

California Heat Pump Partnership Blueprint

Scaling California's Heat Pump Market:
The Path to Six Million

Table of Contents

- About CAHPP..... 3
- Leadership 4
- Executive Summary..... 6
- Introduction 13
- Current Market Landscape..... 14
- Major Barriers to Mass Heat Pump Adoption 18
- Strategies to Reach Six Million 24
- Beyond Six Million: Supporting Long-Term Decarbonization..... 31
- Appendix 33



About CAHPP

The California Heat Pump Partnership (CAHPP) is a public-private partnership that brings together state policy leaders, heat pump manufacturers, retailers, distributors, utilities, and other key market stakeholders to rapidly scale California's heat pump market and achieve Governor Newsom's goal of installing six million heat pumps in California's buildings by 2030. In doing so, the CAHPP will accelerate the pace of reducing greenhouse gas emissions from California's buildings to support the state's ultimate goal of achieving carbon net neutrality by 2045.

For more information about the CAHPP, visit heatpumppartnership.org.

The CAHPP is committed to advancing the following goals:

1

Accelerating progress toward the installation of six million heat pumps by 2030, with 50% of funding directed towards low-income and disadvantaged communities.

2

Facilitating closer cross-sector coordination between key stakeholders and decision-makers.

3

Identifying and addressing technical, market, and policy barriers to accelerate heat pump adoption.

4

Increasing awareness and favorability of heat pumps and building electrification among California homeowners, renters, and contractors through strategic marketing.



Market Advisory Board



Kyle Gilley
Carrier



Dave Calabrese
Daikin



Karim Yasin
Fujitsu General America



John Hurst
Lennox



Dana Fischer
Mitsubishi Electric US



Helen Walter-Terrinoni
Trane Technologies



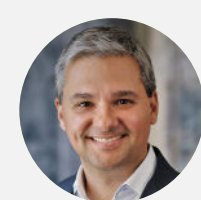
Steve Scarbrough
LG Electronics



Josh Greene
A.O. Smith



Chris Day
Rheem



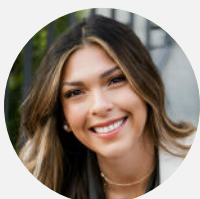
David Lopes
Bosch



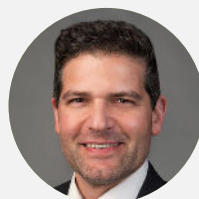
Matt Petersen
Los Angeles Cleantech
Incubator



Armando Mendieta
Home Depot



Stephanie Vega
Ferguson



Michael Backstrom
Edison International



Mike Delaney
Pacific Gas & Electric



Paul Lau
Sacramento Municipal
Utility District



Hollie Bierman
San Diego Gas & Electric

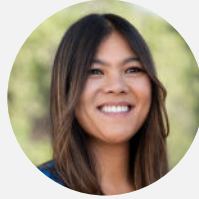


JP Ross
Ava Energy

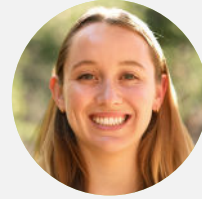


Steve Baule
Los Angeles Mayor's Office
of Energy and Sustainability

CAHPP Staff



Terra Weeks
CAHPP Director



Kayla Robinson
CAHPP Program Manager

The CAHPP team would like to thank Bruce Mast, Teddy Kisch, and Pepper Hunziker for their contributions to the Blueprint.

Executive Summary

Introduction

Heat pump space and water heating equipment (collectively referred to here as “heat pumps”) are critical technologies to move California toward a healthier, more efficient building stock, powered by clean electricity. Unlike traditional fossil gas systems, heat pumps use electricity to transfer heat rather than generate it, making them highly efficient while reducing greenhouse gas emissions and air pollution. When equipped with load flexibility features, they can also support grid reliability by shifting energy demand to off-peak hours.

While heat pumps are gaining traction among consumers and contractors, accelerated adoption is necessary to fully realize these benefits and meet California’s ambitious climate goals. This Blueprint outlines near-term strategies to advance the state’s target of installing six million heat pumps by 2030. Through shared commitments and cross-sector collaboration, we aim to make clean energy solutions the easy and obvious choice for Californians.



California's Policy Momentum

California has demonstrated its commitment to achieving a clean energy future for all through groundbreaking policies and programs supporting building decarbonization and heat pump installations. A key milestone is the 2025 building energy code, which goes into effect January 1, 2026, and will prioritize heat pumps in new construction and commercial retrofits.

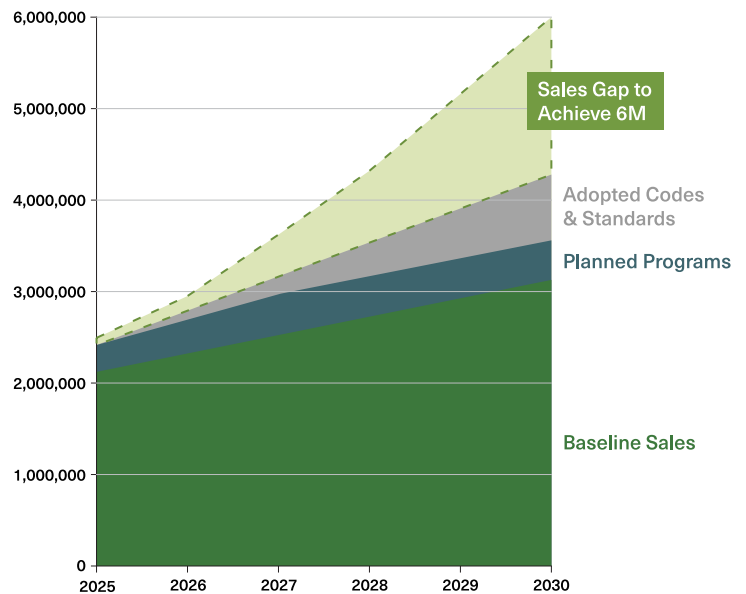
Federal, state, and local governments have also increasingly pursued standards, codes, and incentive programs that promote the adoption of heat pumps. For example, the Bay Area Air District Board of Directors adopted rules that establish a zero-nitrogen-oxide standard for water heaters, furnaces, and larger water heating systems. Both the California Air Resources Board and the South Coast Air Quality Management District are also exploring space and water heater standards, which would support the state in achieving its six million heat pump goal.

Remaining Market Gap

Despite the progress made to date, the adoption of heat pumps in California remains in its early stages. As of the end of 2024, an estimated 1.9 million heat pump units were installed statewide in residential and commercial buildings—well below the 23 million units needed to decarbonize space and water heating in these sectors.

Currently, of the over 1 million HVAC units sold in the state each year, roughly 20% of sales are estimated to be heat pump HVAC (HP HVAC) systems. Meanwhile, of the roughly 800,000 water heaters sold annually, only 3-5% are HPWHs. At the current rate of adoption and without additional state interventions, California is on track to install only 3.4 million heat pumps by 2030. Even with the implementation of current policies, codes, and incentives, the state is projected to achieve only about 4 million heat pumps by 2030, falling short of the goal by 2 million units.

Projected California Heat Pump Installs by 2030



Conditions for Success

For mass heat pump adoption, the following key factors must align:

1. Customers must want and be able to afford them.
2. Contractors must be motivated and equipped to sell and install them.

Contractors play a pivotal role, as their recommendations shape customer decisions. In turn, customer demand influences how many contractors prioritize heat pumps in their business models.

Adoption is most likely when a majority of the following criteria are met:

1. Equal or superior energy services compared to traditional systems, including health, comfort, convenience, and reliability.
2. Little or no installation cost premium compared to traditional systems, including wiring and panel upgrades when needed.
3. Comparable or lower energy bills compared to traditional systems.
4. Minimal transaction friction, including simple permitting and incentive processes.

While heat pumps often meet the first criterion, the other three remain inconsistent across California, posing significant adoption barriers. Overcoming these challenges requires coordinated public and private efforts to tackle barriers and improve the customer value proposition.



Major Barriers to Mass Heat Pump Adoption

Several key barriers remain that must be addressed for heat pumps to achieve the scale needed to meet the state's climate goals.

Relative Costs

Upfront installation costs

Heat pump installations may have a higher initial price tag than traditional systems. Additional expenses, such as electrical upgrades, rewiring, and appliance relocation, can further deter adoption.

Operating costs

Heat pumps are typically more efficient than traditional systems, but in California, the high electric-to-gas rate ratio can limit potential cost savings for consumers switching from gas-powered systems.

Transaction Friction

Complex incentive program design

The design and application process for incentive programs can be burdensome, with lengthy approval times and intricate documentation requirements that discourage participation.

Lack of consistent incentive funding

While incentives help lower costs, inconsistent funding leads to market uncertainty, discouraging contractors and consumers from committing to heat pump installations.

