pilot report states that barriers arise from navigating multiple permit and licensing requirements, since plumbers who commonly install HPWHs may lack the licensing or technical capacity to perform electrical upgrades, complete load calculations, or conduct panel work, requiring subcontracted electricians and adding time and cost.[10] Senate Bill (SB) 222, if passed, would greatly reduce this barrier as it would require local governments to issue one nondiscretionary permit per installation instead of layering multiple permits .

Barrier 4: Jurisdictional Variability

Jurisdictional variability in permitting practices creates additional barriers. Some jurisdictions issue same-day permits by treating HPWHs like resistance units or like-for-like replacements, while others require full plan checks, electrical load calculations, and verification of supporting infrastructure, which increases costs and delays.[11] As noted in Smoothing the Transition to Heat Pumps, Part 2: Permitting and Inspections, "Perhaps the thorniest permitting issue is jurisdictional variance across the Bay Area. Each of the area's 101 cities interprets and applies state building codes differently."[12] The California Heat Pump Partnership similarly observes that permitting processes are often complex, slow, and inconsistent across jurisdictions, frequently requiring multiple permits that add costs and delays.[13] The BayREN and TECH Clean California TECH Permitting Pilot for residential heat pump water heater conversions cited inconsistent rules and the lack of a standardized permitting process (along with building departments' unfamiliarity with heat pump technology) as the top challenges facing contractors statewide. Contractors may also lack familiarity with electronic documentation and digital submission systems used by permitting offices, leading to increased submission errors and processing delays.[14]

Best Practices in Municipal Permitting

Some jurisdictions in California have already implemented streamlined, standardized permitting practices that make installations simpler, faster, and more accessible.[15] Examples include Pleasant Hill, Santa Clara, San Mateo County, San José, Contra Costa County, Novato, and Larkspur, each offering variations of digital permitting portals, standardized templates, fast-track review processes, and regional coordination.

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10 *Ibid*., 22.

11 *Ibid*., 20, 22

12 Fishman, Sam. 2024. *Smoothing the Transition to Heat Pumps, Part 2: Permitting and Inspections.* SPUR. https://www.spur.org/news/2024-10-21/smoothing-transition-heat-pumps-part-2-permitting-and-inspections

13 California Heat Pump Partnership. 2025. *California Heat Pump Partnership Blueprint*. https://heatpumppartnership.org/wp-content/uploads/2025/03/CAHPP-Blueprint-Final.pdf

14 *Ibid*., 23

15 CalNEXT. 2025. *DIY Heat Pump Water Heater Installation and Market Study*. https://calnext.com/wp-content/uploads/2025/06/ET24SWE0044_DIY-Heat-Pump-Water-Heater-Installation-and-Market-Study_Final-Report.pdf

The City of San Mateo's digital permitting reforms led to a 600% increase in approved rooftop solar permits within one year, illustrating the transformative potential of digital modernization.[16] Faster inspections, fewer administrative hurdles, and improved clarity benefit contractors and homeowners alike, resulting in quicker project timelines and higher compliance rates.

Finally, statewide progress toward permitting reform has been advanced through collaborative partnerships. Programs such as the BayREN and TECH Clean California Permitting Pilot, along with the City of San José's permit simplification initiative, demonstrate the effectiveness of best practices, including digital permitting portals, standardized permit templates, fast-track review processes, regional coordination, and early, proactive engagement with AHJs. After transitioning to a streamlined permitting system for rooftop solar projects, the City of San Mateo experienced a 600% increase in approved permits within the first year of implementation.[17] Collectively, these initiatives underscore the need for coordinated regional and statewide action to enable consistent, efficient, and equitable permitting of heat pump technologies across California.

Permitting Timelines and Costs

Permit costs for heat pump installations in California vary widely by jurisdiction. For HPWHs, permit fees typically range from $100 to $200 when no electrical permit is required, while HP HVAC permits generally range from $100 to $300 without electrical work, although some cities charge substantially higher fees. When an electrical permit is required, total costs typically increase by an additional $100 to $200. Higher overall permit costs are often driven by the requirement for multiple separate permits, including electrical, plumbing, mechanical, and building permits, as well as additional plan review or inspection requirements. To address these inconsistencies, Senate Bill 222 proposes reforms to permitting and inspection aimed at standardizing and streamlining residential heat pump installations. The bill would prohibit a city, county, or city and county from charging permit fees that exceed the estimated reasonable cost of providing the service, including capping permit fees for residential HPWH installations at $150. SB 222 would also allow licensed contractors to self-certify certain installation requirements, reducing reliance on in-person inspections while maintaining oversight. In addition, the bill would require cities and counties to implement online, automated permitting systems capable of issuing permits in real time for qualifying heat pump installations by July 1, 2028, and would eliminate permit requirements for plug-in window air conditioners or window heat pumps that are 120 volts or less and self-contained.[18]

Although consolidated permit cost data for MCE's service area were not available through existing studies, Cadmus consolidated fee information from individual municipal websites and through direct

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[16] Sustainable San Mateo County.org. January 2025. *Permit Process Simplification*. https://sustainablesanmateo.org/wp-content/uploads/2025/01/Permit-Process-Simplification_202501-.pdf

[17] Smoothing the Transition to Heat Pumps, Part 2: Permitting and Inspections, *op. cit.*

[18] California Senat Bill 222 (S.B. 222). Reg. Sess. (Cal. 2025-2026) *Residential heat pump systems: water heaters and HVAC: installations*. Accessed February 2, 2026. Bill Text: CA SB222 | 2025-2026 | Regular Session | Amended | LegiScan

communication with permitting authorities. Table 2, Table 3, Table 4, and Table 5 summarize the cost data collected through these sources. The municipal count category reflects the number of unique municipalities with available permit data. For example, data were available for 29 municipalities with HPWH permits that do not require an electrical upgrade, and for 31 municipalities with HPWH permits that require an electrical permit.

Table 2 Heat Pump Water Heater Cost Analysis (No Electrical Permit Required)

Municipal Count	Minimum Cost	Maximum Cost	Average Min. Cost	Average Max Cost
29	$30	$500	$164	$500

Table 3 Heat Pump Water Heater Cost Analysis (with Electrical Permit Required)

Municipal Count	Minimum Cost	Maximum Cost	Average Min. Cost	Average Max Cost
31	$136	$517	$331	$477

Table 4 Heat Pump HVAC Cost Analysis (No Electrical Permit Required)

Municipal Count	Minimum Cost	Maximum Cost	Average Min. Cost	Average Max Cost
36	$96	$500	$193	$304

Table 5 Heat Pump HVAC Cost Analysis (with Electrical Permit Required)

Municipal Count	Minimum Cost	Maximum Cost	Average Min. Cost	Average Max Cost
30	$136	$517	$363	$477

According to TECH Clean, permit review and issuance times for HPWHs vary widely across California. Bay Area jurisdictions average 7.6 days, compared to a statewide average of 5.9 days, based on actual project timelines. Expected permitting timelines, derived from information provided by permitting authority staff, municipal websites, and direct communication, range from zero to 10 working days. Approximately 30% of permitting authorities within MCE's jurisdiction offer over-the-counter permitting. This suggests opportunities to increase adoption of streamlined permitting practices within MCE's service. Table 6**,** Table 7, Table 8, and Table 9 provide an overview of the timeline data collected through municipal websites and direct communication.

Table 6 Heat Pump Water Heater Timeline Analysis (No Electrical Permit)

Municipal Count	Minimum Days	Maximum Days	Average Days
30	0	20	5

Table 7 Heat Pump Water Heater Timeline Analysis (with Electrical Permit)

Municipal Count	Minimum Days	Maximum Days	Average Days
26	0	28	6

Table 8 Heat Pump HVAC Timeline Analysis (No Electrical Permit)

Municipal Count	Minimum Days	Maximum Days	Average Days
31	0	20	5

Table 9 Heat Pump HVAC Timeline Analysis (with Electrical Permit)

Municipal Count	Minimum Days	Maximum Days	Average Days
25	0	20	6

Permit volume alone does not determine processing speed, as both low- and high-volume jurisdictions experienced efficient and delayed permitting according to TECH Clean. Some low-volume jurisdictions, such as Livermore and San Francisco, issued permits the same day, while some high-volume jurisdictions, including Sacramento and San José, took longer on average. Conversely, Sacramento County performed well despite high demand, while Vallejo experienced delays despite low volume. These patterns indicate that staffing capacity, staff familiarity, digital permitting systems, and streamlined processes, rather than project volume, drive efficiency. Jurisdictions with front-loaded review requirements and extensive documentation tend to have longer timelines, while those treating HPWH permits like standard water heater replacements approve permits more quickly but with less thorough review, according to the TECH Clean California Permitting Pilot. Delays are further compounded by incomplete contractor applications, particularly when electrical requirements are not fully addressed. Jurisdictions with robust digital infrastructure and experienced staff consistently process permits faster than those relying on paper-based systems.

Opportunities to Align Permitting Practices with Electrification Goals

After reviewing individual municipal websites, Cadmus identified several California jurisdictions that are adopting streamlined permitting practices to reduce administrative burden, accelerate project timelines, and improve consistency for heat pump installations. These efforts, which include online permitting platforms, standardized documentation, simplified permit categories, contractor self-certification pathways, and regional alignment, demonstrate how targeted process improvements can meaningfully enhance permitting efficiency, reduce staff workload, and improve the experience for contractors and homeowners. Counties such as American Canyon, Benicia, Concord, Danville, El Cerrito, Fairfield, Larkspur, Martinez, Mill Valley, Pinole, Pleasant Hill, Novato, Richmond, Ross, San Anselmo, San Rafael, San Ramon, St Helena, Vallejo, Walnut Creek, Unincorporated Napa/Napa County, Unincorporated Marin/Marin County, Unincorporated Solano/Solano County, Yountville have implemented online permitting systems that allow electronic application submittal, document uploads, automated routing which has led to permit issuance within one to two business days for standard installations, reducing in-person visits and streamlining internal workflows. Pre-approved

After reviewing individual municipal websites, Cadmus identified several California jurisdictions that are adopting streamlined permitting practices to reduce administrative burden, accelerate project timelines, and improve consistency for heat pump installations.

permit templates and standardized submittal checklists, including Pleasant Hill's HPWH Supplemental Template and Electrical Load Estimator and BayREN's regional standardized submittals, further improve efficiency by clarifying documentation requirements and reducing incomplete applications.

Additional best practices include issuing a single consolidated permit covering plumbing, electrical, mechanical, and building scopes, rather than requiring multiple applications from different contractors, an approach recommended by BayREN and San Francisco Bay Area Planning and Urban Research Association (SPUR) but not yet widely formalized.[19] Like-for-like replacements in the same location can also be categorized as "simple" permits that do not require plan review. Notably, 31% of TECH-participating jurisdictions issued permits within one day or less for these replacements, significantly reducing project lead times.[20] Simple or express permits offered for limited-scope projects, like those offered by Larkspur, are typically less expensive than non-simple permits and typically have a quick turnaround.[21] SB 222 would enforce this best practice by requiring local governments to issue one nondiscretionary permit per installation instead of layering multiple permits, although separate permits can still be required for electrical panel upgrades or structural or demolition work.[22]

Further efficiencies can be achieved through contractor certification and inspection reform. Pre-qualified contractor certification and self-certification pathways, as proposed under S.B. 282, the Heat Pump Access Act, would allow qualified contractors to self-certify compliant installations, reducing inspection demand while maintaining appropriate oversight through targeted spot checks. Although S.B. 282 did not advance, it provides a useful example of the types of legislative approaches that could support streamlined permitting practices. Similarly, SB 222 would allow asynchronous inspections starting July 1, 2027, where the contractor and building inspector do not have to be on site at the same time. Instead, inspectors can call or video chat with [23] during inspection. Complementary pilots led by BayREN, SPUR, and municipal partners have tested virtual inspections, regional inspection pools, and batch inspection scheduling aligned with contractor routes, reducing inspection wait times and rescheduling challenges. Finally, collaborative initiatives such as the BayREN and TECH Clean California Permitting Pilot and San Mateo County's permit simplification initiative, along with proposed legislation like SB 222, highlight the importance of coordinated regional and state action to achieve consistent, efficient, and equitable heat permitting of pump technology across California.

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19 SPUR. 2025. *Greenlighting Clean Heat: Modernizing Permits for Heat Pumps.* https://www.spur.org/sites/default/files/2025-06/SPUR_Greenlighting_Clean_Heat.pdf

20 TECH Clean California Data Analysis Report, *op. cit*., 13.

21 City of Larkspur. Accessed November, 2025. "Permit Process." https://www.ci.larkspur.ca.us/881/Permit-Process

22 California Senate Bill 222, *op.cit*.

23 *Ibid*.

Best Practices for Contractor Engagement

Hands-on training, in-field demonstrations, and practical tools such as permit templates and load calculators help build contractor confidence while reducing administrative burdens, according to the TECH Clean Permitting Pilot. Direct support mechanisms, including online support portals and clear permitting resources, help contractors address the challenges they face when managing regional permitting rules and guidelines. Additionally, involving contractors and other key stakeholders in the design of streamlined permitting pathways can help smooth the adoption of heat pump technology.

Hands-On Training and Field Demonstrations

According to TECH Clean, written resources are not sufficient on their own to educate building department staff on heat pump water heater permitting. Alternate methods of education, such as live demonstrations, on-demand webinars, or other engaging options, are suggested when designing learning materials for building departments. Examples include BayREN's "Learn and Earn" sessions, in which regional in-person training is provided to both contractors and building department staff to build localized expertise in heat pump water heater installation and permitting best practices, and TECH Clean California's in-field training pilots.[24] These approaches improved understanding of installation best practices and permitting steps while building confidence with new technologies.

Pre-Packaged Permit Toolkits

Pre-packaged toolkits containing fillable permit templates, checklists, electrical load calculators, and inspection guides help reduce administrative burden and ensure complete, accurate documentation on first submission. While written materials alone are not sufficient to rapidly cover contractor knowledge gaps, they are useful as reference tools according to the TECH Clean California Streamlining Permitting Pilot.[25]

Online Support Portals and Help Desks

Online support platforms, such as Concord's Zoning and Permit Information Center and Building Permit Fee Calculator, calculate the permits and fees required for residential permits.[26] Other cities, such as St. Helena, Walnut Creek, and American Canyon, provide FAQs, compliance checklists, and permit guidance. TECH Clean California's contractor-facing support portal provides FAQs, compliance checklists,

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[24] TECH Clean California. 2024. *Streamlining Permitting and Installation of Heat Pump Water Heaters: Final Pilot* Report., *op. cit*., 16.

[25] CalNEXT, *op.cit*., 30.

[26] City of Concord. Accessed January 2026. "Permit Center (Virtual Permit Center with links to PermitPal and ePermitOnline." https://www.cityofconcord.org/169/Permit-Center https://www.cityofconcord.org/169/Permit-Center

incentive navigation help, and permit guidance.[27] These tools help address the difficulties that contractors face when managing regional permitting rules and guidelines.