Complicated permitting processes

Heat pump permitting is often slow and complex, increasing costs and delays. While legally required for all systems, permits are mandatory for heat pump incentives but often bypassed for gas appliances, creating an uneven playing field.

Market Maturity

Low customer awareness and demand

Many homeowners and businesses lack familiarity with heat pumps and their benefits, leading to hesitation in adopting the technology.

Contractor reluctance to prioritize heat pumps

Many contractors remain hesitant to transition from traditional systems to heat pumps due to a lack of training, inconsistent financial incentives, and limited consumer demand.

Shortage of trained installers

California has a shortage of skilled workers to meet the growing demand for heat pump installations.

Market Visibility

Limited data availability to inform policy and market efforts

A lack of comprehensive, real-time data on heat pump adoption poses challenges to assessing market trends and adjusting policies and programs effectively.

Strategies to Reach Six Million Heat Pumps

Achieving California's heat pump adoption goal by 2030 requires bold, near-term actions to address market barriers and catalyze growth. This section outlines targeted strategies for both the state and heat pump supply chain to drive immediate progress and deliver meaningful impacts within the next five years.

Improve Customer Economics

1. Support long-term, stable incentives

Consistent, long-term funding for incentives is essential to ensure market certainty and accelerate adoption. Programs should prioritize non-ratepayer funding sources and include higher incentive rates for low-income customers through 2030.

2. Continue supporting electrification-friendly rates

Aligning rates with decarbonization goals and increasing transparency around bill impacts can help customers make informed decisions. Targeting households with the greatest cost-saving potential—such as those replacing inefficient air conditioners in warm climates—can accelerate adoption in the near-term. Additionally, encouraging participation in demand response programs can reduce operational costs and support grid reliability.

3. Direct 50% of program funds to low-income and disadvantaged communities

Governor Newsom has directed that 50% of the state's building decarbonization investments be allocated to low-income and disadvantaged communities, which often face greater barriers to clean, safe, and affordable energy services. The CAHPP is committed to supporting historically underserved communities by working to align available funding with the Governor's directive.

4. Expand low-cost appliance financing options

Low-cost, accessible financing solutions are vital to help customers bridge the gap between available incentives and full project installation costs. By providing options such as low and zero-interest loans, customers can install heat pumps with little to no upfront payment. CAHPP supports the expansion of heat pump financing tools, especially if the programs use funding from sources other than electricity ratepayers.

5. Target near-term, high value opportunities for appliance retrofits

CAHPP will focus near-term market development efforts in regions where heat pumps offer strong value, such as areas with low installation costs and high potential for utility bill savings. Key opportunities include inland regions where high cooling loads offer high bill savings potential. CAHPP will also focus on the Bay Area, where zero-NOx appliance standards are in place, and explore Southern California where additional zero-emission space and water heater standards are under consideration.

Streamline Sales and Installation Processes

6. Modernize local heat pump permitting processes

Implementing faster online permitting, removing burdensome requirements, and streamlining inspection processes across all jurisdictions would make it simpler, faster, and less expensive for contractors and homeowners to comply. To maximize effectiveness of improvements, investments in training for contractors and building department staff will be essential.

7. Simplify incentive program design

To maximize impact of funding programs, incentives should be designed with input from contractors, manufacturers, retailers, distributors, and other key stakeholders. Best practices include streamlined applications, predictable program phases, point-of-sale rebates, and stackable incentives. Programs should also ensure cost parity with traditional systems or better and provide additional support to low-income households.

Accelerate Market Adoption

8. Supercharge heat pump marketing efforts

Through a coordinated marketing campaign, CAHPP aims to create a positive feedback loop where informed consumers drive contractor interest in heat pumps, and knowledgeable contractors, in turn, boost consumer confidence. An integrated strategy will use a targeted, multi-channel approach—including paid and earned media, influencers, experiential events, and digital tools—to engage both consumers and contractors across diverse platforms. Partner collaboration will further expand the campaign's reach, leveraging showrooms, co-hosted events, and digital engagement.

9. Develop a comprehensive workforce engagement campaign

A strong, engaged network of contractors is vital to accelerating heat pump adoption. The CAHPP will launch a comprehensive workforce engagement campaign to address workforce gaps and equip contractors with the tools they need. This initiative will not only support technical training but also position contractors as influential advocates for heat pumps, helping to drive widespread adoption across the state. The CAHPP will also assemble an industry advisory council to provide actionable recommendations.

10. Launch a Heat Pump Week

Introducing a dedicated Heat Pump Week would generate excitement and momentum around heat pump adoption by engaging both consumers and contractors in a focused, high-impact campaign. The week could feature live demonstrations showcasing heat pump technologies in action and coordinated promotions and rebates to incentivize adoption.

Increase Market Visibility

11. Collect and leverage heat pump adoption data

Effective implementation of these strategies requires rapid feedback loops to guide decision-making. State agencies and industry stakeholders must collaborate to compile up-to-date adoption data, enabling program evaluation, adjustments, and progress tracking toward state goals.

Beyond Six Million: Supporting Long-Term Decarbonization

Sustained cross-sector collaboration will be essential to reach the six million heat pump target by 2030 and ultimately achieve carbon neutrality by 2045. Looking ahead, the CAHPP will continue to align strategies with the state's long-term decarbonization objectives by focusing on the following key areas:

- ▶ **Equity:** Ensuring that electrification benefits are accessible to all communities, including renters, multifamily, mobile and manufactured homes, low-income households, and disadvantaged communities, will remain a top priority.
- ▶ **Load Flexibility and Grid Planning:** As heat pump adoption scales, integrating these technologies with load management strategies will be essential for grid resilience, reliability, and customer affordability.
- ▶ **Research and Development (R&D) Investments:** Ongoing R&D and manufacturing advancements will support long-term heat pump adoption and

enhance customer satisfaction. Key priorities include: diversifying product designs to fit various building types, expanding low-power appliance options, and improving overall performance, reliability, and affordability.

- ▶ **Compliance with Codes and Standards:** Ensuring high rates of compliance with state and local regulations is essential to maximizing their effectiveness in advancing decarbonization and public health goals.
- ▶ **Targeted Electrification:** Strategic electrification can play a role in supporting equity communities and capture the cost benefits of avoiding gas infrastructure.

By continuing to address these foundational needs and refining strategies over time, the CAHPP will support meeting the six million heat pump target and lay the groundwork for a carbon-neutral future in California.



Introduction

Heat Pump Space and Water Heating Equipment

Heat pump space and water heating equipment (collectively referred to here as “heat pumps”) are critical technologies to move California toward a healthier, more efficient building stock, powered by clean electricity. Unlike traditional fossil gas systems, heat pumps use electricity to transfer heat rather than generate it, making them highly efficient while reducing greenhouse gas emissions and reducing air pollution.¹ In addition, when equipped with load flexibility features, they can also support grid reliability by shifting energy demand to off-peak hours.

While they continue to grow in popularity with consumers and contractors, accelerated growth is necessary to achieve these benefits and to meet the state's ambitious climate goals. The CAHPP was formed to accelerate growth toward Governor Newsom's bold objective of installing six million heat pumps in California's buildings by 2030, paving the way for a carbon-neutral building stock by 2045.² This Blueprint outlines near-term strategies to advance California's 2030 heat pump goal and address key policy and market barriers. Through shared commitments and cross-sector alignment, we strive to pave the way towards a future where cleaner energy solutions are the easy and obvious choice for Californians.

¹ Bay Area Air District (2023). Air District Strengthens Building Appliance Rules to Reduce Harmful NOx Emissions, Protect Air Quality and Public Health. <https://www.baaqmd.gov/news-and-events/page-resources/2023-news/031523-ba-rules>

² The heat pump and clean and healthy homes targets were set in a letter to California Air Resources Board Chair Liane Randolph from Governor Gavin Newsom on July 22, 2022 regarding the state's Scoping Plan. Source: Governor Gavin Newsom (2022) <https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf>



Current Market Landscape

California's Policy Momentum

California has demonstrated its commitment to achieving a clean energy future for all through a series of groundbreaking policies and programs supporting building decarbonization and heat pump installation, as shown in Table 1 below. A key milestone is the upcoming 2025 building energy code, which goes into effect January 1, 2026, and will prioritize heat pumps in new construction and commercial retrofits.

Table 1: Key State Policy Milestones

| | | |
|-------------|--|--|
| 2018 | The state passed foundational legislation to require the California Energy Commission (CEC) to assess ways to cut building emissions by 40% by 2030 and establish initial funding for the TECH and BUILD programs. | |
| 2019 | Local governments across the state began adopting electric-friendly "reach codes" to encourage all-electric new construction. | The California Public Utilities Commission (CPUC) established a market transformation administrator (now CalMTA) to increase energy efficiency and reduce GHGs by driving adoption of selected technologies and practices. |
| 2021 | The CEC passed an electric-friendly state building code to favor all-electric new construction and require "all-electric ready" new construction starting in 2023. | TECH launched its single-family electrification incentives program to support heat pump retrofits, followed by its multifamily incentives program in 2022, with \$120M in initial funding. |



| | | | | | |
|-------------|--|---|---|--|---|
| 2022 | Governor Newsom set targets of 6M heat pumps and 3M climate-ready and climate-friendly homes by 2030. | The CPUC eliminated subsidies for developers to connect new properties to the gas system beginning in July 2023. | California's plan for meeting air quality standards includes a zero greenhouse gas emission space and water heater measure. | The CEC launched the BUILD program, a program to support all-electric new construction with \$80M in funding. | |
| 2023 | The Bay Area Air District (BAAD) passed the nation's first zero-NOx space and water heater standards (rules 9-4 and 9-6). | 10 of the world's largest manufacturers, distributors and suppliers of building heating and cooling equipment committed to actions aimed at achieving the state's heat pump goal. | The CPUC launched the Self Generation Incentive Program's new heat pump water heater incentive through TECH, adding an additional \$84.7M to the program. | | |
| 2024 | The CPUC adopted income-based fixed charges as part of rate structures, which will lower volumetric electric rates and make building electrification more economic. | The state signed Senate Bill 1221 into law, which requires the CPUC to establish zonal decarbonization pilots, directs gas companies to provide distribution plans, and addresses obligation to serve for the piloted projects. | The CEC strengthened the building code by, starting 2026, encouraging heat pumps in most new buildings and encouraging heat pump replacements in commercial buildings. ³ | The CEC launched the first phase of Department of Energy's (DOE) Home Electrification and Appliance Rebates (HEEHRA) through TECH. This included \$45M for single-family and \$35M for multifamily households. | The South Coast Air Quality Management District (SCAQMD) adopted zero-NOx standards for boilers and large water heaters (rule 1146.2) |
| 2025 | SCAQMD will launch the Go Zero incentive program, providing \$21M in incentives to encourage residents and small businesses to adopt zero-NOx emission space and water heating appliances. | The CEC will launch the EBD program, a statewide direct install incentive program with \$567M in funding to provide decarbonization retrofits to low-income households. | | | |

Continued state agency engagement remains a key factor for success in achieving both the interim 2030 goal of six million heat pumps and the 2045 goal of statewide carbon neutrality. Federal, state, and local governments have increasingly pursued standards, codes, and incentive programs that promote the adoption of heat pumps. In California, the BAAD Board of Directors adopted rules that establish a zero-nitrogen-oxide (zero-NOx) standard for water heaters, furnaces, and larger water heating systems to improve regional air quality and protect public health. The SCAQMD in

Southern California has also adopted similar zero-NOx standards for boilers and larger water heaters and is proposing similar standards for furnaces and small water heaters. The California Air Resources Board (CARB) is developing statewide zero-greenhouse gas space and water heater standards, which will support the state in achieving its six million heat pump goal. At the federal level, the DOE has updated water heater efficiency standards, which if implemented, would boost the adoption of heat pump water heaters (HPWHs) nationwide starting in 2029.

³ Additionally, the CEC added a voluntary measure to the State's Green Building Standards Code (CALGreen) to favor heat pump HVAC when replacing air conditioners. This CALGreen measure is voluntary for local jurisdictions to adopt.

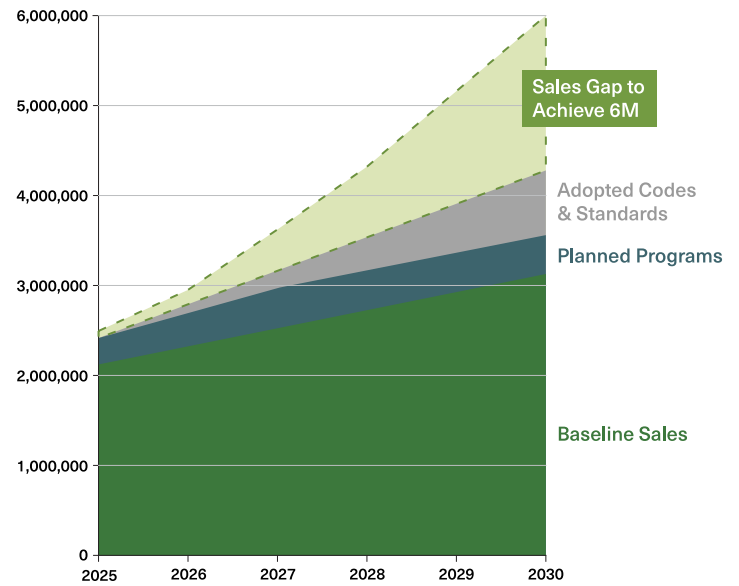
While these policies have the potential to significantly increase heat pump adoption, meeting California’s ambitious goal for six million heat pumps by 2030 will hinge on a comprehensive portfolio of complementary policies to support widespread heat pump installations. Robust contractor training, consumer engagement and education, and streamlined processes are essential to scaling adoption. Achieving this goal will depend on a coordinated effort between the public and private sectors to build the market infrastructure needed to deploy heat pump technologies at scale.

Remaining Market Gap

Despite the progress made to date, the adoption of heat pumps in California remains in its early stages. As of the end of 2024, an estimated 1.9 million heat pump units were installed statewide in residential and commercial buildings⁴—well below the 23 million units needed to decarbonize space and water heating in these sectors.⁵

Currently, of the over 1 million HVAC units sold in the state each year, roughly 20% of sales are estimated to be heat pump HVAC (HP HVAC) systems.⁶ Meanwhile, of the roughly 800,000 water heaters sold annually,⁷ only 3-5% are HPWHs (see Appendix B for sales breakdown). At the current rate of adoption and without additional state interventions, California is on track to install only 3.4 million heat pumps by 2030. Even with the implementation of current policies, codes, and incentives, the state is projected to achieve only about 4 million heat pumps by 2030, falling short of the goal by 2 million units.

Projected California Heat Pump Installs by 2030



Sources: Baseline Sales: HARDI, RASS, Census Data; Adopted Codes and Standards: CEC, BAAD, SCAQMD presentations and communication; Planned Programs include Federal, State, and CPUC programs. For a complete list of programs, see Appendix B.

That said, heat pumps are becoming increasingly popular across the U.S. In 2022, HP HVAC unit sales surpassed those of gas furnaces for the first time, and this trend continued through 2024.⁸ Much of the growth in U.S. heat pump sales has been seen in the Southeast, where economic conditions are favorable and residential natural gas connections are less common. While HPWHs have smaller overall market share compared to HP HVAC units (representing approximately 2% of U.S. water heater sales⁹), HPWHs had record sales growth in 2023, with shipments growing 35% to 190,000 units, their largest unit increase in history.¹⁰

⁴ Based on an internal analysis of data from the Residential Energy Consumption Survey (RECS), HARDI (Heating, Air-conditioning and Refrigeration Distributors International), and ENERGY STAR.

⁵ This estimate was calculated with the following assumptions: For the residential sector, two heat pumps (one for space heating and one for water heating) for every building based on US Census’ 2023 American Housing Survey (i.e., single family, manufactured homes, and multi-family dwellings with 2-4 units). For the commercial sector, two heat pumps for every commercial building. For multi-family dwellings between 5-50 units, it assumes 10 housing units per HVAC system and 2 housing units per water heating system.

⁶ While there are limited data sources for California specific HVAC sales data and heat pump HVAC market share, this reflects a current best estimate. For additional detail, see Appendix B.

⁷ Opinion Dynamics (2024). California Water Heater Market Study. https://techcleanca.com/documents/5445/Water_Heater_Market_Characterization_Study_PDA_Final_9_18_2024.pdf

⁸ Canary Media (2024). Heat Pumps Outsold Gas Furnaces Again Last Year — and the Gap is Growing. <https://www.canarymedia.com/articles/heat-pumps/heat-pumps-outsold-gas-furnaces-again-last-year-and-the-gap-is-growing>

⁹ Advanced Water Heater Initiative (2024). AWHI 5-Year Report 2019-2024. https://static1.squarespace.com/static/605d0aa46f4b6f47e0ab88af/t/665676aa45623613b17990e8/1716942508748/AWHI_FiveYearReport_202405.pdf

¹⁰ Clean Technica (2024). Soaring Sales for Heat Pump Water Heaters in 2023. <https://cleantechnica.com/2024/09/24/soaring-sales-for-heat-pump-water-heaters-in-2023-let-the-party-begin/>



However, compared to other regions, California faces distinct challenges that may include higher upfront costs, longer project timelines, and potentially higher operational expenses. These factors can make heat pump adoption less economically attractive for many consumers. Overcoming these barriers will require coordinated efforts from both the public and private sectors to enhance the value proposition of heat pumps, ensuring they are cost-competitive and accessible to households across the state.

Conditions for Success

For mass heat pump adoption, the following key factors must align:

1. Customers must want and be able to afford both the upfront and operational costs of heat pumps.
2. Contractors must be motivated and equipped to sell and install them.