Streamlined Permitting Pathways with Contractor Input

Actively involving contractors and other key stakeholders in the design of streamlined permitting systems leads to higher adoption and smoother implementation. This approach was successfully demonstrated through the Governor's Office of Business and Economic Development (GO-Biz) initiative to simplify permitting for solar panel and electric vehicle (EV) charger installations. GO-Biz's targeted outreach, including the assignment of dedicated staff to address local jurisdictional challenges, played a critical role in advancing permit process simplification for EV infrastructure across California.[28] Although this effort focused on EVs and solar installations, the strategies and lessons learned are directly transferable to heat pump technology.

3.2. Contractor Surveys

To better understand the experiences of heat pump contractors across Marin, Napa, Solano, and Contra Costa counties, Cadmus conducted a contractor permitting survey, reaching out to 202 unique contractor clients during fall 2025. Forty-four respondents partially completed the survey, and 34 finished the survey. This section summarizes survey findings but does not provide specific responses to preserve anonymity.

Contractor Demographics

Most contractors surveyed (n=44), 75% reported that they always pull permits when completing work. An additional 11% relied on homeowners to pull permits, 9% sometimes pulled permits, 5% reported rarely pulled permits.

In terms of geographic coverage, the largest number of contractors reported working in Contra Costa County (55%; n=44), followed by Solano County (48%), Marin County (36%), and Napa County (34%) (Figure 1). Most surveyed contractors offered a range of services, with general HVAC and HP HVAC installations (57%; n=44) being the most commonly provided services. Other frequently offered services included HPWHs (41%), electrical work (34%), and plumbing (27%). Over half of the respondents (53%, n=44) currently use online systems to obtain permits(Figure 2).

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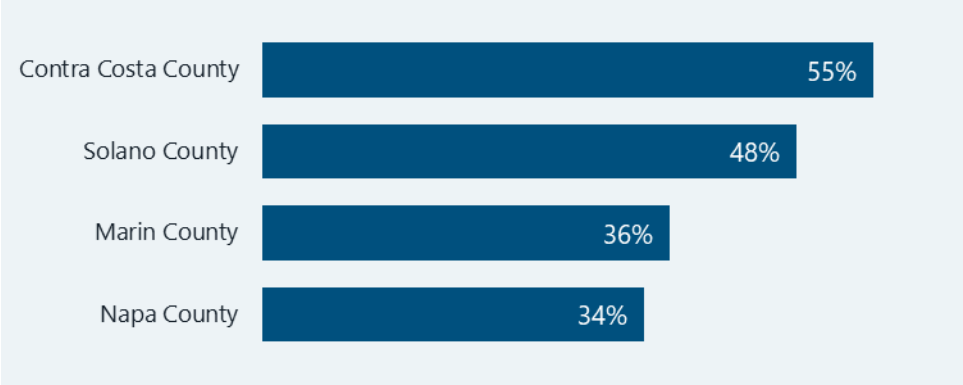
[27] Frontier Energy/TECH Clean California. Accessed January 29, 2026. "TECH Contractor Knowledge Base." https://frontierenergy-tech.my.site.com/contractorsupport/s/

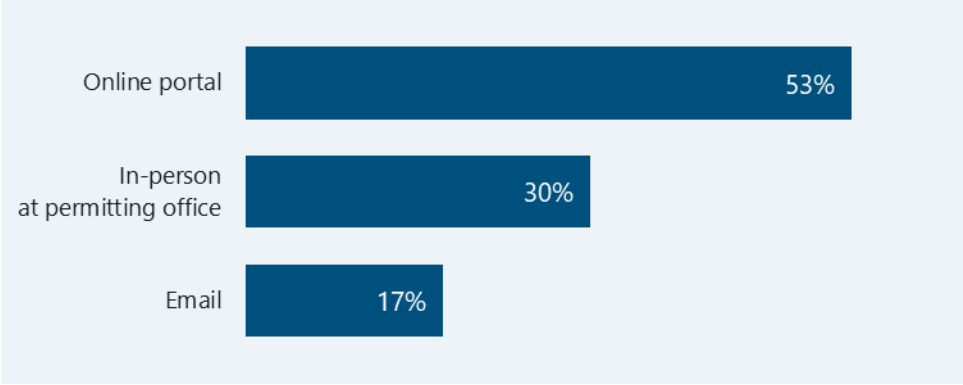
[28] Sustainable San Mateo County, Permit Process Simplification, *op. cit.*, 2.

Figure 1. Contractor Representation by County



Source: Contractor Experience Survey Question 1.3. " In which of the following MCE communities do you regularly perform installations?" (n=44; multiple responses allowed)

Figure 2. Medium of Attaining Permits

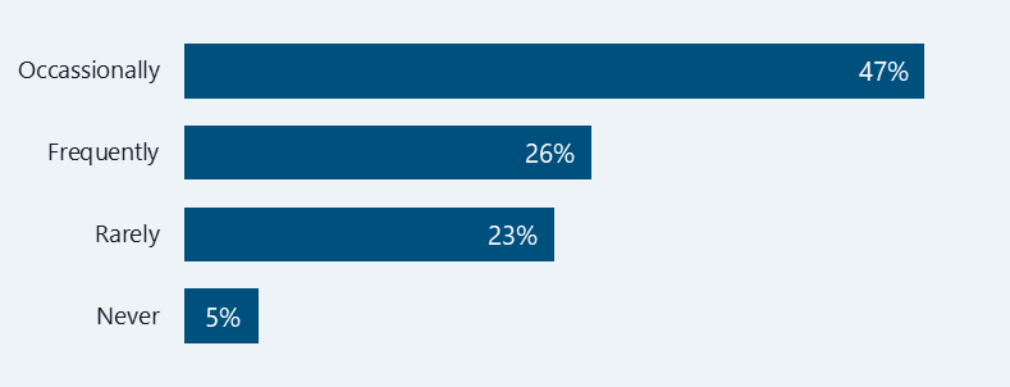


Source: Contractor Experience Survey Question 1.6. " How do you usually submit permit applications?" (n=44; multiple responses allowed)

Permitting-Related Delays

The survey asked respondents how often the permitting process delayed their projects. As shown in Figure 3, responses varied. While 5% of respondents (n= 34) reported that permitting never caused delays, 23% said rarely, 47% said occasionally, and 26% said frequently. This indicates that permitting-related delays are a common experience for many contractors and provides context for the specific barriers discussed below.

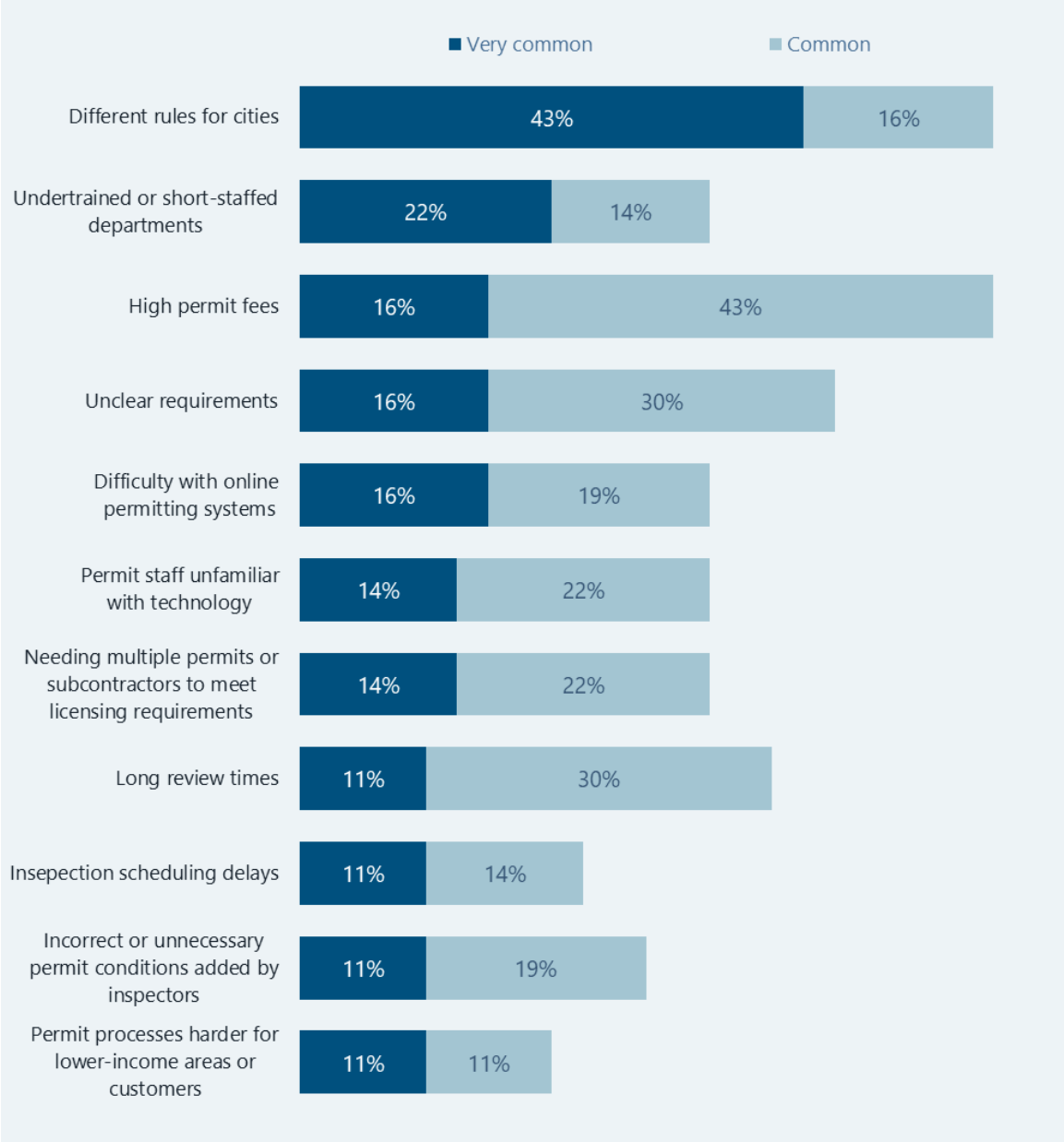
Figure 3. Frequency of Permitting-Related Delays



Source: Contractor Experience Survey Question 2.9. " How often do permitting-related issues delay project completion?" (n=44; multiple responses allowed)

Although most contractors surveyed are experienced and routinely handle permitting, their feedback highlights structural issues in the permitting ecosystem that extend beyond any single barrier. Figure 4 shows all permitting barriers included in the survey, sorted by the share of respondents (n=37) who rated them as *very common*. 43% of respondents cited "different rules for different cities" as the most common barrier

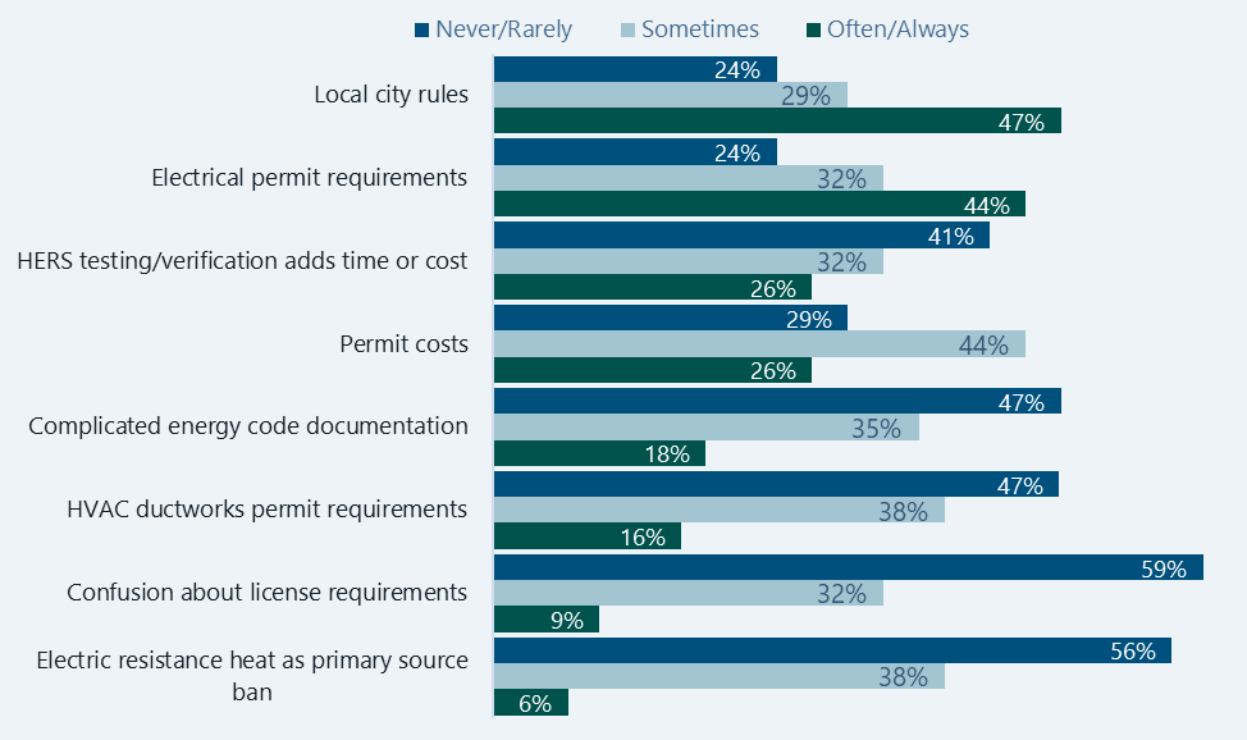
Figure 4. Permitting Barriers Ranked by Share of Respondents Rating Them as Very Common



Source: Contractor Experience Survey Question 3.16. "Please rate the following permitting barriers for heat pump or HPWH installations based on how common they are in your experience?" (n=37)

To better understand which aspects of the heat pump permitting process create the most delays or challenges, respondents (n=34) were asked to reflect on their project experience and indicate how frequently eight common permitting-related issues delayed or interfered with their heat pump installations, selecting from *never*, *sometimes*, *often*, *always*, or *not applicable*. Most respondents (47%) cited local city rules as the issue that delayed their projects. Figure 5 summarizes the survey results.

Figure 5. Frequency of Permitting-Related Issues Reported by Contractors

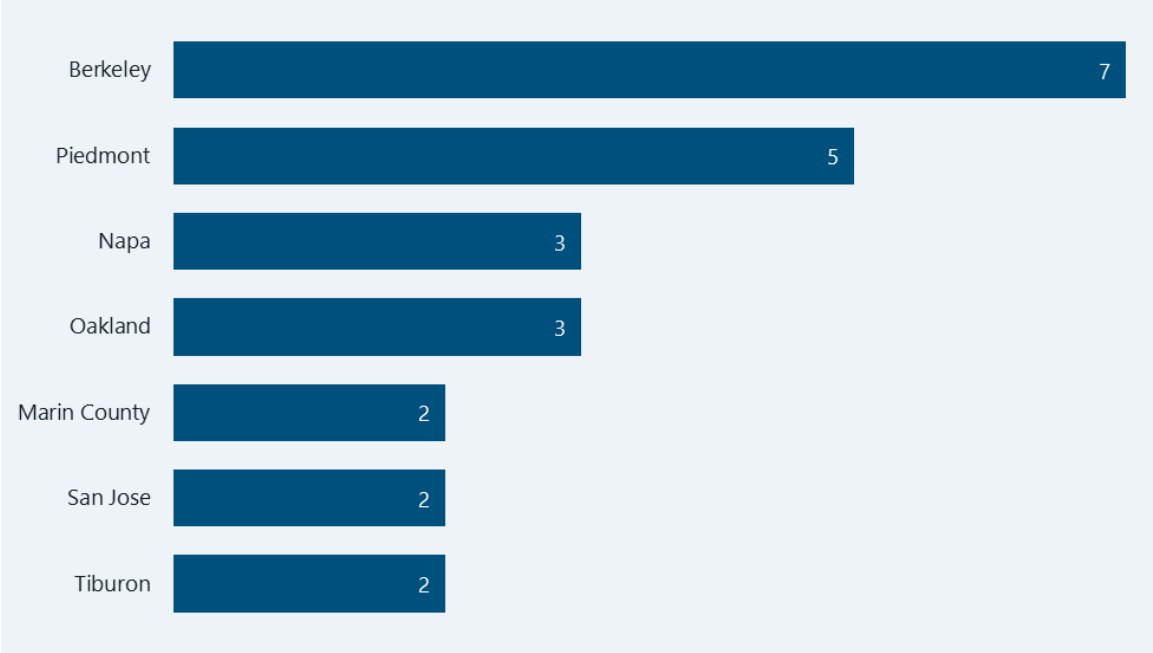


Source: Contractor Experience Survey Question 3.17. " We want to understand what parts of the HP permitting process actually cause headaches or delays for contractors. For each of the following permitting-related issues, please indicate how often it has delayed or interfered with your heat pump projects." (n=34)

Jurisdictional Inconsistency

The survey asked respondents which jurisdiction(s) had the slowest or most challenging permitting processes. Figure 6 presents the most frequently cited jurisdictions (n=34, multiple responses allowed). Other jurisdictions, including Benicia, Concord, Contra Costa, Davis, San Mateo, Pinole, Richmond, Sacramento, San Anselmo, and Walnut Creek, were each mentioned once as having hard or slower permitting processes.

Figure 6. The Jurisdictions Most Frequently Cited for Hard, Slow Permitting



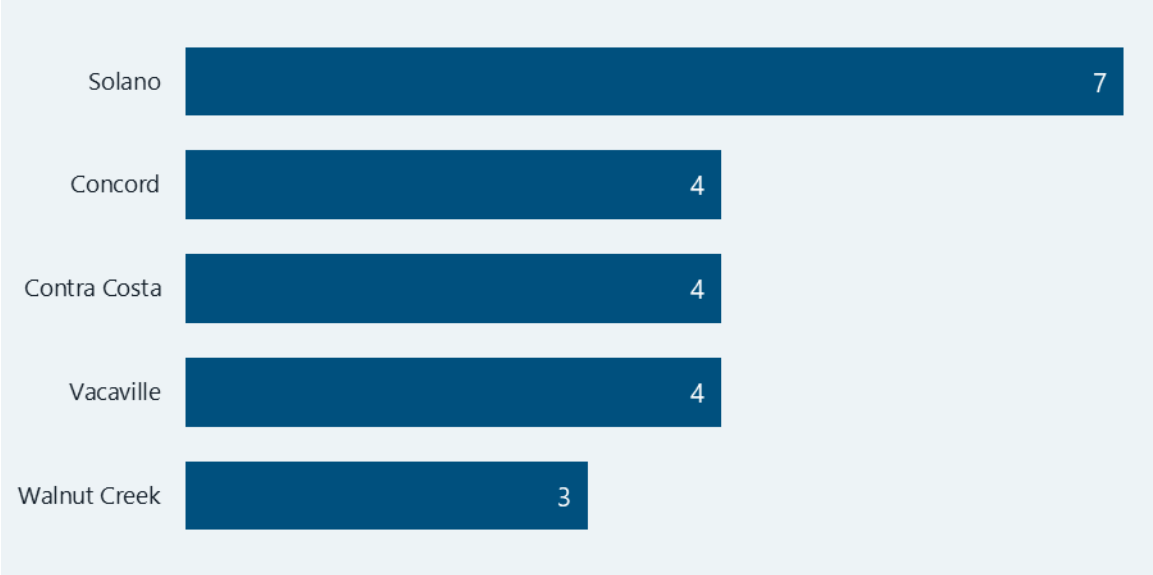
Source: Contractor Experience Survey Question 2.10. "Which jurisdiction(s) has the slowest/hardest permitting process? What makes the process slower there?" (n=34, multiple responses allowed)

In a follow-up question, survey respondents were asked what makes permitting processes hard or slow, and 18 provided responses. The most frequently cited factors included unclear or additional requirements, slow processing, limited knowledge of permitting rules, the need for multiple permits or inspections, and inspection-related delays. In open-ended feedback, contractors emphasized that no two cities ask for the same set of documentation, even when the installation type is identical. They noted that some jurisdictions request full electrical line diagrams, while others require panel schedules, load calculations, specification sheets, site photos, or supporting structural documentation. A few respondents noted that they frequently "over-submit" documentation to avoid rejection.

On the other hand, as shown in Figure 7, contractors (n=34) most frequently cited Solano County, Concord, Contra Costa County, Vacaville, and Walnut Creek as jurisdictions with easy and fast permitting processes. Several other jurisdictions, including Alameda, Albany, Antioch, Danville, Fairfield, Marin, Oakland, Palo Alto, Petaluma, Pinole, San Mateo, Sonoma, Suisun, and Woodland, were each mentioned once as having faster permitting processes. When contractors were asked a follow-up question on what makes a jurisdiction easy to work with, 11 contractors noted the following in their open feedback:

- Streamlined, predictable workflows
- Digital permitting platforms
- Same-day or automated approvals
- Clear requirements and fewer steps

Figure 7. The Jurisdictions Most Frequently Cited for Fast or Easy Permitting

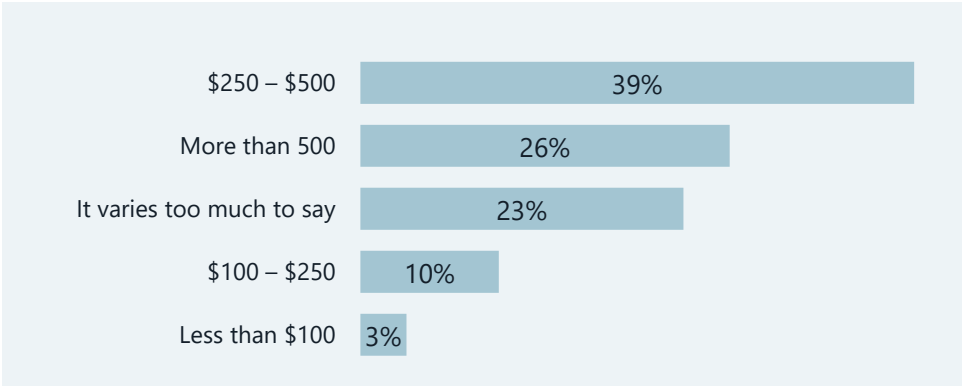


Source: Contractor Experience Survey Question 2.11. "Which jurisdiction(s) has the fastest/easiest permitting process? What makes the process faster there?" (n=34, multiple responses allowed)

Permit Fees

Contractors cited high permit fees as a significant barrier, with 59% identifying them as common or very common (n=37, see Figure 4). Cadmus' permit cost and data analysis, detailed in *Permitting Timelines and Costs* section, shows substantial variation across jurisdictions, from under $100 to more than $500. As shown in Figure 8, 26% of respondents specifically noted fees above $500 (n=31). The largest cluster fell in the $250 to $500 range (39%), highlighting that many projects routinely face mid-to-high permitting costs (Figure 8). This variability and the prevalence of higher fee tiers make it difficult for contractors to price jobs consistently, reinforcing why high permit fees remain a prominent barrier.

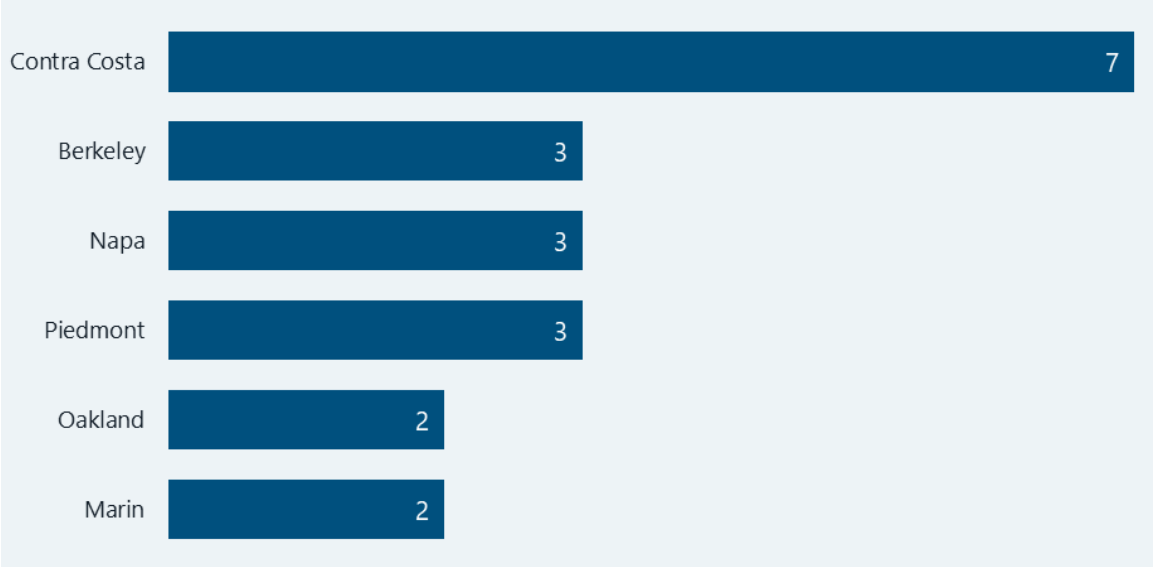
Figure 8. Permit Fee Range based on Contractor Survey Responses



Source: Contractor Experience Survey Question 3.19."What is the typical permit fee you see for heat pump installations in the jurisdictions you work in?" (n=31)

Figure 9 shows the jurisdictions respondents most often cited for the most expensive permits. Although single mentions dominate, respondents cited Contra Costa, Berkley, Napa, and Piedmont more often for their high permit fees (n=34, multiple responses allowed). Foster City, Sausalito, San Francisco, Tiburon, Solano, Benicia, Danville, Calistoga, Concord, Suisun, Santa Rosa, Kentfield, Saint Helena, Davis, Orinda, and San Mateo were each cited once.

Figure 9. The Jurisdictions Most Frequently Cited for Most Expensive Permits



Source: Contractor Experience Survey Question 3.21. "Which jurisdiction do you work with has the most expensive permitting process?" (n=34, multiple responses allowed)

Unclear Requirements and Short-Staffed Departments

In open-ended feedback, contractors cited undertrained or short-staffed permitting departments and unclear requirements as common barriers. Contractors reported that review comments often seemed subjective, inconsistent, or dependent on the individual reviewer. In some cases, identical projects submitted to the same jurisdiction received different feedback based on who reviewed the file.

Contractors also noted a lack of clear permitting guidance, particularly for HPWHs, electrical service upgrades, and paired HVAC/electrical work, which resulted in unnecessary back-and-forth. They noted that each correction cycle can add days or weeks to project timelines, increase administrative workload, and disrupt installation schedules.

Several respondents suggested that clearer upfront documentation requirements and reviewer training focused on heat pump technologies could significantly reduce the need for corrections and streamline the permitting process.

Inspection-Related Delays

Contractors frequently noted the indirect financial impacts caused by inspection delays. Of 40 respondents, 35% indicated that inspection delays add cost and disrupt workflow. Respondents noted that inspection delays impose measurable financial burdens on contractors, both through lost productivity and additional labor costs, and are a systemic operational barrier rather than an isolated regulatory issue.

Key issues highlighted by respondents include the following:

- Long on-site wait windows, which reduce productive work time (e.g., four-hour arrival windows).
- Lost billable hours, as installers must pause projects while waiting for inspections.
- Extra trips for sequential or redundant inspections, increasing labor and travel costs.

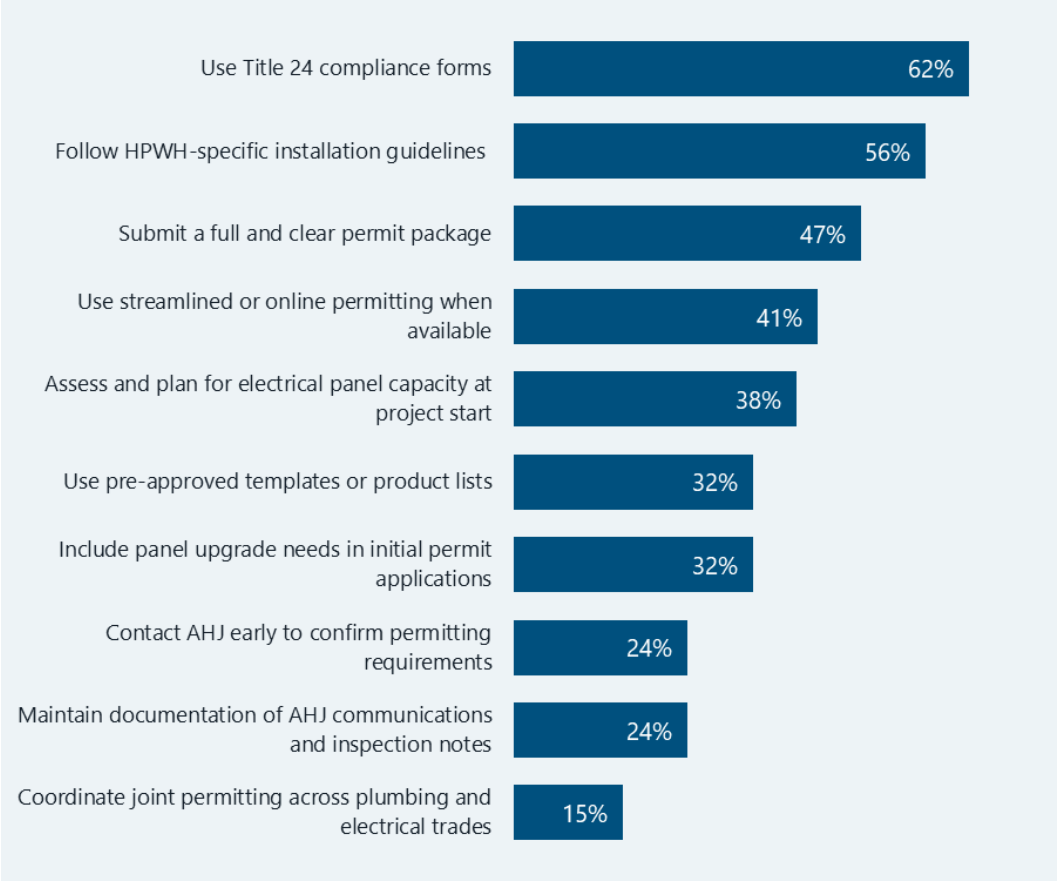
Contractors reported these challenges across multiple counties, suggesting that the issue stems largely from regional workforce and staffing limitations rather than local policy differences.