Contractors are crucial in this process, as their recommendations often drive customer decisions. Their technical expertise also ensures that systems are properly designed and deliver maximum benefits to the end user.¹¹ Customer demand, in turn, influences how many contractors prioritize heat pumps in their business offerings. If customers are not already convinced of the benefits, contractors must be able to make a clear, compelling case for the switch.

The strongest case for heat pump adoption exists when a majority of the following criteria are met:

1. Equal or superior energy services compared to traditional systems, including health, comfort, convenience, and reliability.
2. Little or no installation cost premium compared to traditional systems, including wiring and panel upgrades when needed.
3. Comparable or lower energy bills compared to traditional systems.
4. Minimal transaction friction, including simple permitting and incentive processes.

While heat pumps may offer equal or superior energy services, the other three criteria are not consistently met for customers across the state, presenting major barriers to adoption. Achieving these conditions consistently across the state requires sustained public and private efforts to tackle barriers and improve the customer value proposition.

¹¹ Opinion Dynamics found that a recommendation from a professional contractor and other customers' reviews were rated as the most influential sources to surveyed homeowners when considering purchasing a new heating system. See TECH Clean California (2024). Time 1 Market Assessment Final Report, https://techcleanca.com/documents/4687/TECH_Time_1_Market_Assessment_Final_Report_4.22.24.pdf

Major Barriers to Mass Heat Pump Adoption

Several key barriers remain that must be addressed for heat pumps to achieve the scale needed to meet the state’s climate goals. These challenges can be broadly categorized into four main areas: 1) **Relative Costs**, 2) **Transaction Friction**, 3) **Market Maturity**, and 4) **Market Visibility**.

Table 2: Major Barriers to Mass Heat Pump Adoption

| | | | |
|--|---|---|---|
| Relative Costs Upfront installation costs Operating costs | Transaction Friction Complex incentive program design Lack of consistent incentive funding Complicated permitting processes | Market Maturity Low customer awareness and demand Contractor reluctance to prioritize heat pumps Shortage of trained installers | Market Visibility Limited data availability to inform policy and market efforts |
|--|---|---|---|

Relative Costs

A key deciding factor for consumers and contractors is a clear value proposition for heat pumps. This involves both the upfront price of heat pumps and their long-term economic benefits compared to traditional systems, particularly natural gas appliances.

Upfront Costs

One of the key challenges to scaling heat pump adoption is the often higher upfront costs compared to traditional HVAC and water heating systems. Cost differences between technology options are particularly significant for low- and moderate-income customers. Factors contributing to these costs include more expensive equipment and more complex and time-consuming installation requirements.

Retrofitting homes to accommodate heat pump systems—such as significant rewiring, new plumbing, service panel optimization or upsize, appliance relocation, duct replacement, or other remedial work—can further increase expenses.¹² Replacing a central air conditioning (AC) system with a heat pump is usually the easiest retrofit, as the installation often utilizes the existing electrical service and outdoor pad locations with minimal intervention. Replacing a gas furnace only (without existing AC) with a heat pump often requires electrical and relocation work to accommodate the installation. Without sufficient incentives or financing options to offset these upfront costs, homeowners and businesses may be deterred from making the transition to heat pump technologies.

On the water heating side, the location of the HPWH installation can greatly affect the cost of installation in

¹² Opinion Dynamics (2022). TECH Clean California Baseline Market Assessment. https://techcleanca.com/documents/3697/TECH_Baseline_Market_Assessment_Final_Report_8AHwAxk.pdf



terms of labor and materials costs. Appliance relocation can entail significant extra costs for rewiring, new plumbing, and related remedial work.^{13 14}

Panel upgrades can significantly increase the upfront costs of heat pump installations, particularly in older homes with outdated electrical systems. However, upgrading from 100 to 200 amps is not always necessary. Many homes can avoid this additional upfront cost and go all-electric with 100- or 150-amp panels by employing a “watt diet” and carefully selecting equipment and managing power allocation.¹⁵ Home energy management systems, for example, can optimize a heat pump’s operation by monitoring total household energy use in real time and adjusting its consumption to stay within panel capacity.

California’s existing incentives and financing programs, such as rebates and low-interest loans, are helping to reduce these upfront costs and encourage adoption. For example, 93% of TECH customers reported that the incentive was either “very important” or “somewhat important” in their decision to purchase a heat pump.¹⁶ However, the scale of support remains insufficient to drive demand. Expanding incentive and financing programs through appropriate funding channels will be essential to overcoming the financial barriers.

Overcoming the cost barrier is made harder by the wide variation in contractor quotes for similar work. The TECH program has observed lower installation costs in regions with more qualified heat pump installers, indicating that costs could be reduced through better contractor engagement, increased market competition, and clearer pricing for consumers. Therefore, some upfront costs are expected to be reduced as the heat pump market matures.

Operating Costs

Operational costs can be another significant barrier to widespread heat pump adoption in California. Despite their superior energy efficiency, heat pumps often

face economic disadvantages. In California, the high electric-to-gas rate ratio can limit potential cost savings for consumers switching from gas-powered systems.¹⁷ Low- and moderate-income customers are particularly vulnerable to adverse utility bill impacts.

On the other hand, some heat pump customers already see substantial operational savings, particularly those replacing inefficient ACs in warm climates with high-efficiency heat pumps. Likewise, customers in very mild climates may not see a significant bill change since their energy costs are lower overall. Focusing on customers who already have cost-saving opportunities will be crucial for driving heat pump adoption.

The CPUC is implementing more equitable rate structures that improve the affordability of electrification.¹⁸ While these changes are important steps in the right direction, additional efforts to increase flat rate billing components, which in turn would decrease volumetric charges, would help to increase operational savings for heat pump consumers.

Transaction Friction

These barriers relate to the complexities and inefficiencies that consumers and contractors face during the purchasing and installation process, including lengthy rebate applications, inconsistent incentive structures, and complicated permitting requirements. These barriers impact adoption of both HP HVAC and HPWHs, though specifics vary by technology.

Complex Incentive Program Design

While incentive programs, such as rebates and direct install programs, are critical to reducing upfront costs and improving the value proposition for customers, complex program designs pose significant challenges to their effectiveness. Administrative requirements can be burdensome, with lengthy applications, detailed

¹³ Ibid.

¹⁴ In some cases, new 120V plug-in HPWHs allow an installer to plug the HPWH directly into a standard outlet and avoid additional wiring.

¹⁵ New Buildings Institute (2023). We Can Power The Homes of the Future with Electric Panels of the Past (2023). <https://newbuildings.org/we-can-power-the-homes-of-the-future-with-electric-panels-of-the-past/>

¹⁶ Opinion Dynamics (2022). Interim Process Evaluation, Section 4.3.3. https://techcleanca.com/documents/991/TECH_Interim_Process_Evaluation_Final_Report.pdf

¹⁷ Heating bill impacts are generally more favorable for Publicly Owned Utility (POU) customers, where electricity rates are typically lower. Source: CEC (2024) California Energy Demand Forecast, 2024 IEPR Update. <https://efiling.energy.ca.gov/GetDocument.aspx?tn=260210&DocumentContentId=96439>

¹⁸ In 2024, the CPUC approved a proposal to reduce the variable electricity rates by 5 to 7 cents per kilowatt-hour for all customers via the introduction of a flat rate bill component. This change will, on average, lower bills for lower-income households and improve economics for electrification and heat pumps. Source: CPUC (2024). Decision 24-05-028 in Rulemaking 22-07-025. <https://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=531686019>.

documentation, and prolonged approval timelines deterring both contractors and consumers from participating. Programs targeted to low-income customers typically also include additional income verification and documentation requirements. Multiple overlapping programs with varying rules and requirements further magnifies the complexity.

These complicated program processes can increase costs and discourage contractors from promoting heat pump installations—especially since alternatives like gas systems are already cost-effective without extra support.¹⁹ Further, delayed incentive payouts can negatively impact cash flow for both customers and contractors, also deterring program participation. Streamlining these programs to simplify administrative processes, align program requirements, and accelerate approval processes will be crucial to boosting participation and ensuring that incentives effectively drive heat pump adoption.

One key consideration is that retrofitting multifamily buildings can be more complex due to factors such as infrastructure challenges, extended decision-making timelines, tenant occupancy, and intricate project financing. Unlike single-family homes, these projects require coordination among multiple stakeholders, including property owners, tenants, and contractors, making implementation more challenging. Given these complexities, incentive programs must be tailored to address the specific barriers of multifamily retrofits.