Contractor Practices

Survey responses (n=34, multiple responses allowed) identified a range of strategies contractors use to navigate permitting and installation for residential HP HVAC and HPWHs (Figure 10). The most commonly reported practices focus on ensuring compliance and completeness:

- Most contractors prioritize compliance and adherence to installation guidelines, with most using Title 24 forms and HPWH-specific guidelines for HPWH installations.
- Many contractors submit complete permit packages and planning for electrical capacity or panel upgrades as strategies to prevent delays.
- Fewer contractors coordinate early with authorities or joint permitting across trades.

Figure 10. Common Contractor Practices: Permitting and Installing Residential HP HVAC and HPWH Systems



Source: Contractor Experience Survey Question 4.27. "Which of the following practices do you typically follow when permitting and installing residential heat pump HVAC or heat pump water heater systems?" (n=34, multiple responses allowed)

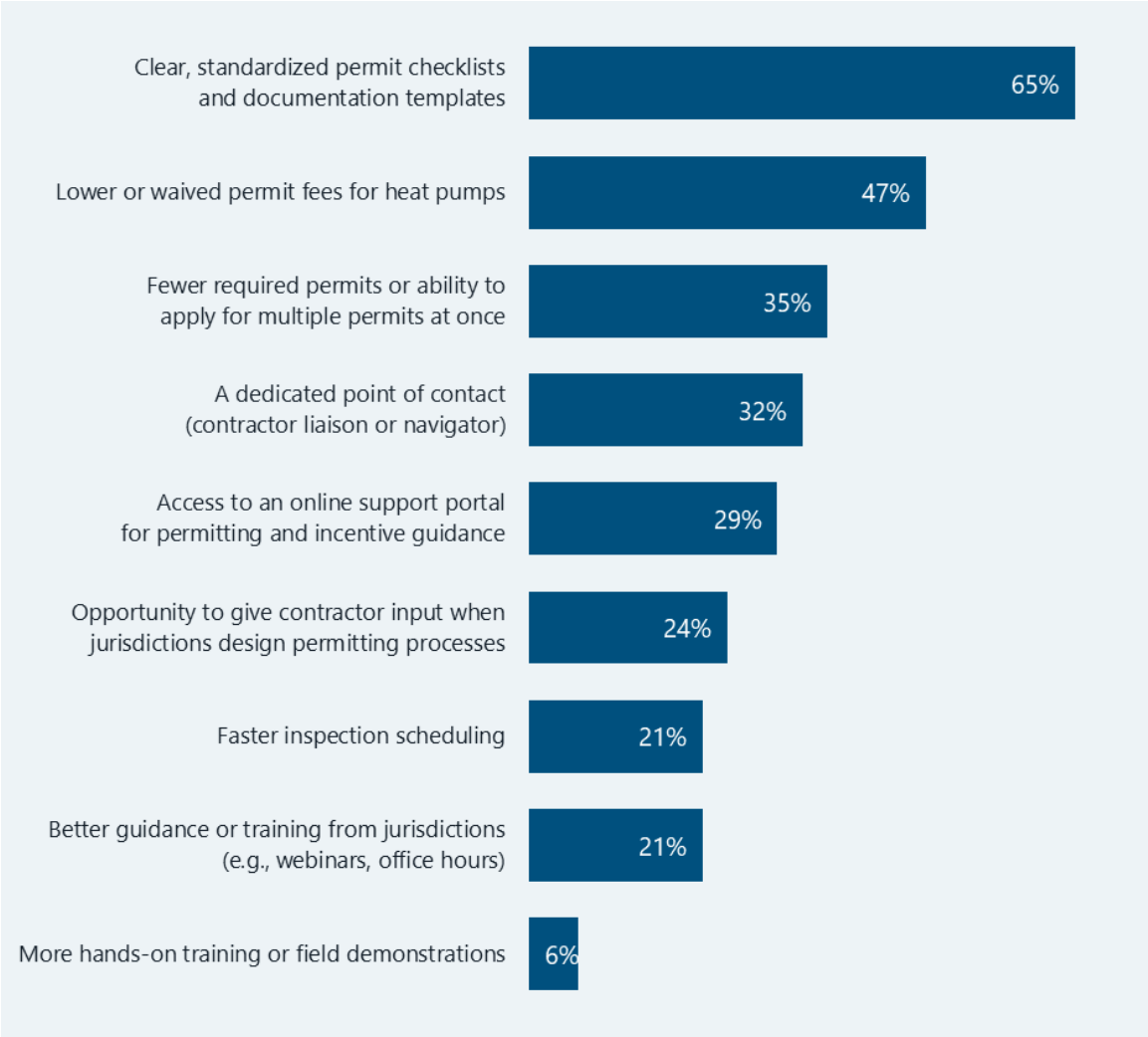
Surveyed contractors said they tend to focus on compliance, thorough permit packages, and proactive planning for electrical capacity, and rely less on practices that involve coordination with authorities or across trades. One contractor noted that "We found that contacting the AHJ ahead of time to clarify code or project-specific situations is often the most burdensome step," helping to explain why it is generally avoided and not frequently selected in the practices list above. Contractors reported that AHJs are often vague or unresponsive, refer back to codes that provide limited guidance, and, in some cases, may request additional work beyond what is strictly necessary. This indicates opportunities to improve efficiency and reduce delays by encouraging more systematic communication and documentation practices.

Contractor Recommendations

Figure 11 summarizes contractor responses on which changes would make the permitting process easier. Respondents were asked to select their top three priorities from a list of potential improvements. Clear, standardized permit checklists and documentation templates emerged as the most frequently selected priority (65%), followed by lower or waived permit fees for heat pumps (47%) and streamlined permitting

pathways, such as fewer required permits or the ability to apply for multiple permits at once (35%). Other commonly selected improvements included having a dedicated point of contact, access to an online support portal, and better guidance or training from permitting jurisdictions.

Figure 11. Contractor-Identified Top Priorities for Improving the Permitting Process



Source: Contractor Experience Survey Question 4.26. " Would the following changes make the permitting process easier for you?" (n=34, multiple responses allowed)

Across dozens of open-ended responses, contractors consistently proposed the same solutions:

- Simplify and standardize rules across cities
- Reduce or eliminate unnecessary plan checks
- Shift to online platforms
- Clarify electrical requirements and load calculation expectations
- Provide consistent guidance and templates

3.3. Contractor Interviews

This section summarizes findings from the interviews but does not provide specific responses to preserve anonymity. The objective of these interviews was to dig deeper into issues previously identified in the contractor survey, gather examples, and better understand contractor pain points related to permitting for HP HVAC and HPWH. The feedback we collected during these phone interviews is based on a limited sample (n=6) and is not statistically significant or necessarily representative of the population of contractors, manufacturers, and other HVAC contractors in California. The feedback summarized in this section is intended to be anecdotal only and provide some insight into the heat pump technology permitting process in California. Our high-level findings from the contractor interviews are presented across several topic areas.

Challenging Jurisdictions and Successful Approaches

Contractors reported extreme delays in some jurisdictions, sometimes lasting several months, even for minor mechanical or like-for-like replacements. They noted a lack of responsive points of contact, inconsistent requirements depending on the assigned permit technician, and unclear or incomplete rejection notices, and explained that these challenges often forced them to proceed with installations without permits, creating compliance and warranty risks. In contrast, contractors praised jurisdictions, such as Pinole, Contra Costa County, and Martinez, for providing examples of best practices, including fast approvals, clear online portals, and consistent staff responsiveness.

Table 10. Positive Permitting Features Identified Across Jurisdictions

Jurisdiction	Positive Features
Pinole	Express permits, online forms, same-day issuance, minimal documentation
Contra Costa County	Fast approval, consistent requirements
Martinez	Walk-in guidance, responsive staff, simple process
Alameda County	Efficient, comprehensive decarbonization permitting structure

Variability and Lack of Standardization

A major theme across all interviews was the high variability in permitting requirements across jurisdictions. Some cities require full site plans, property drawings, sound studies, and load calculations, while others are transactional and quick. Variability also exists within the same permitting office, as inspectors and plan reviewers interpret codes differently. Contractors explained that this inconsistency creates significant administrative burdens and forces them to adapt workflows for each city.

Documentation and Administrative Burden

Contractors reported that excessive documentation was a key challenge, with many jurisdictions requiring detailed architectural-level drawings, multiple site visits, and complex submissions even for simple HVAC replacements. They noted that smaller contractors without in-house engineering or drafting staff often must outsource these tasks, increasing costs and delays. In addition, strict sound ordinances and

inconsistent setback requirements further complicate installations, limiting equipment placement and forcing trade-offs in efficiency, aesthetics, or equipment type.

Inspection Challenges

Contractors reported that inspection scheduling often involves broad time windows and inconsistent interpretation of code across inspectors and jurisdictions. Inspectors sometimes request work beyond what is required, and escalation paths for disputes are limited. Contractors emphasized that consistent training for inspectors and improved communication would reduce delays and simplify project management. Narrowing inspection windows or implementing automated notifications would help contractors plan more effectively and reduce time spent waiting on site.

Digital Tools and Online Portals

Contractors noted that the availability of online permitting portals greatly affects efficiency. Jurisdictions without online submissions experience turnaround times that can increase from 10 days to 30 to 60 days due to document delivery and revisions. Portals that enable digital submission, fee payment, and instant issuance, combined with clear checklists, significantly improve speed and accuracy. Contractors noted that third-party platforms like SolarAPP+ could standardize applications across multiple jurisdictions and reduce repetitive administrative work.[29]

Key Recommendations and Takeaways

Contractors' intervention recommendations focus on reducing administrative burden, improving project timelines, lowering costs, and supporting broader adoption of heat pump technologies.

Short-Term/Immediate Improvements

- Standardized Checklist for Plan Review
  - Create uniform checklist across jurisdictions for required documents, measurements, and calculations can reduce back-and-forth and prevent unnecessary revisions.
- Reliable Point of Contact
  - Assign a knowledgeable staff member per jurisdiction to answer contractor questions.
- Digital Submission Options
  - Enable portals for online submissions to reduce delays from physical document delivery.
- Express Permit Pathways
  - Streamline like-for-like replacements to replicate Pinole's model (same-day or one- to two-day permits).
- Inspection Scheduling Optimization
  - Narrow time windows; use automated notifications or real-time estimated arrival times.

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[29] SolarAPP+ (Solar Automated Permit Processing Plus) is a national online platform that automates and standardizes solar permit approval for residential rooftop solar PV and battery storage systems.

Medium-Term/Policy-Level Improvements

- Training for Inspectors
  - Emphasize consistent code interpretation, limit personal preference enforcement, and establish escalation paths.
- Harmonized Documentation and Fee Structures
  - Reduce unnecessary paperwork for standard equipment replacements.
- Third-Party or Standardized Platforms
  - Consider platforms like SolarAPP+ (designed for solar permits) for uniform permit processing across multiple jurisdictions.

Long-Term/Strategic Improvements

- Centralized Bay Area Permitting Portal
  - Create one portal for electrification work, reducing redundancy across different systems.
- Standard Requirements across Jurisdictions
  - Standardize setback and sound requirements for HP HVAC and HPWH installations.
- Policy Advocacy
  - Encourage municipalities to adopt express permit pathways and digital-first approaches.

3.4. Permitting Authority Interviews

To better understand the permitting landscape for residential electrification projects across MCE service areas, Cadmus conducted nine interviews with building officials, plan checkers, and planning staff from a mix of cities and counties. These discussions explored current permitting and inspection practices, resource constraints, technology adoption, and the specific challenges associated with permitting HP HVAC and HPWH installations. The interviews provide insight into how local permitting authorities interpret state code requirements, manage fluctuating workloads, engage with contractors, and approach ongoing streamlining efforts. Together, these perspectives offer a grounded view of the structural and operational factors that influence electrification permitting across the region and highlight opportunities to improve efficiency, consistency, and user experience.

This section summarizes the feedback collected during those interviews. High-level findings include the following:

- Administrative fragmentation, not technical code requirements, is the primary barrier across nearly all jurisdictions.
- Incomplete or incorrect applications are the single largest cause of delays, primarily due to missing forms (CF1R, contractor declarations), outdated documentation, or incorrect permit paths.
- Staffing shortages and inspector capacity bottlenecks are widespread, affecting both plan review and inspection scheduling.
- Permit runners and third-party expeditors frequently introduce errors, requiring repeated staff guidance.

- Most HP HVAC and HPWH permits are technically simple; delays are administrative, not driven by code complexity.
- Jurisdictions that issue same-day or rapid permits rely on close staff communication and small team workflows, not advanced software.
- Online permitting transitions are common but bring onboarding challenges and slow processing during ramp-up periods.
- Contractor education and documentation literacy remain major gaps, amplified by three-year code cycles and unique local requirements.
- Regional standardization, especially a shared permitting platform, is strongly desired, with cities calling for an app like the solar permitting tool SolarAPP+ for electrification
- Inspections, not permit review, are a growing bottleneck, especially in larger jurisdictions with high inspection loads

Across interviews with permitting authorities, several consistent themes emerged regarding current permitting practices, persistent pain points, and opportunities to streamline the electrification permitting process. While each jurisdiction operates under the same state code requirements, differences in staffing models, digital systems, contractor familiarity, and internal processes shape their overall efficiency. Together, these perspectives highlight both structural constraints and practical strategies that can enable faster, smoother permitting of HP HVAC, HPWHs, and related electrical upgrades.

Local Permitting Administration and Tools

Staff from permitting authorities across the nine cities repeatedly emphasized that technical requirements, especially for HP HVAC, HPWHs, and related electrical work, are largely uniform due to statewide building and energy codes. They agreed that differences arise from administrative implementation: the software platform used (eTRAKiT in Pinole; Accela or transitioning systems in Richmond and Oakland; and email-based intake and in-person applications in Hercules), the presence or absence of express permits, inspection scheduling rules, and document uploading workflows. Richmond and San Anselmo staff described how cross-city differences in portal navigation create unnecessary friction for contractors, while Contra Costa County staff highlighted how each department operates semi-independently despite sharing a regional code framework. They noted that for contractors working across multiple MCE service areas, this administrative variability, not code interpretation, is the primary source of confusion and error.