Lack of Consistent Incentive Funding

Programs like TECH have played a vital role in jumpstarting adoption, but interruptions in funding availability have created start-stop dynamics that disrupt progress and inhibit long-term market growth.²⁰ This unpredictability makes contractors and other market actors hesitant to invest in training, certification, and promotion of heat pump technologies, as they cannot rely on the continuity of support. Additionally, retailers and distributors may be reluctant to stock heat pumps if demand remains uncertain due to inconsistent incentives. Future incentives from initiatives such as the federal IRA and California's EBD program appear

vulnerable to the same dynamic. Ensuring stable, long-term funding streams will be critical to fostering confidence among market participants and driving consistent heat pump adoption. While additional funding will be needed to reach the six million goal, efforts should also be made to simplify and align program requirements for existing funding sources to facilitate incentive layering and amplify incentive impacts.

Complicated Permitting Processes

In California, permitting processes are a major barrier to heat pump deployment. They are often complex, slow, and inconsistent across jurisdictions, requiring multiple permits that add costs and delays.

While permits are legally required for all new HVAC and water heater installations, they are not consistently obtained. Heat pumps typically require proof of a permit to qualify for incentives, whereas gas appliances are frequently installed without permits—despite the legal requirement. This disparity places an additional burden on heat pumps, increasing costs and administrative challenges that traditional gas systems often avoid.

Heat pumps also face unique hurdles, such as the need for electrical upgrades, which can further complicate compliance—especially during emergency replacements when time is critical. Permit costs for heat pumps can also vary widely, adding another layer of unpredictability.

Modernizing the permitting process and ensuring stronger compliance across all installations is essential to creating a level playing field and supporting broader heat pump adoption. Several pieces of legislation for other clean energy sectors offer potential models for modernizing heat pump permitting:

- ▶ **SB 379 (Wiener, 2022):** Requires most California cities and counties to implement an online, automated permitting platform for residential solar projects that verifies code compliance and issues permits in real time or allows the agency to issue permits in real time. Several technology companies have emerged to offer local jurisdictions easier

¹⁹ Opinion Dynamics (2024). Memo on Reduced TECH Incentive Applications in 2023 Compared to 2022: Contractor Interview Findings. https://techcleanca.com/documents/4819/Memo_on_Reduced_TECH_Incentive_Applications_in_2023_Final_3.4.24.pdf

²⁰ Opinion Dynamics (2024). Memo on Reduced TECH Incentive Applications in 2023 Compared to 2022: Contractor Interview Findings. https://techcleanca.com/documents/4819/Memo_on_Reduced_TECH_Incentive_Applications_in_2023_Final_3.4.24.pdf

compliance pathways that could be expanded to include heat pump permits.

- ▶ **AB 2188 (Muratsuchi, 2014):** Requires expedited solar permitting and restricts reasons for denying solar permits.
- ▶ **AB 1132 (Friedman, 2023):** Limits high fees for solar permits.
- ▶ **AB 1236 (Chiu, 2015):** Requires an expedited and simplified permit process focused solely on a health and safety review for electric vehicle charging stations.
- ▶ **AB 970 (McCarty, 2021):** Limits jurisdictions to a simple non discretionary permit type for electric vehicle charging stations.

Market Maturity

These barriers include gaps in consumer awareness and workforce capacity. The market is still emerging, with many consumers lacking a clear understanding of the benefits of heat pumps, an absence of well-established business models for promoting their adoption, and a limited pool of skilled installers to meet growing demand. This is particularly true for HPWHs, which comprise only 3-5% of water heaters sold in the state annually.²¹

Low Customer Awareness and Demand

Many consumers are unfamiliar with the benefits of heat pumps.²² In California, where natural gas is widely available and has been historically inexpensive and thus often the default, consumers may not recognize the advantages of heat pumps, such as potential energy savings, comfort control, and health benefits.²³ Outdated perceptions of heat pump performance, concerns about electric grid reliability, and worries over upfront costs and installation complexity further hinders interest. Without a clear understanding of the value heat pumps offer, consumers are less likely to prioritize them over traditional systems, leading to slow adoption and limited market demand. However, when consumers are presented with accurate information about zero-emission heating options, their willingness to adopt increases.²⁴

Initiatives like The Switch is On and Energy Upgrade California, statewide campaigns promoting climate action and energy efficiency, are helping to fill this awareness gap by educating consumers and showcasing the value of heat pumps through targeted outreach. By providing clear information, incentives, and resources, the campaigns can shift public perception and drive greater demand for heat pumps across California. Increasing customer awareness through efforts like these will be essential to stimulating broader adoption and accelerating the transition to heat pumps.

²¹ Opinion Dynamics (2024). California Water Heater Market Study. https://techcleanca.com/documents/5445/Water_Heater_Market_Characterization_Study_PDA_Final_9_18_2024.pdf

²² Opinion Dynamics (2022). TECH Customer Post-Install Survey Topline Findings. https://techcleanca.com/documents/628/TECH_Single-Family_Customer_Post-Install_Survey_Topline_Findings_Q4_2022.pdf

²³ ENERGY STAR (2024). Heat Pump Water Heater Guide. https://www.energystar.gov/partner-resources/residential_new/educational_resources/sup_program_guidance/heat_pump_water_heater_guide#:~:text=Heat%20Pump%20Water%20Heaters%20run,cleaner%2C%20low%2Dcarbon%20grids

²⁴ The California Air Resources Board and Southern California Edison (2023). California Zero-Emission Appliance Awareness Study. <https://lead.etcc-ca.com/reports/california-zero-emission-appliance-awareness-study>

Contractor Reluctance to Prioritize Heat Pumps

A significant barrier to heat pump adoption in California is the shortage of contractors promoting and integrating heat pumps into their business models. Although contractors who install conventional systems are also licensed to install heat pumps (see Table 3), this has not translated into a significant increase in heat pump installations.

Table 3: Types of Heat Pump Contractors

| Technology Type | Applicable License Types |
|---------------------------------|------------------------------|
| Conventional Water Heating | Plumbers (C36) |
| HPWH (and incidental wiring) | HVAC (C20), Plumbers (C36) |
| Conventional HVAC | HVAC (C20) |
| HP HVAC (and incidental wiring) | HVAC (C20) |
| Panel upgrade | Electrical contractors (C10) |

* Note: General building contractors (B license) can also install HVAC and water heating systems for complex building projects

Table 4: Number of California Licensed Contractors²⁵

| Contractor License Type | Active Licensees |
|-------------------------|------------------|
| B-General Building | 105,792 |
| C20-HVAC | 12,076 |
| C36-Plumbing | 17,200 |
| C10-Electrical | 27,987 |

Due to a lack of market confidence, many contractors have been unable to develop a sensible business case to fully invest in training or restructuring their businesses to prioritize heat pumps. For example, while 85% of HVAC contractors reported confidence in their ability to install heat pumps, only half said that all of their staff had experience with heat pumps in the past year.

Workforce readiness for HPWHs is even more limited. Just 64% of plumbing contractors felt confident in their ability to install HPWHs, and more than half of those

installers started working with HPWHs in the last five years. Additionally, only 1,064 contractors are certified under TECH to access rebates, representing a small fraction of the state’s qualified HVAC and plumbing professionals.²⁶

This slow adoption reflects a broader issue: the lack of established business models that make heat pumps a compelling alternative to traditional systems. Many contractors are reluctant to move away from the reliable market of traditional gas-based systems, particularly

²⁵ Data provided by Contractors State License Board on October 7th, 2024

²⁶ TECH Contractor Database



in the absence of strong financial incentives or clear market demand. This uncertainty discourages investment in the training and resources needed to support a broader heat pump market.

Achieving the state's goal of installing six million heat pumps requires nearly all HVAC and plumbing contractors to gain experience in selling, installing, and servicing heat pumps. Addressing these challenges will require training programs that go beyond technical skills, equipping contractors with tools for developing business models, refining sales strategies, setting competitive pricing, and seamlessly integrating heat pumps into their offerings. Additionally, targeted marketing campaigns and stronger financial incentives will be essential to drive adoption and promotion of heat pumps within the industry.

Shortage of Trained Installers

A major barrier to widespread heat pump adoption in California is the shortage of skilled installers.²⁷ The skilled trades face a growing labor gap, exacerbated by an aging workforce and recruitment challenges impacting current needs. Societal undervaluation of vocational careers, competition from higher-paying entry-level jobs, and unequal availability and access to training programs, particularly in rural and disadvantaged areas, hinder recruitment efforts.²⁸

Additionally, existing training programs often fail to meet heat pump industry needs. Programs often lack standardized curricula, modern equipment, and instructors trained in advanced heat pump technologies, creating a disconnect between industry needs and the skills students learn. While a variety of entities—such as state and local agencies, utilities, and community-based organizations—have current workforce initiatives, many have limited direct understanding of residential HVAC and plumbing markets and struggle to have industry connections and align with industry recognized standards. Moreover, few of those providing training carry industry recognized instructor or specialty heat pump credentials.

Overcoming these challenges demands substantial investment in workforce development, with a focus on training both new and incumbent workers in heat pump technologies. Key efforts should include modern training programs to equip the next generation of workers with the skills needed to implement heat pump solutions and providing ongoing professional development for trade professionals and educators. To ensure effectiveness, these initiatives must be designed in collaboration with industry stakeholders, aligning with best practices and evolving industry standards.

Market Visibility

Limited market visibility prevents stakeholders from accurately assessing the effectiveness of current initiatives and making timely adjustments to programs, policies, and strategies.

Limited Public Data Availability

Efforts to achieve California's target of six million heat pump installations are hampered by the absence of detailed, location-specific data on sales, installations, and customer demographics. Currently, no centralized, publicly accessible dataset exists to provide precise insights into market trends, adoption rates, or system performance. While estimates are available, they are often fragmented and lack the granularity needed to track installations in real-time or identify adoption patterns across regions and customer segments. This data gap makes it difficult to refine program designs, workforce development initiatives, grid flexibility and reliability efforts, and policy approaches to ensure they effectively support the state's decarbonization goals.

²⁷ A contractor is typically the business owner who holds a license to bid on and complete jobs, manages operations, and oversees work projects. A contractor may or may not also perform the installations themselves. An installer is a skilled worker who is responsible for the set up and installation of a system under the authority of the contractor as the responsible party.

²⁸ Opinion Dynamics (2024). California Residential Fuel Substitution Workforce Readiness Study. https://www.calmac.org/publications/FuelSubstitutionWorkforceReadiness_Report_9_27_2024_Final.pdf

Strategies to Reach Six Million

Achieving California’s heat pump adoption goal by 2030 requires bold, near-term actions to address key market barriers and catalyze growth. This section outlines targeted strategies for both the state and heat pump supply chain to drive immediate progress and deliver meaningful impacts within the next five years. The strategies focus on improving the value proposition

for heat pumps, driving consumer and contractor engagement, addressing workforce gaps, advancing supportive policies, and leveraging data to refine efforts. Together, these initiatives aim to create the conditions necessary for rapid market growth and sustained adoption of heat pump technologies.

Table 5: Strategies to Reach Six Million Heat Pumps

| Strategy | Barrier(s) Addressed |
|---|--|
| Improve Customer Economics | |
| 1 Support long-term, stable incentives to provide market certainty. | <i>Upfront installation costs</i> |
| 2 Continue supporting electrification-friendly rates, prioritizing cost-saving opportunities for customers. | <i>Operating costs</i> |
| 3 Direct 50% of program funds to low-income and disadvantaged communities, ensuring all Californians are included in the heat pump transition. | <i>Operating costs</i> <i>Upfront installation costs</i> |
| 4 Expand low-cost appliance financing options, such as low-interest loans or innovative financing programs. | <i>Upfront installation costs</i> |
| 5 Target near-term, high value opportunities for appliance retrofits, especially AC replacements in warm climates and water heater retrofits in regions with forthcoming appliance standards. | <i>Operating costs</i> <i>Upfront installation costs</i> |
| Streamline Sales and Installation Processes | |
| 6 Modernize local heat pump permitting processes, particularly at time of issuance, inspection, and close. | <i>Transaction friction: Permitting and inspection</i> |
| 7 Simplify incentive program design to ease customer accessibility. | <i>Transaction friction: Incentive program implementation</i> |
| Accelerate Market Adoption | |
| 8 Supercharge heat pump marketing efforts, with a two-pronged focus on consumers and contractors. | <i>Low customer awareness and demand</i> <i>Lack of trained contractors and installers promoting heat pumps</i> |
| 9 Develop a comprehensive workforce engagement campaign to address gaps, provide essential training and sales tools, and position contractors as key advocates for heat pump adoption. | <i>Lack of trained contractors and installers promoting heat pumps</i> <i>Transaction friction</i> |
| 10 Launch a Heat Pump Week, including training and educational events for consumers and contractors, as well as partner promotions and rebates. | <i>Low customer awareness and demand</i> <i>Upfront installation costs</i> |
| Increase Market Visibility | |
| 11 Collect and leverage heat pump adoption data to track progress toward state goals and inform future actions. | <i>Limited data availability to inform efforts</i> |



Improve Customer Economics

1 Support Long-Term, Stable Incentives

Ensuring consistent, long-term funding for incentive programs is essential to establishing market certainty and accelerating heat pump adoption. Streamlined, reliable funding would provide the stability needed to achieve the goal of six million heat pumps and lay the foundation for lasting market growth.

To promote an equitable transition, programs should utilize primarily non-ratepayer funding sources and include higher incentive rates for low-income customers through 2030.

Similar to the California Solar Initiative and Clean Vehicle Rebate Project—which played a critical role in scaling the markets for distributed solar and zero-emission vehicles—long-term heat pump incentives can drive significantly increased sales volume and foster market competition. Achieving California’s carbon-neutrality goal may mean shifting essentially 100 percent of the market to heat pumps (among other zero-emission technologies), necessitating sustained and substantial investment to support customers and ensure widespread adoption at scale.

2 Continue Supporting Electrification-Friendly Rates

The CPUC has developed rate structures that promote electrification.²⁹ However, despite the efficiency of heat pumps, many households may face higher operational costs due to the disparity between electricity and gas rates, which can deter adoption. As more work is done to align rates with California’s broader decarbonization goals, it will be important for customers and stakeholders to support and take advantage of these rates to enable heat pump adoption and contribute to achieving California’s 2030 goals. For example, a higher flat rate billing component could increase consumer confidence in using more electricity and would help to accelerate heat pump adoption across the state.³⁰

As mentioned earlier, certain customer segments can already achieve operational savings by installing a heat pump—especially those replacing older, less efficient air conditioners in warm climates with high-efficiency models. On the other hand, customers in very mild climates may experience minimal changes in their energy bills, as their overall energy costs are already low. Targeting these customers with existing cost-saving opportunities will help to avoid operational cost barriers and accelerate statewide heat pump adoption. Additionally, tools to increase transparency around bill impacts can further support customer decision-making and satisfaction.

Encouraging customers to take advantage of demand response programs could also reduce operational costs for customers and allow load reduction during the peak load hours, supporting grid reliability.

²⁹ For example, California’s recent reform to move towards a higher fixed charge on electricity bills. Source: CPUC (2024). Decision 24-05-028 in Rulemaking 22-07-025. <https://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=531686019>.

³⁰ For example, POUs typically have a flat rate component.

3 Direct 50% of Program Funds to Low-Income and Disadvantaged Communities

To ensure all Californians benefit from the state's clean energy transition, Governor Newsom has directed that 50% of the state's building decarbonization investments be allocated to low-income and disadvantaged communities.³¹ These communities often face greater barriers to accessing clean, safe, and affordable energy services, making it essential to prioritize them in this transition.

The CAHPP is committed to supporting historically underserved communities by working to align available funding with the Governor's directive. Programs targeting low-income and disadvantaged communities should be closely coordinated with electrification-friendly rate structures and accessible financing options to address the financial challenges these households may face. Further, since a significant portion of low-income Californians reside in buildings that may be more complex to decarbonize—such as multifamily, mobile, or manufactured homes—programs must reflect the distinct needs of these housing sectors.

4 Expand Low-Cost Appliance Financing Options

Low-cost, accessible financing solutions are vital for helping customers bridge the gap between available incentives and full project installation costs. By providing options such as low and zero-interest loans or innovative financing programs, customers can install heat pumps with little to no upfront payment. These financing tools not only make heat pumps more affordable but also create an equitable pathway for all households to access the benefits of heat pumps.

CAHPP supports the expansion of heat pump financing tools, especially if the programs use funding from sources other than electricity ratepayers. The State Treasurer's Office's GoGreen Home program provides affordable loans for energy upgrades—customers benefit from interest rates

less than half of market averages, lower monthly payments through extended terms, and more flexible credit access for those with marginal credit scores. The state should continue to explore opportunities to offer and enhance financing tools to reduce transaction friction, expand customer access to favorable financing terms, and scale capital deployment.

5 Target Near-Term, High Value Opportunities for Appliance Retrofits

In the near term, CAHPP will work with program implementers and contractors to focus its market development efforts on regions and segments where heat pumps already provide strong value to customers, particularly low incremental installation costs and high opportunities for utility bill savings. The greatest opportunities for HVAC adoption are in inland areas of the state, where most customers already have air conditioning and many have high cooling loads. These projects offer low incremental costs, customer bill savings and the potential benefit of reducing summer peak electricity demand. Replacing air conditioning sales with heat pumps presents a straightforward, no-regrets strategy for enhancing grid resiliency, decarbonization, energy affordability, and equity.

Increasing heat pump market share for AC replacements from 23% to 80% would boost annual sales by approximately 280,000 units, equating to roughly 1.7 million additional units over six years.³² This geographic focus also aligns with the state's equity goals, as these areas include a high concentration of disadvantaged communities. Additional opportunities lie in retrofitting electric resistance systems for space conditioning and water heating.