Permit Submittal Errors and Review Cycles

Across every jurisdiction—from larger cities such as Oakland and Richmond to smaller ones like Pinole and Hercules—staff consistently emphasized that the overwhelming majority of permitting delays stem from incomplete or incorrect applications, not from technical code review. This included missing contractor declarations, outdated notarized forms (a recurring issue in Pinole), absent CF1Rs or HERS documents, invalid business licenses, incorrect project information, and incomplete load calculations, all of which repeatedly force resubmittals. Staff in multiple cities expressed frustration that contractors or permit runners often do not read instructions embedded directly in their portals or submittal guides. Permit runners are third-party administrative service providers hired by contractors to submit permit

applications, upload required documents, and manage communications with local permitting offices on the contractor's behalf. These individuals are often not technical staff and may have high turnover, resulting in limited familiarity with specific jurisdictional requirements, permitting software, or documentation standards. As a result, permit runners frequently submit incomplete or incorrect applications, creating additional review cycles for permitting authorities and contributing to preventable delays in the permitting process. Pinole staff noted that many applications "would be approved the same day if contractors simply followed the instructions already written on the portal," while Hercules staff described how same-day issuance is routine when applications arrive complete. This pattern appeared in nearly every interview, making incomplete submissions the single most consistent barrier across all nine jurisdictions.

Staffing Capacity and Workload Patterns

Staffing levels and fluctuations in volume emerged as major determinants of processing speed across counties and cities. Staff from smaller jurisdictions, such as Hercules and San Anselmo, said they often process complete electrification permits within 24 hours because they manage intake directly, can respond to email quickly, and face relatively modest volumes. In contrast, staff from Oakland and parts of Contra Costa County reported slower processing when submittals surge, because staffing cannot scale to sudden peaks. Oakland staff noted that "fluctuation in submittals is probably the biggest delay," and Contra Costa staff noted that their inspectors commonly complete 11 to 12 inspections daily, leaving limited time for thorough site visits or coordination with plan review staff, which contributes to communication gaps and strains the overall permitting workflow. Pinole staff noted that, even with their generally fast turnaround times, inspections slow down when a single inspector is out.

Digital Permitting Systems

Adoption of permitting software and automation tools varied widely across the nine jurisdictions. Pinole's expansion of Symbium for HP HVAC and HPWH permits stands out as a promising model: automated license checks, workers' comp verification, and structured uploads reduce errors before submittal. Contra Costa County noted that the switch to fully online permitting during the COVID-19 pandemic accelerated adoption, but the true efficiency gains remain mixed. Some inspectors said that standardized digital checklists slow them down, and they prefer to rely on professional judgment. Staff from Contra Costa County reported piloting an automated code-checking tool and exploring AI platforms to support plan review. Oakland staff said the city is preparing to launch an online system next year with the expectation that digital intake will reduce variability in processing times. Staff from Hercules said that despite not using a formal online portal, they achieve high efficiency through a hybrid model that allows email and in-person submissions. This allows them to effectively meet contractors "where they are" and support contractors who struggle with digital systems. Several interviewed authorities emphasized that software is not a universal solution: effective streamlining depends on how well systems guide users, enforce completeness, and reduce back-and-forth, rather than on digitization alone.

Contractor Knowledge Gaps

Jurisdiction staff repeatedly noted that contractors are technically competent but often unaware of administrative requirements, especially following the triennial updates for state code. Staff from

Richmond, San Anselmo, and Hercules said that contractors may not stay current with new documentation rules after their initial licensing exam, and this mismatch leads to predictable, recurring missing documents or outdated practices. Many jurisdiction staff also expressed concern about third-party permit runners who cycle rapidly across cities and frequently resubmit incomplete applications. They noted that this creates a structural knowledge gap that consumes significant staff time. Staff from several cities expressed interest in regional efforts potentially led by MCE to standardize documentation guidance, reinforce best practices, and provide contractor training to reduce preventable errors.

Communication and Predictable Timelines

Across both small and large jurisdictions, staff described contractor benefits from predictable inspection windows, flexibility in business license timing, and accessible staff communication. Staff from Pinole and San Anselmo said they allow contractors to call inspectors on the day of inspection to estimate arrival order, improving jobsite planning. Hercules staff reported issuing permits quickly through direct email communication with the building official, resulting in high contractor satisfaction despite minimal use of technology. Contra Costa County staff said they maintain a 24-hour turnaround goal for final inspections, emphasizing predictable scheduling over procedural uniformity. Staff across jurisdictions identified practices such as direct communication, clear expectations, and reliable timelines as drivers of positive contractor experiences, independent of system size or digital maturity.

Electrification Permits Relative to Other Residential Permits

Staff across jurisdictions consistently reported that the HP HVAC and HPWH permitting process was similar to other residential mechanical or electrical permits. No interviewee identified electrification technologies themselves as major sources of delay. The only consistent complication that surfaced during interviews was when panel or service upgrades were required, which introduced utility coordination, electrical review, and additional inspection steps. Otherwise, the majority of the interview staff reported that electrification fits within familiar permitting workflows.

Best Practices Highlighted Across Interviews

Across interviews, permitting authorities identified a set of practical, low-cost practices (listed below) that have helped improve application quality, reduce back-and-forth, and maintain faster review and inspection timelines for residential electrification projects:

- Clear, accessible permit guidance posted online, including checklists, sample diagrams, and detailed requirements for common electrification projects (HPWH, service upgrades, panel work, HVAC).
- Pre-application guidance channels, such as phone lines, counter hours, and email support, that allow contractors to clarify requirements before submitting.
- Internal front-end screening systems that direct electrification-related applications to staff with relevant expertise to reduce back-and-forth corrections.
- Standardized review practices and templates within departments to minimize variability from reviewer to reviewer.

- Consistent same-day or next-day inspection scheduling when staffing allows to help keep projects moving without long field delays.
- Training and refreshers for staff and inspectors on emerging technologies, especially HPWHs and electrical upgrades, to reduce inconsistent comments.
- Use of digital permitting platforms that let applicants track status and upload corrections quickly to reduce miscommunication and missing files.

3.5. Summary

As detailed in the Executive Summary, the study findings inform the recommended next steps and identify potential leads to spearhead implementation. The following appendices provide supporting literature review data, contractor survey questions, and the interview guides used for permitting authority and contractor interviews.

Appendix A. Literature Review

Table A-1 summarizes Cadmus' literature review by source and key findings.

Table A-1. Summary of Literature Review

#	Source Name	Findings	URL
1	Best Practices Guide for Streamlining Electrification Permitting	Jurisdictions can streamline electrification permitting by designating an internal champion to coordinate efforts, leveraging state-mandated expedited review requirements, and investing in ongoing staff training to stay current on electrification technologies. Early identification of electrification projects, supported by proactive pre-application resources, can reduce delays, while evaluating permit fee structures can help ensure parity with—or preference for—electric over natural gas equipment. Establishing dedicated application, plan check, inspection, and review processes, supported by web-based permitting systems, further improves efficiency. Tracking permitting trends as well as common application and inspection errors enables continuous improvement. At a broader level, aligning plan check and inspection requirements across jurisdictions and supporting third-party plan check or inspection services through training, guidance, and incentive programs can help standardize practices and reduce friction for applicants region-wide.	Link
2	Issue 139: Blueprint California Energy Commission Efficiency Division	The most significant update in the 2022 Building Energy Efficiency Standards affecting single-family residential buildings is the introduction of a prescriptive heat pump baseline for either water heating or space heating, depending on the climate zone. The standards also strengthen ventilation requirements to improve indoor air quality, including a new requirement that installed heat recovery and energy recovery ventilation systems meet a HER)–verified maximum fan efficacy of 1.0 watts per cubic foot per minute (cfm) (§150.0(o)2C). In addition, the 2022 standards introduce new requirements and revisions applicable to residential additions and alterations.	Link
3	2022 California Energy Code, Title 24, Part 6	Heat pump requirements include meeting minimum HSPF², SEER, and SEER2 ratings, with field verification of performance per RA3.3 and verification of heating capacity at both 47°F and 17°F per RA3.4. In Climate Zones (CZs) 3, 4, 13, and 14, heat pumps are required unless compliance is demonstrated under §150.1(b)1. Airflow requirements specify at least 350 cfm/ton for all air-source systems, with reduced thresholds in CZs 2 and 8–15 for standard systems (≥300 cfm/ton) and small-duct high-velocity systems (≥250 cfm/ton). For altered space-conditioning systems—defined as changes to compressors, coils, piping, or metering devices—setback thermostats are required (§110.2(c)), ducts must be sealed and tested per RA3.1, and systems must meet leakage limits, visual inspection, and smoke testing requirements; garage installations must also comply with §150.2(b)1Diic. HPWHs must be 240V units installed in garages or conditioned space, with additional requirements by climate zone, including compact distribution systems in CZs 1 and 16, drain water heat recovery in CZ 16, or compliance via Northwest Energy Efficiency Alliance (NEEA) Tier 3+ alternatives. For additions that include a second water heater, the unit must be an HPWH that meets specific installation, insulation, and communication interface requirements, with a limited exception allowing 120V HPWHs for dwelling units with one bedroom or fewer. Heat pumps equipped with supplementary electric resistance heaters must include controls that prevent the supplemental heaters from operating when the heat pump alone can meet	Link

#	Source Name	Findings	URL
		heating demand. Thermostats serving heat pump systems are required to comply with the provisions of Section 110.2(b), and the code establishes standardized size and efficiency categories for all heat pump types beginning in Table 110.2-B.	
4	Heat Pump Water Heater Permitting and Inspection Checklist	HPWH installations must comply with industry standards and manufacturer installation specifications, ensure the unit's electrical service rating meets or exceeds the calculated electrical load in accordance with NEC Article 220, and verify that the branch circuit rating complies with NEC 422.10(A) or 422.13. Permit applications typically require a combination of electrical, mechanical, and plumbing permits and must include detailed HPWH information such as type, size, and efficiency, along with a scaled floor plan showing the existing and proposed water heater locations and the location of electrical panels. Depending on the scope of work, applicants may also need to submit an electrical line diagram—particularly when upgrading from 120V to 240V service or relocating the unit—detailing wiring methods, connections, grounding, and installation specifications. Additional requirements may include mechanical and plumbing design details such as heat traps, ducted intake and exhaust air specifications, condensate drainage (including pump requirements where applicable), equipment controls, completed electrical load calculations, and manufacturer specification sheets and installation manuals.	Link
5	Submittal Guidelines: Electric Heat Pump Water Heater	Installation of an electric HPWH requires submission of two complete CF1R-ALT-05-E forms and documentation demonstrating compliance with the minimum required energy factor of 2.8. Applicants must provide a partial floor or site plan showing the proposed electric HPWH location, specify the make and model of the equipment, and include seismic bracing details in accordance with California Plumbing Code 507.2 or an engineered design. Electrical load calculations are required to confirm that the existing service panel can support the added load, and bollard protection must be specified if the unit is installed adjacent to a vehicle path. Outdoor installations must meet applicable setback requirements and comply with the 6-decibel ambient noise limit, while installations in attic spaces are subject to additional, project-specific requirements.	Link
6	Certificate Of Compliance	If new space conditioning systems are installed or existing systems are altered and are not exempt from HERS verification, then a CF1R-ALT-02 shall be completed and registered with a HERS Provider Data Registry. On pages 12 and 13, Space Conditioning and Water Heating System requirements are stated.	Link
7	2022 HPWH Building Code Assistance Sheet	The 2022 Building Code provides clear regulatory references for identifying prescriptive and mandatory water heating requirements and allows HPWHs under all performance compliance paths, including new construction, additions with a second water heater, and alterations. Licensed C-36 (Plumbing) or C-20 (HVAC) contractors may apply for permits when no electrical work is involved, when electrical work is authorized under an AHJ-issued joint permit, or when a C-10, General (B), or a joint venture including a C-10 applies for the required electrical permit. Compliance documentation includes completion of the CF1R-ALT-05-E form specifying a heat pump water heater with electric fuel type and UEF efficiency, meeting NEEA Tier 3 or higher, or satisfying defined installation and communication interface criteria and federal minimum UEF standards. Permit submittals may also require electrical line or circuit diagrams, site diagrams, and potentially electrical or structural load calculations. General installation requirements include consistency with the approved CF1R form, insulation of accessible hot and cold water piping, proper condensate disposal, and seismic	Link

#	Source Name	Findings	URL
		bracing of the storage tank. Additional considerations address adequate air volume or ventilation, safety bollards for garage installations in vehicle paths, and proper capping and removal of abandoned natural gas lines. Electrical requirements further ensure that dedicated circuits, disconnects, and service panels are sufficient for the added load, or that approved load management methods are implemented to maintain compliance.	
8	Title 24, Part 6 Fact Sheet	Minimum central heat pump efficiency requirements are based on HSPF2 and SEER2 ratings applicable at the time the equipment was manufactured. For new construction in Climate Zones 3, 4, 13, and 14, heat pump space heating is prescriptively required. In addition, projects must include a dedicated 240-volt, 30-amp branch circuit installed within three feet of the furnace and accessible without obstruction; this reserved space at the main electrical service panel must accommodate a future double-pole circuit breaker to support the installation of a heat pump space-heating system.	Link
9	2025 Energy Code Compliance Documents - Forms for Single-Family Buildings	Single-family residential projects that require FV&DT must demonstrate compliance through compliance documents to building departments and, for some projects, to enforcement agencies registered with an ECC Provider. This source organizes the required forms by category.	Link
10	Heat Pump Electrical Requirements: A Comprehensive Guide	California follows the 2020 NEC, with heat pump electrical requirements primarily addressed in Article 440. Most heat pump systems are rated for 208/230 volts, allowing installation in buildings with either single-phase or three-phase electrical service. Their power requirements are calculated by multiplying the rated amperage by the operating voltage. Electrical design must account for the Minimum Circuit Ampacity (MCA), which defines the minimum conductor size needed to safely carry the load, and the Maximum Overcurrent Protection (MOCP), which establishes the largest allowable circuit breaker or fuse to protect the equipment. The MCA is typically calculated at 125% of the rated amperage, while the MOCP is commonly calculated at up to 225%, as permitted by the NEC. Conductor sizing is further guided by NEC Table 310.16, which provides ampacity ratings for copper conductors based on terminal temperature ratings of 60°C, 75°C, and 90°C.	Link
11	Single-Family Homes Additions/Alterations: HVAC Heat Pumps	An addition is defined as any modification that increases a building's conditioned floor area or volume. An HVAC addition occurs when all heating and cooling components are installed or replaced, and 75% or more of the duct system is new or replaced, commonly referred to as a "cut-in." An alteration, by contrast, involves changes to a building's water-heating, space-conditioning, lighting, or envelope systems that do not increase conditioned space; an HVAC alteration, often called a "change-out," occurs when one or more—but not all—major components such as the air handler, outdoor condensing unit, coil, or other refrigerant-containing components are replaced. Single-family buildings include single-family homes, accessory dwelling units (ADUs), duplexes, and townhomes of any height. Heat pump space heating is prescriptively required for new single-family homes, townhomes, and newly constructed detached ADUs in Climate Zones 3, 4, 13, and 14, but is not required for alterations, replacement equipment, systems serving additions, or projects that comply using the Performance Approach. New construction must comply with Energy Code Section 150, and new or replacement space-heating systems serving additions may be either heat pump or gas systems. HVAC equipment serving additions must meet applicable mandatory and compliance provisions, including Sections 110.0–110.9	Link