CAHPP will also prioritize the Bay Area where zero-NOx emission standards are in place, effectively phasing out first small tanked gas water heaters and then gas furnaces, followed by larger water heating

³¹ The state's building decarbonization investment commitment was set in a letter to California Air Resources Board Chair Liane Randolph from Governor Gavin Newsom on July 22, 2022 regarding the state's Scoping Plan. Source: Governor Gavin Newsom (2022) <https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf>

³² Based on HARDI (Heating, Air-conditioning and Refrigeration Distributors International) sales data

systems.³³ Focusing on this region, especially for water heating in the near-term, leverages regulatory momentum while improving compliance and accelerating the transition to cleaner technologies. The CAHPP will also explore focusing on the SCAQMD, where additional zero-NOx space and water heater standards are under consideration. Decision-makers for buildings that may require retrofits to support heat pump adoption can benefit from early supportive information about how to prepare for upcoming emissions standards.

Streamline Sales and Installation Processes

6 Modernize Local Heat Pump Permitting Processes

A key strategy for reducing transaction friction and accelerating heat pump adoption is modernizing the permitting process. The current system is complex, often expensive, and time-consuming for appliance retrofits. Because permits are often required to access many heat pump incentive programs, yet conventional equipment installations are often completed without permits, this disparity undermines the value of incentives and creates an uneven playing field for heat pump installation.

Implementing faster online permitting, removing burdensome requirements unrelated to health and safety, and streamlining inspection processes across all jurisdictions would make it simpler, faster, and less expensive for contractors and homeowners to comply.³⁴ Other potential opportunities for improvement include simplifying panel upgrade permitting processes and consolidating processes that currently require separate permits (e.g., heating, plumbing, and electrical).

To maximize the effectiveness of these system improvements, investments in training for contractors and building department staff will be essential. Enhanced training, with clear guidance on documentation requirements and best practices, will ensure a smooth transition to modernized permitting and help drive widespread compliance, ultimately supporting broader heat pump adoption.

7 Simplify Incentive Program Design

As noted earlier, an estimated \$6 billion or more in additional funding is needed to meet the six million heat pump goal. For an investment of this magnitude to deliver maximum impact across building types, the incentive design should prioritize input from key stakeholders, such as contractors, manufacturers, retailers, and distributors.

Further, based on field experience from programs such as TECH and Efficiency Maine's incentives, program designers should consider the following best practices:

- a. Streamlined Processes: Keep participation simple to minimize administrative burdens and delays for contractors and customers.
- b. Predictable Incentive Phases: Set clear timelines for phased incentive reductions to support business planning and avoid disruptive starts and stops.
- c. Point-of-Sale Rebates: Offer instant rebates through retailers and distributors to facilitate emergency replacements and streamline installation processes.
- d. Incentive Layering: To maximize the impact of funding, it should be layerable with existing funding sources, utilizing tools such as The Switch is On.
- e. Cost Parity or Better: Set incentives to achieve first-cost parity or better with gas appliances.

³³ Per BAAD Rule 9-6 (small water heaters <75,000 btu/hr starting January 1, 2027; larger water heating systems 75,000 btu/hr. Up to 2 million btu/hr. Starting January 1, 2031) and Rule 9-4 (gas furnaces starting January 1, 2029). SCAQMD's rules are still under development and have not yet been adopted at the time of the writing of this report.

³⁴ Modernizing permitting for heat pumps also may include redesigning permit requirements, by amending setbacks or noise ordinances. Sources: Bay Area Regional Energy Network (2023). Removing Known Barriers: Changing Zoning to Help Electrify Existing Homes. https://www.bayren.org/sites/default/files/documents/2023/BayREN-Q4-2023-Forum-Zoning-Changes-Help-Electrify-Existing-Homes_Paz.pdf; Palo Alto Online (2023). Code Changes Aim to Spark Conversions to Electric Appliances. <https://www.paloaltoonline.com/news/2023/10/04/code-changes-aim-to-spark-conversions-to-electric-appliances/>

- f. Support Zero-Emission Requirements: Maintain incentives for low-income households after zero-emission regulations take effect until cost parity is achieved.
- g. Targeted Panel Optimization or Upsizing: Deploy strategies to avoid service upsizing and focus panel upgrade incentives on homes with undersized systems (i.e., less than 100 amps for single-family and less than 60 amps for multifamily), emphasizing support for multifamily, low-income, and disadvantaged communities. Offer layerable incentives to support other strategic measures to optimize the panel capacity to avoid retrofits, such as home energy management systems.³⁵

within air districts subject to forthcoming zero-NOx regulations—ensures resources are efficiently directed for maximum impact. To support equitable, widespread adoption of heat pumps, renters and renter-occupied building owners are other important target audiences.

By engaging consumers and contractors at various life stages and interest levels, the CAHPP marketing campaign will provide tailored touchpoints that keep HP HVAC systems and HPWHs top-of-mind throughout the decision-making process. Additionally, collaborating with partners including manufacturers, distributors, retailers, utilities, and other stakeholders will amplify efforts and maximize the campaign's reach.

Lastly, the CAHPP will collaborate with partners to leverage existing and co-fund additional marketing efforts to promote heat pump technologies. This could include utilizing showrooms or demonstration spaces, co-hosting experiential events, and amplifying digital marketing efforts.

Accelerate Market Adoption

8 Supercharge Heat Pump Marketing

Successful heat pump marketing requires a dual focus: driving customer awareness and demand while motivating and empowering contractors to promote them. Through a coordinated marketing campaign, the CAHPP aims to create a positive feedback loop where informed consumers increase contractor interest in heat pumps, and knowledgeable contractors, in turn, boost consumer confidence.

The CAHPP integrated marketing strategy will use a targeted, tactical, multi-channel approach, combining paid and earned media, influencers, experiential events, and digital tools to engage consumers and contractors across diverse platforms. The campaign will leverage and amplify existing tools like The Switch Is On website which connects homeowners and renters to incentives and qualified contractors. New and expanded experiential events and community ambassador programs will help generate widespread awareness, particularly in the target communities discussed in Strategy 5, while social media campaigns and influencer partnerships will share relatable stories about the benefits of heat pumps. Targeting high-propensity households—such as those with high cooling loads and those

9 Develop a Comprehensive Workforce Engagement Campaign

A strong, engaged network of contractors is vital to accelerating heat pump adoption and achieving California's electrification goals. To address workforce gaps and equip contractors with the tools they need, the CAHPP will launch a comprehensive engagement campaign. This initiative will not only support technical training but also position contractors as influential advocates for heat pumps, helping to drive widespread adoption across the state. By fostering confidence in heat pump technology and supporting business model transitions, the campaign will empower contractors to be at the forefront of the heat pump market growth. CAHPP will collaborate with industry experts to align and enhance existing efforts.

Key tactics include:

- ▶ **Convene a Workforce Advisory Council:** The CAHPP will assemble an industry advisory council composed of contractor associations, workforce development and training organizations, trade

³⁵ Armstrong, Sean, Emily Higbee, Dylan Anderson, Diane Bailey, and Tom Kabat (2021). A Pocket Guide to All-Electric Retrofits of Single-Family Homes. <https://buildingdecarb.org/resource/a-pocket-guide-to-all-electric-retrofits-of-single-family-homes>

unions, and industry groups. This council will provide actionable recommendations to ensure workforce efforts are equitable and aligned with industry needs.

► **Explore Opportunities to Expand the Heat Pump Workforce:**

With guidance from the Workforce Advisory Council, the CAHPP will explore strategies to attract more workers to the industry. By addressing workforce gaps and identifying opportunities to make these jobs more attractive and training more accessible, the CAHPP aims to meet the growing demand for heat pumps while supporting job growth in the sector.

► **Outline Strategies to Address Training Gaps:** In partnership with the Workforce Advisory Council, the CAHPP will identify opportunities to expand access to advanced technical training for both new and incumbent workers, leveraging partnerships with manufacturers, trade schools, community colleges, high school trade programs, and pre-apprenticeship and apprenticeship programs. By focusing on skill development in installation, maintenance, and diagnostics, the CAHPP will support a pipeline of skilled workers ready to meet the growing demand for heat pumps.

► **Connect Contractors to Heat Pump Resources:** To further support contractors, CAHPP will identify opportunities to leverage existing contractor resources and identify resource gaps. CAHPP will also explore developing a centralized resource hub to equip contractors and their teams with the tools they need to promote and install heat pumps and adjust business models to reflect this technology transition.

This hub could provide sales enablement and training resources, along with solutions to simplify processes such as digital permitting, electrical panel best practices (e.g., when upgrades are necessary or not), and information on load flexibility technologies. Integrated with ‘Switch is On,’ it would provide contractors with up-to-date information on incentives, rebates, and stacking processes.

► **Explore a CAHPP Contractor Certification Program:**

With input from the Workforce Advisory Council, CAHPP will assess the benefits of establishing a certification program to highlight and promote heat pump integration into contractors’ business models. Such a program could utilize training materials from manufacturer members. This could build on models like the New York Clean Heat program, where manufacturers developed comprehensive cold-climate heat pump training for their products.