#	Source Name	Findings	URL
		and 150.0(a)–(n), (p), and (q), and demonstrate compliance under either the Prescriptive or Performance Approach. Replacement space-conditioning systems for alterations must similarly comply with applicable mandatory requirements and one of the two compliance approaches, but a heat pump is not required in these cases.	
12	Permit Requirements For HVAC Installation	Every township, city, and local government in California administers its own HVAC permitting process, resulting in variations in permit fees and specific requirements by jurisdiction. However, most California cities generally require an electrical permit, a current HVAC contractor's license, an HVAC ductwork permit where applicable, and a site plan showing the proposed location and scope of the HVAC installation to issue a permit.	Link
13	2022 Energy Code Compliance Manuals and Forms	Energy Code documentation requirements span the permit, construction, and final approval phases and rely on the CF1R, CF2R, and CF3R forms. At the building permit stage, compliance documentation consists primarily of the CF1R, which is based on the approved building plans; new construction uses CF1R-NCB forms, while additions and alterations use CF1R-ALT-HVAC forms. Depending on the compliance approach, additional worksheets may be required: the Prescriptive Approach requires supporting envelope and roof worksheets, while the Performance Approach relies on CEC-approved software and requires only the registered CF1R-PRF documents. During construction, all applicable CF2R forms must be completed to document installed measures across envelope, lighting, mechanical, plumbing, and solar systems, with initial field verification performed by the builder or subcontractor when HERS verification is required. Certain mandatory, prescriptive, or performance-based measures also require independent field verification or diagnostic testing by a certified HERS Rater, who completes and registers the CF3R documenting test results. Final approval may be granted at inspection once the enforcement agency confirms the dwelling complies with approved plans, the CF1R, and all applicable codes; has received all required, signed, and registered CF2R forms; and, where applicable, has received a properly signed and registered CF3R from the HERS Rater.	Link
14	Streamlining Permitting and Installation of Heat Pump Water Heaters Final Pilot Report	The pilot team found that while the statewide average time to issue a heat pump water heater permit is 5.9 days, permitting timelines and challenges vary significantly by jurisdiction. On average, permits take 3.3 days from application to approval and an additional 2.6 days from approval to issuance, with nearly half of jurisdictions issuing permits for at least 75% of projects within one day or less; overall, 527 of the 774 verified permits were issued in one day or less. Despite relatively short timelines in many areas, common barriers include limited technical knowledge of heat pump water heaters among building department staff, a lack of standardized permitting processes across jurisdictions, and the burden on contractors to navigate inconsistent local requirements. While written reference materials were helpful, they were insufficient to meaningfully improve permitting efficiency or code compliance, whereas online training proved more effective yet still left notable knowledge gaps. The analysis indicates that targeted, hands-on learning opportunities designed to address jurisdiction-specific gaps will be critical to achieving streamlined, single-day permitting for heat pump water heaters.	Link

#	Source Name	Findings	URL
15	Streamlining Permitting and Installation of Heat Pump Water Heaters Data Analysis and Recommendations for Next Steps	Analysis of TECH Clean California HPWH claims shows that 92% of projects occurred in the Sacramento Valley and San Francisco Bay Area, with permit data representing 51 jurisdictions statewide. While nearly half of jurisdictions issue permits for most HPWH projects within one day, timelines vary substantially: 32% of claims, spanning 69% of jurisdictions, averaged more than one day to permit issuance, and regional differences were pronounced, with average processing times of 3.88 days in the Sacramento Valley and 7.58 days in the San Francisco Bay Area. Longer processing times were typically associated with incomplete applications requiring follow-up with contractors or HPWH installations embedded within larger retrofit projects that required additional review. The analysis found no correlation between higher permitting volume and faster processing, indicating that streamlining guidance is valuable regardless of a jurisdiction's experience level. Outreach revealed systemic challenges, including limited technical expertise and confidence among permit staff, inconsistent reliance on external guidance, staffing constraints, and varied levels of trust in state-issued resources. Additional barriers included inconsistent differentiation between HPWHs and other water heater types, contractor gaps in electrical expertise and digital submission skills, and more stringent upfront documentation requirements in Southern California jurisdictions. Collectively, these findings underscore the need for targeted, practical guidance and training tailored to local permitting contexts to reduce delays, improve consistency, and address safety and compliance risks.	Link
16	California Heat Pump Market Characterization and Baseline Study	Heat pump adoption in new construction is expected to grow as local reach codes increasingly require heat pumps, bans on natural gas in new buildings expand, and available tax credits improve market attractiveness. However, adoption continues to face barriers, including high upfront costs, contractor "risk pricing" driven by limited experience, gaps in builder and architect understanding of heat pump design and benefits, high electricity rates that reduce competitiveness with gas, and concerns about system complexity and callbacks. The average total installed cost for heat pumps is approximately $11,534, with significant variation driven by system type, brand, efficiency, equipment markups, and supplier relationships. Labor constraints further challenge deployment, as skilled contractors are in short supply and workforce availability fluctuates with construction demand, reinforcing the need for targeted, practical training for designers, installers, and mechanical, electrical, and plumbing engineers that addresses whole-building performance, refrigerant handling, equipment placement, and effective customer communication. Lessons from other state programs suggest emphasizing midstream incentive models that engage distributors and manufacturers, building strong and supported contractor networks, and limiting the number of participating distributors to improve engagement and tracking. Heat pump water heaters have a lower average total installed cost of approximately $3,908, though costs vary based on unit and home location, contractor experience, customer budgets, and, most notably, the scope of required electrical upgrades, which can significantly affect overall installation costs.	Link

#	Source Name	Findings	URL
17	California Heat Pump Partnership Blueprint	Despite progress to date, heat pump adoption in California remains at an early stage relative to decarbonization goals. As of the end of 2024, approximately 1.9 million heat pumps had been installed across residential and commercial buildings, far short of the roughly 23 million units needed to fully decarbonize space and water heating in these sectors. Of the more than 1 million HVAC units sold annually in the state, only about 20% are heat pump HVAC systems, and just 3% to 5% of the approximately 800,000 water heaters sold each year are heat pump water heaters. At current adoption rates and in the absence of additional state interventions, California is projected to reach only about 3.4 million installed heat pumps by 2030. Widespread adoption depends on aligning customer affordability and interest with contractors' motivations and capabilities, as contractors strongly influence customer decisions while customer demand, in turn, shapes contractors' business priorities. Adoption is most likely when heat pumps deliver equal or superior comfort, health, convenience, and reliability; carry little or no installation cost premium, including necessary electrical upgrades; offer comparable or lower operating costs; and involve minimal transaction friction through streamlined permitting and incentive processes. Persistent barriers include high upfront and operating costs, complex and inconsistent incentive programs, complicated permitting, low customer awareness, contractor reluctance, workforce shortages, and limited data to inform effective policy design.	Link
18	TECH Clean California's Heat Pump Market Transformation Approach: Lessons Learned in Year 1	TECH Clean California is a $120 million statewide market transformation initiative designed to accelerate adoption of heat pumps for space and water heating in support of California's climate goals, including deploying six million heat pumps and enabling three million climate-ready homes by 2030. Although heat pumps currently account for less than 10% of market share in most U.S. states, they are essential to reducing the 91% of direct residential building emissions associated with fossil fuel-based space and water heating. The program operates across three integrated pillars: midstream incentives and workforce training, regional pilots and Quick Start Grants to test scalable and equitable solutions, and a public data platform to inform policy and investment. By addressing barriers such as high upfront costs, limited contractor training, and low consumer awareness through streamlined incentives, simplified applications, and statewide outreach campaigns like Switch Is On, TECH has rapidly scaled participation. Early results exceeded expectations, with more than 900 contractors enrolled and over 20,000 projects initiated within the first six months, while maintaining a strong equity focus that directs 30% to 40% of benefits to disadvantaged communities. Insights from early implementation highlight the importance of flexible approaches to electrical upgrades, integrated program design, and consistent statewide incentives, offering valuable lessons for other states seeking durable, equity-centered market transformation beyond traditional rebate programs.	Link
19	Smoothing the Transition to Heat Pumps, Part 2: Permitting and Inspections	Permitting delays and complexity significantly increase costs and discourage electrification, affecting projects ranging from large infrastructure upgrades to household installations such as heat pump water heaters. Low permit compliance is common, particularly for urgent replacements like gas water heaters, and new regulations phasing out gas equipment in the Bay Area further heighten the need for permitting reform to support widespread electrification. A major barrier is jurisdictional inconsistency, with more than 100 cities interpreting and applying state building codes differently, requiring varied documentation and enforcing	Link

#	Source Name	Findings	URL
		inconsistent inspection standards. Projects often require multiple permits across trades, creating added complexity that can exclude smaller or less experienced contractors, while unpredictable permit and inspection timelines—combined with limited inspector familiarity with heat pump technologies—contribute to poor customer and contractor experiences. Evidence from other sectors, such as rooftop solar, demonstrates that streamlined permitting can dramatically improve compliance, as seen in San José's significant increase in solar permits after the process was simplified. Municipal leadership is therefore critical, and early pilots by local governments and regional agencies have shown promise through measures such as simplified forms, online portals, and consolidated multi-trade permits. Recommended reforms include reducing plan-check requirements, enabling self-certification for qualified contractors, expanding virtual inspections, and eliminating unnecessary documentation for gas-to-heat-pump retrofits, alongside strengthening building department capacity through targeted training, dedicated staff, and digital permitting tools.	
20	Greenlighting Clean Heat: Modernizing Permits for Heat Pumps	Complex, inconsistent, and outdated permitting processes represent a significant barrier to heat pump adoption in California, with local rules varying widely across jurisdictions and imposing differing setback, noise, and aesthetic requirements, adding unnecessary complexity. Excessive documentation, unclear submittal requirements, inconsistent inspections, and high or unpredictable permit fees further delay projects and increase costs for homeowners and contractors. As a result, a substantial share of heat pump installations proceed without permits, undermining safety, code compliance, and eligibility for incentives. These challenges are compounded by building codes and permitting systems originally designed around gas appliances, creating regulatory mismatches for electric heat pump technologies. Streamlining permitting processes has the potential to substantially reduce project timelines and costs, improving affordability and access to clean heating. Experiences from other U.S. and international jurisdictions demonstrate that simplified permitting and self-certification models can be effective pathways for reform in California.	Link
21	The HVAC permit application process	Securing an HVAC permit typically begins by confirming whether the project scope triggers permitting requirements, such as new equipment installation, capacity changes, duct relocation, or gas line tie-ins. Some jurisdictions now require permits even for one-for-one equipment replacements if efficiency ratings change. Once a permit is required, contractors must assemble detailed technical documentation, which commonly includes equipment data sheets, load calculations or Title 24 compliance forms, duct design documentation, electrical one-line diagrams, and gas piping schematics, and ensure that files are clearly labeled to align with plan reviewer preferences. Applications are then submitted through a local online portal or directly to the building department, along with administrative details such as contractor licensing, project valuation, and applicable fees; accuracy and consistency across all forms are critical, as incomplete or inconsistent submissions are the leading cause of delays. After submittal, applicants should actively monitor the plan review process, as review timelines vary with project complexity and department workload, and timely follow-up can help keep applications moving. Once approved, the permit must be pulled and clearly posted at the job site, along with any inspection documentation, to ensure inspectors can easily verify compliance during site visits.	Link

#	Source Name	Findings	URL
22	Fee Schedule 2023-2024	Page 4 shows the cost of a heat pump at $281	Link
23	Do I Need A Permit For Sacramento, Placer, El Dorado And Yolo County Areas?	Across the three permit zones, residential and commercial water heater permit fees vary by county and technology type. In Sacramento County (Permit Zone 1), residential water heater permits are $200, commercial permits are $400, gas tankless systems are $220, heat pump water heaters are $300, and modular homes are $800. In Placer County (Permit Zone 2), fees increase slightly for residential ($250) and commercial ($450) water heaters, with tankless systems at $270, heat pump water heaters at $250, and modular homes remaining $800. Yolo County (Permit Zone 3) has the highest residential water heater fee at $300, commercial fees at $450, gas tankless systems at $400, heat pump water heaters at $300, and modular home permits consistent at $800, illustrating notable jurisdictional variation in permitting costs across counties.	Link
24	FINAL REPORT: Heat Pump Water Heater Permit Requirements and Costs in San Mateo County	Permit fees and processing timelines for water heaters and heat pump systems vary significantly across Bay Area jurisdictions. Permit fees range from as low as $50 in Mountain View for water heaters and $60 in Foster City, to more than $300 in cities such as Hillsborough, Redwood City, San Mateo, and Woodside, with some jurisdictions noting wide fee ranges for HVAC and heat pump systems. Sacramento County, included for comparison, charges $300 for heat pump water heaters and $200 for residential water heaters. In addition to cost variability, permitting timelines also differ notably by jurisdiction: several cities—including Burlingame, Daly City, East Palo Alto, Hillsborough, Portola Valley, and Redwood City—typically issue permits in one or more days, while others such as Atherton, Colma, San Mateo, South San Francisco, and Woodside often experience processing times of four days or longer. Together, these variations in fees and timelines highlight the inconsistent permitting landscape that contractors and homeowners must navigate when installing heat pump and water heating systems.	Link
25	California S.B.282	To address wide variability and potentially high permitting costs, California enacted Senate Bill 282, known as the Heat Pump Access Act, which seeks to streamline and standardize local permitting for heat pump technologies. The legislation caps residential permit fees at $50 for heat pump water heaters and $150 for heat pump HVAC systems, authorizes self-certification by licensed contractors to reduce reliance on in-person inspections, and requires jurisdictions to implement online, automated permitting systems that enable real-time permit issuance.	Link
26	TECH Working Data Set	The TECH Clean California datasets include detailed, installation-level data fields describing site characteristics such as California Climate Zone and CalEnviroScreen Disadvantaged Community status, information on both installed and replaced equipment, total project costs covering equipment and labor, incentives provided by TECH Clean California and any stacked partner programs, and installation details such as project duration and quality installation measures completed by installers. These data are organized into three TECH Working Data Sets: the Single-Family dataset, which captures primarily individual heat pump installations in single-family homes (with a small number of small multifamily projects) supported through the Single-Family Incentive Program; the Multifamily dataset, which covers large-scale heat pump installations in multifamily buildings,	Link

#	Source Name	Findings	URL
		including central and unitary systems funded through the Multifamily Incentive Program; and the Low-Income Direct Install dataset, which documents electrification projects in low-income homes implemented in partnership with programs such as Energy Savings Assistance.	
27	Heat Pump Water Heater Permitting Materials	In the City of Pleasant Hill, permits for HPWH installations may be submitted electronically, and the city provides several tools to help contractors and homeowners achieve permit approval. These resources include an HPWH supplemental template that offers a standardized, user-friendly form for permit submittals and allows applicants to upload site and floor plan images directly; a 2022 HPWH Building Code Assistance Sheet, adapted from earlier BayREN efforts, which provides educational guidance on demonstrating code compliance for single-family buildings; and an Electrical Load Estimator that helps applicants perform load calculations to verify electrical code compliance.	Link
28	Simple Building Permits	Permits may be submitted electronically for a limited set of projects, including roofing replacements that exclude structural work, like-for-like air conditioner replacements, and like-for-like water heater replacements. For these eligible project types, permits are typically issued within one to two days.	Link
29	Simplifying HPWH permitting across San Mateo County	The initiative will begin with a comprehensive analysis of existing HPWH permitting processes across all county jurisdictions to identify inefficiencies and opportunities for improvement. Based on these findings, streamlined procedures will be developed to simplify permit application, review, approval, and inspection workflows. A 2025 pilot will then test the new processes in seven or more jurisdictions, with lessons learned informing broader countywide implementation. Supporting materials, including standardized documentation, guidance, and training for local government staff and contractors, will be developed to ensure consistent adoption. Stretch goals include enabling instant permitting for 120-volt HPWH installations and establishing consistent permit fees across the county.	Link
30	Request for Proposals (RFP - Informal) for Permit Simplification	San Mateo County is launching a pilot project to simplify HPWH permitting across all 21 jurisdictions, with the goal of accelerating the transition from gas to electric appliances by reducing permitting complexity and aligning local practices with established best practices. A qualified consultant will be engaged to evaluate existing permitting processes, develop a streamlined permitting model, and support implementation in at least seven jurisdictions in close coordination with the County's Sustainability Department. Key deliverables include a comparative analysis of current practices, a recommended simplified permitting framework, an implementation strategy, training materials for staff and contractors, and defined performance metrics to measure success. The pilot will be administered by the County Sustainability Department with funding and technical assistance from BayREN's Codes & Standards program, and while the contract term may extend up to five years, all core activities—such as outreach, training, and reporting—are expected to be completed within 18 months of contract award.	Link
31	Pilot Addresses Barriers to Heat Pump Water Heater Permits	In partnership with BayREN, TECH Clean California launched the Streamlining Permitting Pilot to address inefficient permitting practices that hinder widespread adoption of residential HPWHs. The pilot developed standardized tools for jurisdictions and installers, including the HPWH Permit Guide, Supplemental Permit Template, and Electrical Load Estimator, to simplify and align permitting requirements. Findings showed that HPWH permitting timelines vary widely	Link

#	Source Name	Findings	URL
		across jurisdictions, with a statewide average of 5.9 days, driven largely by inconsistent local rules and limited technical familiarity among permitting staff. The pilot concluded that tailored, jurisdiction-specific training for building departments is the most effective strategy for closing knowledge gaps and enabling streamlined, single-day permitting. As a next step, TECH Clean California recommends broad deployment of these resources, combined with direct jurisdictional support and targeted training, to advance statewide permitting reform.	
32	Online Permits at SJPermits.org	Building permits are required for a wide range of projects, including new construction; electrical, plumbing, and mechanical installations or improvements; structural modifications such as wall changes or window replacements; and the installation of new roofs or major appliances. For simple projects, San José offers downloadable building permits through SJPermits.org for 56 project types, such as solar installations, reroofs, minor kitchen or bathroom remodels, and certain electrical work, with a full list available under Online Building Permits. More complex residential and commercial projects that require plan review—including all ADU projects—generally begin through the Self-Start Online process at SJPermits.org, with plans uploaded via SJePlans. However, projects submitted through specific programs, including Best Prepared Designer Projects, Over-the-Counter Permit Service, Residential Express Permit Service, Streamlined Tenant Alteration Review, or the Streamlined Restaurant Program, follow separate permitting pathways and do not use the standard SJPermits and SJePlans process.	Link
33	Pinole's PEER Program: A Local Model to Improve Energy Efficiency Program Uptake	Launched in January 2024, the PEER Program supports Pinole residents in overcoming high upfront costs for energy efficiency and electrification upgrades by layering local incentives on top of existing regional and state programs. The program uniquely fills critical gaps by offering rebates for electrical panel upgrades—enabling installations such as EV chargers and HVAC systems—and for roof repairs for eligible homes, both of which are measures not typically covered elsewhere. During its initial six-month pilot phase, the program delivered more than $101,000 in rebates to 19 single-family homes, with heat pump HVAC systems and heat pump water heaters among the most commonly installed upgrades. Developed through a partnership between the City of Pinole and Contra Costa County, with support from BayREN, the program aligns with local climate goals and highlights effective intergovernmental collaboration. Reopened from October 2024 through June 2025, PEER continues to serve both single- and multifamily homes, enabling residents to stack rebates and pursue meaningful energy upgrades with reduced financial barriers.	Link
34	Energy Code ePermit Tool Project	The purpose of the ePermit Tool Project is to provide an online guidance resource that helps homeowners and contractors navigate common building permit code requirements, with the goals of educating users, expediting the permitting process, and improving Energy Code compliance. The tool offers step-by-step permit guidance for customers seeking to install or replace water heaters and fenestration components, such as windows, glass doors, and skylights.	Link
35	CalEPA Best Practices & Guidance on Language Access Services for Persons with Limited English Proficiency	Although CalEPA conducts most of its official business in English, California is home to more than 200 languages and dialects. Census estimates indicate that approximately 7 million Californians—nearly one-fifth of the state's population—speak English "less than very well," and many others, while able to speak English, may feel uncomfortable communicating in it, particularly on complex and technical topics such as those addressed by CalEPA.	Link

#	Source Name	Findings	URL
36	Language Access Plan	It is the policy of the California Department of Housing and Community Development, as a recipient of federal financial assistance, to comply with Title VI of the federal Civil Rights Act of 1964 and with California's Dymally-Alatorre Bilingual Services Act, ensuring equitable and non-discriminatory access to information and services for all members of the public, including individuals with limited English proficiency who constitute a substantial population as defined by law.	Link
37	Language Access Gap Analysis, Survey Results, and Policy Recommendations	Surveys of City employees and limited English proficient (LEP) community members found that employees are not always aware of available language access resources or when to offer language services, and that community members are similarly unaware of the services provided, indicating a need for additional training, outreach, and marketing. In response, Nimdzi Insights, LLC recommended a series of improvements to strengthen language access, including regularly tracking changes in LEP populations; expanding services in Spanish, the most frequently encountered LEP language; prioritizing resources for programs serving higher proportions of LEP individuals; increasing outreach to raise awareness of available services; establishing a formal complaint process; and enhancing employee training on when and how to use interpreters. Additional recommendations include providing clear guidance on when professional language services are appropriate versus using bilingual staff, developing procedures to identify vital documents requiring translation, and consulting LEP.gov guidance to improve multilingual website and digital content practices.	Link
38	Residential Express Permits	The City of Novato allows licensed contractors to apply online for Residential Express Permits covering five specific like-for-like residential projects: water heater replacements with no changes, HVAC replacements with no change in location, electrical panel replacements with no change in location that meet CEC 110.26 and PG&E Bulletin TD-7001M-b010, reroof projects with no change in roof pitch (excluding roofs with existing solar installations), and window or door replacements with no change in size. These express permits are intended to streamline straightforward home improvement projects and may be obtained only by licensed contractors or qualified permit agents who hold a valid California Contractors State License Board license and maintain a valid City of Novato business license.	Link
39	Permit Process	The City of Larkspur offers a Simple Permit process for a range of residential projects, including reroofs; water heater and furnace replacements; new and replacement air conditioning systems with a site plan; electrical service changes; like-for-like window and siding replacements; residential roof-mounted solar PV systems with plans; battery backup systems for existing solar arrays; and other simple mechanical, electrical, and plumbing work. Once the City determines that a submission is complete, Simple Permits are generally issued within two to three working days.	Link
40	Do it Yourself (DIY) Heat Pump Water Heater Installation and Market Study	More than half of Californians replacing water heaters pursue do-it-yourself installations, driven by lower costs, limited contractor availability, and homeowner confidence. However, DIY HPWH installations present greater technical complexity than gas or electric resistance systems, particularly with respect to electrical upgrades, equipment sizing, and product sourcing. Common barriers include limited access to clear instructions and video guidance, confusing rebate programs across state, utility, and local levels, difficulty finding appropriate HPWH models—especially 120-volt plug-in options—and insufficient	Link

#	Source Name	Findings	URL
		information on local codes and permitting requirements. Fuel-switching retrofits from gas to electric also raise concerns for utilities and permitting offices, even though homeowners often find gas disconnection and vent removal manageable. Lower-complexity configurations, such as 120-volt plug-in HPWHs installed in garages with top-mount plumbing and internal mixing valves, are more feasible for DIY approaches. Providing targeted homeowner resources—such as decision guides, installation checklists, tool lists, and best-practice guidance—can significantly improve installation quality and safety, and strategically supporting the DIY "workforce" represents a cost-effective opportunity to expand HPWH adoption when paired with coordinated policy, programmatic support, and education.	
41	Frontier Energy/TECH Clean California, Contractor Support Center	The TECH Contractor Knowledge Base is an online support and documentation portal maintained by Frontier Energy for participants in the TECH Clean California program, particularly contractors involved in heat pump and energy-efficiency installations. It serves as a centralized resource for the following: • Permitting guidance and best practices • Program participation requirements • Step-by-step instructions for submitting documentation and incentive requests • FAQs and troubleshooting information specific to contractors • Templates and example forms used in compliance and reporting	Link
42	Code of Federal Regulations: 430.32 Energy and water conservation standards and their compliance dates.	10 CFR § 430.32 establishes the federal energy and water conservation standards and compliance dates for a wide range of consumer appliances and equipment, including water heaters, HVAC equipment, refrigerators, and other residential products. The regulation specifies minimum efficiency requirements, outlines technology-specific standards, and sets effective and future compliance dates.	Link

Appendix B. Contractor Experience Survey Questionnaire: HP & HPWH Permitting

This survey is being conducted by Cadmus on behalf of MCE to better understand contractor experiences with permitting residential heat pumps and heat pump water heaters. MCE is a not-for-profit public electricity provider serving Contra Costa, Marin, Napa, and Solano counties. As both a utility and a community advocate, MCE is committed to advancing clean energy, energy efficiency, and building electrification, and we're conducting this survey to better understand the permitting process for heat pumps and heat pump water heaters so we can identify barriers and opportunities for improvement. Your feedback will help identify challenges, improve support for contractors, and provide recommendations to local cities and counties to streamline the permitting process. We appreciate your time and estimate that this survey will take 15-20 minutes to complete. As a thank you, all participants will receive a $25 gift card, and there is an opportunity for a follow-up phone interview for an additional $50 gift card.

Participant Information

Name:

Email: (Gift cards will be sent via email)

Contact number (Optional):

Section 1: Background Information

1. **Which of the following best describes your company's services?** *(Select all that apply)*
    a. Heat pump HVAC installation
    b. Heat pump water heater installation
    c. General HVAC
    d. Plumbing
    e. Electrical
    f. Other (please specify): _____
2. **Approximately how many residential heat pumps and heat pump water heater systems has your company installed in the past 12 months?**
    a. 0–5
    b. 6–15
    c. 16–30
    d. 31+

3. **In which of the following MCE communities do you regularly perform installations?**
    (Select all that apply)

Marin County:
☐ Belvedere
☐ Corte Madera
☐ Fairfax
☐ Larkspur
☐ Mill Valley
☐ Novato
☐ Ross
☐ San Anselmo
☐ San Rafael
☐ Sausalito
☐ Tiburon

☐ Unincorporated
Marin County

Napa County:
☐ American Canyon
☐ Calistoga
☐ Napa
☐ St. Helena
☐ Yountville
☐ Unincorporated
Napa County

Contra Costa County:
☐ Concord
☐ Danville
☐ El Cerrito
☐ Lafayette
☐ Martinez
☐ Moraga
☐ Oakley
☐ Pinole
☐ Pittsburg
☐ Pleasant Hill
☐ Richmond
☐ San Pablo
☐ San Ramon
☐ Walnut Creek
☐ Unincorporated
Contra Costa County

Solano County:
☐ Benicia
☐ Fairfield
☐ Suisun City
☐ Vallejo
☐ Unincorporated
Solano County

Other: _____

Section 2: Permitting Process Experience

4. **When installing heat pump and HPWH systems, do you typically pull permits or rely on homeowners?**
    a. We always pull permits
    b. We sometimes pull permits
    c. We rarely pull permits
    d. Homeowners usually handle it

5. **Rate your experience with permitting for the following technologies:**

    (1 = Very Easy, 5 = Very Difficult)

Task / Technology	1	2	3	4	5
Heat pumps	☐	☐	☐	☐	☐
Heat pump water heaters	☐	☐	☐	☐	☐
Electrical panel upgrades	☐	☐	☐	☐	☐

6. **How do you usually submit permit applications?** *(Select all that apply)*
    a. Online portal
    b. Email
    c. In-person at permitting office
    d. By mail
    e. Other: _____
7. **On average, how long does it take to receive a permit for heat pump installations?**
    a. Same day
    b. 1–3 days
    c. 4–7 days
    d. 1–2 weeks
    e. More than 2 weeks
    (Skip if N/A)
8. **On average, how long does it take to receive a permit for heat pump water heater installations?**
    a. Same day
    b. 1–3 days
    c. 4–7 days
    d. 1–2 weeks
    e. More than 2 weeks
    (Skip if N/A)

9. **How often do permitting-related issues delay project completion?**
    a. Frequently
    b. Occasionally

c. Rarely
d. Never

10. **Which jurisdiction(s) has the *slowest/hardest* permitting process? What makes the process slower there?**
(For example: unclear requirements, multiple permits, in-person submittals, unfamiliarity with heat pumps, inspection delays, etc.)
(Open text)
11. **Which jurisdiction(s) has the fastest/easiest permitting process? What makes the process faster there?**
(For example: clear requirements, same-day approval, online system, fewer permits needed, knowledgeable staff, etc.)
(Open text)

12. **How do on-site inspections impact your project timelines or costs, if at all? Please describe any common issues you encounter** *(For example: delays due to scheduling, waiting for inspectors on-site, needing multiple inspections, requiring different trades for inspection sign-off, using third party resources to manage inspections. etc.).*
(Open text)

13. **Do you experience permitting-related issues for other types of permits (non-heat pump technologies, e.g. gas furnaces or water heaters, insulation, etc.?) If the permitting processing time and complexity varies by technology or fuel type, can you discuss why you think that is the case?**

(Open text)

14. **In your experience, do jurisdictions typically require a separate building permit in addition to an HVAC/mechanical or plumbing permit for heat pump or HPWH installations?**
☐ Yes, a separate building permit is often required
☐ No, mechanical, or plumbing permit alone is sufficient
☐ It varies by jurisdiction (please explain):_____

15. **When jurisdictions offer 'over the counter' permits for heat pump or HPWH installations, how quickly are they typically issued?"**
☐ Same day — within a few hours
☐ Next business day
☐ Within 2–3 business days
☐ It varies (please explain): _____

Section 3: Barriers and Incentives

16. **Please rate the following permitting barriers for heat pump or HPWH installations based on how common they are in your experience.**

Permitting Barrier	*Very Common*	*Common*	*Occasionally Encountered*	*Rare*	*Not Common*
Long review or approval times	☐	☐	☐	☐	☐
High permit fees	☐	☐	☐	☐	☐
Different permitting rules or requirements between cities	☐	☐	☐	☐	☐
Unclear requirements or documentation	☐	☐	☐	☐	☐
Inspection scheduling delays	☐	☐	☐	☐	☐
Permit staff unfamiliar with heat pump or HPWH technology	☐	☐	☐	☐	☐
Needing multiple permits or subcontractors to meet license requirements	☐	☐	☐	☐	☐
Undertrained or short-staffed permitting departments	☐	☐	☐	☐	☐
Incorrect or unnecessary permit conditions added by inspectors	☐	☐	☐	☐	☐
Difficulty with online permitting systems	☐	☐	☐	☐	☐
Permit processes harder for lower-income areas or customers	☐	☐	☐	☐	☐
Other — Please explain: _____	☐	☐	☐	☐	☐

17. We want to understand what parts of the HP permitting process actually cause headaches or delays for contractors. For each of the following permitting-related issues, please indicate how often it has

delayed or interfered with your heat pump projects.
(Skip if N/A)

PERMITTING ISSUE	*NEVER*	*RARELY*	*SOMETIMES*	*OFTEN*	*ALWAYS*	*NA*
Confusion about license requirements (c-20 HVAC, c-10 electrical)	☐	☐	☐	☐	☐	☐
Electrical permit requirements (load calculations, panel upgrades)	☐	☐	☐	☐	☐	☐
HVAC ductworks permit requirements	☐	☐	☐	☐	☐	☐
Complicated energy code documentation (cf1r, cf2r, cf3r forms)	☐	☐	☐	☐	☐	☐
HERs testing/verification adds time or cost	☐	☐	☐	☐	☐	☐
Local city rules (noise, setbacks, drainage)	☐	☐	☐	☐	☐	☐
Requirements around banning electric resistance heat as the primary source	☐	☐	☐	☐	☐	☐
Permit costs	☐	☐	☐	☐	☐	☐
Other — please explain: _____ _____	☐	☐	☐	☐	☐	☐

18. We want to understand what parts of the HPWH permitting process actually cause headaches or delays for contractors. For each of the following permitting-related issues, please indicate how often it has delayed or interfered with your HPWH projects.