By reducing administrative burdens and expanding training opportunities, CAHPP seeks to help contractors manage complex projects while maximizing customer savings. Ultimately, it aims to position contractors as key drivers of California’s zero-emission future.

10 **Launch a Heat Pump Week**

Introducing a dedicated Heat Pump Week would generate excitement and momentum around heat pump adoption by engaging both consumers and contractors in a focused, high-impact campaign. The week could feature live demonstrations showcasing heat pump technologies in action and coordinated promotions and rebates to incentivize adoption. By bringing together industry stakeholders, manufacturers, the workforce, and community partners, Heat Pump Week would raise awareness about the benefits of heat pumps and create opportunities for direct engagement. This concerted effort would not only boost immediate interest but also build long-term enthusiasm and support for heat pump technologies. A Heat Pump Week could also partner with existing efforts such as Heat Pump Water Heater Day³⁶ to maximize impact and outreach.

³⁶ Advanced Water Heater Initiative (2024). Heat Pump Water Heater Day. <https://www.advancedwaterheatinginitiative.org/hpwh-day>

Increase Market Visibility

11 Collect and Leverage Heat Pump Adoption Data

Effective implementation of the above strategies will require fast feedback loops to inform decision-makers about what is working and where adjustments are needed. State agencies and industry stakeholders, including manufacturers, distributors, and retailers, must work together to compile equipment adoption data and related information in a standardized format. This approach will enable the evaluation of incentive program effectiveness, support necessary adjustments, and track progress toward state goals. Furthermore, state agencies responsible for forecasting energy demand would benefit from more detailed system installation data to enhance their projections.

Policymakers require robust data to develop, and eventually implement and enforce, regulations that support emissions reductions at the appropriate statewide pace, sensitive to regional differences and challenges within the state. Adoption data is essential to developing an appropriately nuanced and scaled regulatory strategy. Such data reporting could be achieved through a regulatory requirement or voluntarily. Modernizing permitting processes could create an additional pathway for collecting adoption data, provided it leads to an increase in permitted projects. The CAHPP should explore potential pathways to collect the most comprehensive and accurate data possible, while avoiding disclosure of sensitive and proprietary business information. CAHPP members will determine a pathway to collect this data in the near term, which will be critical to ensure California is on track to achieve its target. To complete the feedback loop, the CAHPP will develop a public dashboard to provide up-to-date information regarding progress toward six million heat pumps and other key metrics.

Beyond Six Million: Supporting Long-Term Decarbonization

While this document presents a comprehensive blueprint for achieving the ambitious goal of six million heat pumps by 2030, this milestone is just one step toward California's broader vision of carbon neutrality by 2045. The transition to a clean energy future requires balancing multiple policy priorities, including climate protection, economic impacts, energy affordability, equity, and grid reliability. Meeting these intersecting goals will demand ongoing collaboration, innovation, and investment across sectors.

Looking ahead, the CAHPP will continue to align strategies with the state's long-term decarbonization objectives by focusing on the following key areas:

- ▶ **Equity and Affordability:** Ensuring that electrification benefits are accessible to all communities, including renters, mobile and manufactured homes, low-income households, and disadvantaged communities, will remain a top priority. This includes designing programs that address financial barriers, increase technology access, protect renters, and deliver direct economic benefits to historically underserved groups. A continued focus on strategies to improve the upfront installation and ongoing operational costs of heat pumps will be vital to successful, wide-spread deployment in the long term.
- ▶ **Load Flexibility and Grid Planning:** As heat pump adoption scales, integrating these technologies with load management strategies will be essential for grid resilience, reliability, and customer affordability. Given the anticipated increase in heat pump adoption, the impact on both summer and winter peak demand must be carefully considered. Rising summer loads and emerging winter peak demands could strain the grid, making efficient electrification a key strategy for mitigating these challenges at a lower cost. The CAHPP will work to support high-efficiency and grid-responsive heat pumps, load flexibility programs, and initiatives that enhance reliability and maximize the use of clean energy. Additionally, closing the heat pump data gap will be crucial for effective grid planning and ensuring reliability.
- ▶ **Research and Development (R&D) Investments:** Ongoing R&D and manufacturing advancements will support long-term heat pump adoption and enhance customer satisfaction. Continued innovation will address evolving customer needs, upcoming regulations, and cost reduction goals. Key priorities include:
 - Diversifying product designs to fit various building types
 - Expanding low-power appliance options
 - Incorporating low- and ultra-low global warming potential refrigerants
 - Implementing panel optimization solutions and load flexibility features
 - Improving overall performance, longevity, reliability, and affordability
- ▶ **Compliance with Codes and Standards:** Ensuring high rates of compliance with state and local regulations is essential to maximizing their effectiveness in advancing decarbonization and public health goals. California's building codes and zero-emission space and water heater standards are powerful tools for reducing emissions and transitioning to clean energy, but their impact depends on consistent compliance and enforcement.

Strong compliance helps create a level playing field for contractors and manufacturers and ensures that the benefits—such as lower emissions, improved air quality, and energy savings—are fully realized. Streamlining permitting and the compliance process through education and strengthening enforcement mechanisms will be critical to prevent non-compliant or unpermitted installations that can undermine progress. By prioritizing compliance, California can accelerate its path to carbon neutrality and ensure the equitable distribution of clean energy benefits.

- ▶ **Targeted Electrification:** Strategic electrification can play a role in supporting equity communities and capture the cost benefits of avoiding gas infrastructure. Deploying heat pumps and other

electric technologies at scale without a managed transition could create affordability challenges, particularly for vulnerable customers with limited ability to electrify. Considering broader affordability and equity impacts could help mitigate cost burdens on remaining gas customers and support equity-focused whole-building electrification.

Achieving full and lasting carbon neutrality will require sustained policy support, industry engagement, and public-private partnerships. By continuing to address these foundational needs and refining strategies over time, the CAHPP will support meeting the six million heat pump target and lay the groundwork for a carbon-neutral future in California.



Appendix A: CA Public Funding for Heat Pumps and Other Electrification Measures

| Program Name | Funding Source | Budget |
|-----------------------------------|--|-------------------------------------|
| TECH | State | \$305,000,000 |
| EBD - (State + HOMES) | State / Federal | \$567,203,000 |
| SGIP HPWH | State | \$84,700,000 |
| California Electric Homes Program | State | \$75,000,000 |
| IRA - HEEHRA | Federal | \$290,000,000 |
| IRA - HOMES | Federal | \$152,000,000 |
| IRA - TREC | Federal | \$10,322,000 |
| SC AQMD - Go Zero Program | Regional | \$21,000,000 |
| Total | Regional, State, and Federal³⁷ | \$1,505,225,000³⁸ |

³⁷ On January 20, 2025, President Trump signed an executive order directing federal agencies to pause disbursement of funds appropriated through the IRA. As of the date of this report, the CEC is reviewing and assessing the impact of this executive order on their federally funded programs.

³⁸ The largest currently funded federal, state, and regional programs (>\$10 million) focused on electrification are included in Appendix A. Customers may also be able to access additional locally offered incentives, but these programs were too numerous to include in this summary and would not significantly alter the total CA electrification funding.

Appendix B: Estimated Annual Equipment Installations

The existing data sources for California HVAC and water heating sales estimates lack comprehensive market coverage, and thus should be interpreted as a present best estimate that will be refined as more information becomes available.

Est. Total Annual CA Sales

| | |
|----------------------|------------------|
| HVAC | 1,047,233 |
| <i>Central A/C</i> | 519,927 |
| <i>Window A/C</i> | 165,000 |
| <i>Furnace</i> | 163,258 |
| <i>Air Source HP</i> | 199,049 |

Sources: Central AC, Furnace, Air Source Heat Pump: HARDI sales data (includes residential and small commercial, calibrated with national sales data); Room / Window AC: Energy Code Ace Title 20 Fact Sheet.

Est. Total Annual CA Sales

| | |
|-----------------------------|-----------------|
| Water Heating | ~800,000 |
| <i>HPWH (high estimate)</i> | 40,000 |
| <i>HPWH (low estimate)</i> | 25,000 |

Sources: Total Water heating market sales: Opinion Dynamics Water Heater Market Characterization (2024)³⁹
HPWH sales: NORESO T24 compliance data, TECH Clean California data, and that TECH / SGIP HPWH units account for between 40% (low estimate) to 90% (high estimate) of the state's HPWH sales.

³⁹ Opinion Dynamics (2024). California Water Heater Market Study. https://techcleanca.com/documents/5445/Water_Heater_Market_Characterization_Study_PDA_Final_9_18_2024.pdf





The following Blueprint details strategies brought forth by the California Heat Pump Partnership, none of which should be attributed solely to any of the participating companies and organizations.