(Skip if N/A)

Permitting Issue	*Never*	*Rarely*	*Sometimes*	*Often*	*Always*	*Not Applicable*
Confusion about which contractor licenses are needed (C-20, C-36, C-10, dual license, partnerships)	☐	☐	☐	☐	☐	☐
Electrical permit requirements (load calcs, line diagrams, panel upgrades)	☐	☐	☐	☐	☐	☐
Plumbing or mechanical requirements being unclear or excessive (site plans, venting, condensate routing)	☐	☐	☐	☐	☐	☐
Structural requirements (joist span/load calcs for raised installs)	☐	☐	☐	☐	☐	☐
Local AHJ rules vary too much or are hard to track	☐	☐	☐	☐	☐	☐
Complicated paperwork (CF1R forms, manufacturer specs, floor plans, etc.)	☐	☐	☐	☐	☐	☐
Extra noise or setback rules from cities	☐	☐	☐	☐	☐	☐
Permit applications taking too long (online portals vs. in-person submittals)	☐	☐	☐	☐	☐	☐
Tier 3 or communication interface requirements for equipment eligibility	☐	☐	☐	☐	☐	☐
Replacement eligibility rules are confusing (e.g., gas still onsite, performance path confusion)	☐	☐	☐	☐	☐	☐
PERMIT COSTS	☐	☐	☐	☐	☐	☐
Other — Please explain: _____	☐	☐	☐	☐	☐	☐

19. What is the typical permit fee you see for heat pump installations in the jurisdictions you work in?

(Select the range that applies most often — include all required permits for a typical installation)

☐ Less than $100
☐ $100 – $250
☐ $250 – $500
☐ More than 500
☐ It varies too much to say

(Skip if N/A)

20. What is the typical permit fee you see for HPWH installations in the jurisdictions you work in?

☐ Less than $100
☐ $100 – $250
☐ $250 – $500
☐ More than 500
☐ It varies too much to say

(Skip if N/A)

21. Which jurisdiction do you work with has the most expensive permitting process? What makes the permit cost high in that area? *(For example: multiple permits required, high base fee, extra plan check or inspection fees, required subcontractors, etc.)*

Please name the city and county

(Open text)

22. Which jurisdiction has the least expensive permitting process? What makes the permit cost lower in that area?

Please name the city and county

(Open text)

23. Are you familiar with any local or utility programs or incentives related to heat pump technologies?

- Yes
- No
- If yes, please list any you have worked with: _____

24. Have incentive programs ever required permit documentation?

- Yes
- No
- Not sure

Section 4: Suggestions and Engagement

25. **Do the areas you work in offer online permitting or self-attestation options?** *)*- (i.e., submitting documentation without inspections for qualified projects)

- Yes
- No
- Not sure

Has it improved your workflow? And how?

Yes

_____

No

_____

26. **Would the following changes make the permitting process easier for you?** *(Select top three priorities)* **(Provision to allow only 3 selections)**

☐ Clear, standardized permit checklists and documentation templates
☐ Lower or waived permit fees for heat pumps
☐ Faster inspection scheduling
☐ Fewer required permits or ability to apply for multiple permits at once
☐ Better guidance or training from jurisdictions (e.g., webinars, office hours)
☐ More hands-on training or field demonstrations
☐ A dedicated point of contact (contractor liaison or navigator)
☐ Access to an online support portal for permitting and incentive guidance
☐ Opportunity to give contractor input when jurisdictions design permitting processes
☐ Other — please explain: _____

27. **Which of the following practices do you typically follow when permitting and installing residential heat pump or heat pump water heater (HPWH) systems?**
(Select all that apply)

☐ Contact AHJ early to confirm permitting requirements
☐ Use pre-approved templates or product lists (if offered)
☐ Coordinate joint permitting across plumbing and electrical trades
☐ Assess and plan for electrical panel capacity at project start
☐ Include panel upgrade needs in initial permit applications
☐ Use Title 24 compliance forms (e.g., CF1R-ALT-05-E)
☐ Submit a full and clear permit package (site plan, specs, load calcs, etc.)
☐ Follow HPWH-specific installation guidelines (e.g., pipe insulation, seismic bracing)
☐ Use streamlined or online permitting when available
☐ Maintain documentation of AHJ communications and inspection notes
☐ None of the above
☐ Other (please specify): _____

27.a. Which of these above practices do you find most burdensome or difficult to implement, and why?

(Open text)

28. If you could improve one part of the permitting process, what would it be?

(Open text)

29. Is there anything else you would like to share about your permitting experience with residential heat pump/HPHW installations?

(Open text)

30. Would you like to participate in a 30-minute follow-up interview? ($50 gift card included)

☐ Yes – provide name and email and/or phone and best time to reach you: _____

☐ No

31. Would you be interested in participating in a local roundtable hosted by MCE to share feedback on contractor-facing programs and incentives, including sharing your experiences with permitting?

- Extremely interested
- Somewhat interested
- Not interested
- Already participating

References

- Similar survey: CPUC TECH Heat Pump Contractor Survey (March 2022)
- A statewide web survey by Opinion Dynamics targeting HVAC and water heater contractors in California. Screened based on service type and scope, and then asked mix-percentage questions and usage patterns in structured formats Contractor-Baseline-Survey.pdf

Appendix C. Contractor Experience Interview Guide

Notes for interviewer:

This survey follow-up phone interview is expected to take 30-40 minutes.

Aim to capture specific examples/stories/opinions and actionable insights.

Keep questions open-ended but use probes from survey responses (e.g., "long review times," "difficulty is load calcs", "inspection delays," "different rules for cities").

Prioritize depth on barriers and potential solutions rather than covering every procedural detail.

Introduction (2 min)

Thank the participants for their time and for completing the survey, if they have.

State purpose: We're working with **MCE**, the community choice energy provider for Contra Costa, Marin, Napa, and Solano counties. In addition to providing clean power, MCE supports contractors and residents with programs for electrification, efficiency, and workforce development. MCE works directly with contractors on residential and commercial electrification projects by providing training, technical resources, and customer incentives. As part of this effort, MCE is interested in how local permitting processes affect electrification technology adoption and what improvements could support both contractors and municipalities. The purpose of this interview is to gather your perspective on current permitting practices, common challenges, and opportunities to streamline. Comments will not be attributed to individual participants without consent. If you'd like more background, MCE has contractor resources available here: MCE Contractor Resources

Section 1: Experience and Context (5 min)

Can you tell us about a recent HP or HPWH installation and the permitting process you went through? What made that project smooth or challenging from a permitting perspective?

Are there particular jurisdictions (municipalities/counties) where permitting has consistently been easier or harder? Why do you think that is? *(Note: Skip if already covered in answer Q1)*

Section 2: Permitting Experience/Pain points (10 min)

1. Thinking of your most frustrating/challenging permitting experience, what specifically caused delays or extra work? (Probe: differing code interpretation, unclear requirements, multiple permits, inspection scheduling delays, multiple visits, plan review, staff familiarity) (Note: Skip this question if answer is already covered when answering Q 1)

Which of these issues (noted above) have the biggest impact on your projects in terms of cost, time, or customer experience?

How do differences in requirements across cities or counties affect your work? Which local ordinances or code requirements (such as reach codes, gas bans, noise limits, or setback rules) have the biggest impact on your work? Which of these/other rules or requirements tend to differ the most from city to city and create barriers for your projects? Can you share an example?

Can you walk us through where in the permitting process load calculations become most challenging, and what changes would make them easier? (*Context: one of the major challenges noted in survey*)

In our survey, contractors noted that installations requiring panel upgrades are often more difficult to permit than heat pumps or heat pump water heaters alone. Could you walk us through what makes panel upgrades more challenging?

(Probe: Is it because of the separate electrical permit, coordination with the utility, or other factors? And typically, how much additional time do panel upgrades add to your overall project timeline?)

Section 3: Interactions & Best practices (5 min)

1. How would you describe your experience working with permitting offices? Please share what works well for you and what could be improved.

    Do you have strategies to navigate permitting or inspection challenges? What works best?

Section 5: Opportunities for Improvement (10 min)

1. If you could change one thing about the permitting process, what would it be?

    Are there steps you feel are redundant or unnecessary?

    In a survey we conducted, many contractors said that having clear, standardized documentation would make permitting easier. What would that look like for you in practice? For example, what kinds of checklists, templates, or guidance would actually help?

    Are there any examples of specific jurisdictions or processes that work particularly well and could be replicated elsewhere?

    How could MCE support you or your team to make permitting easier? (e.g., templates, liaisons, training)

Closing (2 min)

1. Is there anything we didn't cover that you think is important to share?

    Would you be open to follow-up if clarification or additional input is needed?

Appendix D. Permitting Authority Interview Guide

Introduction (2-3 minutes)

Thank the participants for their time.

State purpose: We're working with MCE, the community choice energy provider for Contra Costa, Marin, Napa, and Solano counties. In addition to providing renewable power, MCE supports contractors and residents with programs for electrification, efficiency, and workforce development. MCE works directly with contractors on residential and commercial electrification projects by providing training, technical resources, and customer incentives. As part of this effort, MCE is interested in how local permitting processes affect electrification technology adoption and what improvements could support both contractors and municipalities. The purpose of this interview is to gather your perspective on current permitting practices, common challenges, and opportunities to streamline. Comments will not be attributed to individual participants or jurisdictions without consent. If you'd like more background, MCE has contractor resources available here: MCE Contractor Resources

Note: An email including an abbreviated version of the guide, background on MCE, and the interview questions will be provided to participants prior to the interview

Section 1: Background (5 minutes)

1. Can you tell me about your role and responsibilities within the permitting process?
2. Roughly how many residential electrification technology permits (e.g., heat pumps, HPWH, EV chargers, solar + storage) do your office process in a year?

Section 2: Current Process (~15 minutes)

(Note: Check municipal website prior to interview, omit questions if listed clearly on website)

1. Can you walk me through the typical permitting process for a heat pump or other electrification technology in your jurisdiction?
2. What documentation is required (plans, load calcs, compliance forms, manufacturer specs)?
3. Which permits are typically needed (building, mechanical, electrical, plumbing)? Are these issued separately or is a combined permit issued? Under what circumstances is an electrical permit required?
4. Do you offer online permitting or require in-person submission?
5. Do staff receive formal training on newer technologies like heat pumps or HPWHs? If not, what's needed? *(Context: 13% said permit staff being "unfamiliar with technology" is very common; 23% said "undertrained/short-staffed departments)*

Section 3: Challenges and Barriers (~15 minutes)

1. What are the most common issues or errors you see in permit applications?

2. Are there specific electrification technologies that create more complexity or delays? Why? (e.g., electrical panel upgrades, setback/zoning issues, HERS testing for HPs, structural load checks)
3. Do state code requirements (e.g., Title 24, HERS, specific contractor licensing) add difficulty compared to national standards?
4. What are the main sources of delay in your jurisdiction (application review, inspection scheduling, staff shortages, others)? *(Context: 76% of contractors reported permitting causes delays at least occasionally, with long review times and inspection scheduling as big complaints.)*
5. From your perspective, do installers/contractors understand local permitting requirements, or is education/awareness a barrier?

Section 4: Consistency and Coordination (~10 minutes)

1. How consistent are permitting processes across neighboring jurisdictions you interact with? How much flexibility do you have to interpret state code locally? Do you think differences across cities are avoidable, or are they baked into the system? *(Context: 43% of contractors flagged "different rules for cities" as very common.)*
2. Are there state-level mandates or local ordinances (e.g., electrification reach codes, bans on gas) that create friction in permitting?

Section 5: Opportunities for Improvement (~15 minutes)

1. If you could change one thing to make the permitting process smoother for electrification projects, what would it be?
2. What would be realistic and feasible (given staff and resource constraints) to simplify or shorten permitting timelines?
3. Would your office be open to adopting standardized checklists/templates across jurisdictions?
4. What would it take to establish a contractor liaison role or online support portal?
5. Is bundling multiple permits into one application feasible in your jurisdiction?
6. Are there specific steps that could be restructured or removed without sacrificing safety or compliance?
7. *(Context: Contractors' top asks: standardized checklists/templates, dedicated liaison, online support portal, fewer permits, lower fees*.)
8. Contractors often cite long or uncertain inspection windows, needing multiple visits or different trades for sign-off, and inconsistent code interpretations as sources of delay. How are inspections scheduled in your jurisdiction, and how do you ensure consistency across inspectors?
9. How are fees set for electrification projects in your jurisdiction? Have you considered reduced fees or streamlining for certain projects or customer groups? *(Context: Contractors pointed to high fees, esp. Contra Costa)*
10. Are there examples of best practices from your jurisdiction or others that could be replicated?
11. What role could MCE play in helping standardize or streamline permitting?

Closing (~3 minutes)

Thank participants for their input.

1. Is there anything we didn't cover that you think is important to share?
2. Would you be open to future follow-up to share feedback or collaborate on permitting improvements?