Outreach and Engagement Update

Zero-Emission Space and Water Heater Standards

California Air Resources Board

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Contents

Introduction

An effective zero-emission standard will also be an equitable one, which begins with an accessible, transparent, and inclusive process -- one that shapes staff analysis, regulatory design thinking, and implementation planning. This document presents an update on the activities undertaken as part of the *California Air Resources Board's (CARB) Outreach and Engagement Strategy and Plan (Engagement Plan) for the development of zero-emission space and water heater standards*. First, it provides background on the zero-emission standards research and development process. Then, it provides an overview of engagement activities completed in 2024, followed by a summary of key themes and related staff actions. Finally, it revisits the goals established in the 2023 plan, noting progress to date and areas to grow. The report also includes appendices: a *current list of public experts* and a *session-by-session summary of perspectives shared at each listening session*.

In 2024, CARB staff conducted a range of public engagement activities, some in partnership with community-based co-hosts and the Sacramento State University Consensus and Collaboration program. These activities offered venues for the public to respond to regulatory ideas from their own lived experiences, offer their perspectives on research and policy issues, and to build a sense of inclusivity and trust between state agency staff and the public. This report is intended to offer a transparent summary of staff takeaways and responses and inform the public of next steps.

CARB staff are committed to helping achieve the state's climate goals through an appropriate and effective regulation, developed through an inclusive process. The harms from a lack of effective climate change mitigation are clear in the devastating loss of homes and lives in more frequent and severe wildfires, drought, acute heat exposure, and other impacts. Staff recognize that the possible reach of zero-emission heating regulations raises concerns around equipment and energy costs, housing security, rural needs, and more, highlighting the risks of not getting climate mitigation policies right.

In 2025, staff will continue to research the issues raised by the public in the 2024 engagement work. Public insights and experiences have helped staff better grasp the potential real-world consequences of regulation designs. With the continued input from public experts, partners at research institutions, and other public agencies, and through the workshop and comment process, staff aim to design a policy that can reduce emissions from the building sector at an appropriate pace, strategically aligned with other policy actions and market trends.

Thank you to all who shared their time and energy to participate in these conversations. The input received will contribute to a more effective and thoroughly considered regulatory proposal.

Background

Regulation Purpose and Timeline

The California Air Resources Board's mission is to "promote and protect public health, welfare, and ecological resources through effective reduction of air pollutants while recognizing and considering effects on the economy." CARB is the lead agency for climate change programs and oversees all air pollution control efforts in California to attain and maintain health-based air quality standards.

In 2022, CARB approved the *State Strategy for the State Implementation Plan* (SIP), which included a regulatory concept for controlling greenhouse gas (GHG) emissions from space and water heaters. The *2022 Scoping Plan for Achieving Carbon Neutrality* (Scoping Plan) also includes a transition to zero-greenhouse gas (GHG)-emission appliances, starting with 80% zero-emission appliance sales for existing residential and commercial buildings by 2030, 100% of sales by 2035 for residential applications, and 100% sales by 2045 for commercial applications.

About 10% of California's GHG emissions are attributed to combustion in residential and commercial buildings.[1] Although CARB is developing a greenhouse gas regulation for heating equipment in the building sector because it is a significant source of greenhouse gas emissions in the state, the regulation would also have a co-benefit of reducing nitrogen oxide (NOx) emissions that contribute substantially to air quality nonattainment and public health impacts. Building emissions contribute 66 tons per day of NOx on average, four times the NOx of power plants statewide[2], adding to the risk of asthma, heart disease, and other illnesses.

Currently, an estimated 20-27% of residential buildings in California have zero-emission space heating equipment, while only about 6% have zero-emission water heating systems. Transitioning more of the emissive heating equipment to zero-emission technologies at the end of their life would contribute to improved air quality and reductions in climate change-causing emissions.

While the 2022 State SIP Strategy included a zero-emission space and water heating measure that would be brought forward for Board consideration in 2025, staff have decided, based on the last year of engagement and deliberation, to revise the initial regulatory concept after analyzing the issues raised by the public. As a result, staff do not expect to bring a proposal for Board consideration in 2025.

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[1] *CARB GHG emission inventory, Scoping Plan Categorization*
[2] *Scoping Plan Appendix F – Building Decarbonization*

Outreach and Engagement Strategy

A strong regulation development process will also nurture a broad network of trusting, supportive relationships across a field of committed practitioners to make equitable building decarbonization a reality after a potential rule comes into effect.

In Winter 2023, CARB staff published an *Outreach and Engagement Strategy and Plan for the Development of Zero-Emission Space and Water Heater Standards,* which included public workshops, technical feedback meetings, listening sessions, and implementation planning meetings. This strategy was informed by CARB's *Community Engagement Model*, whose cyclic approach offers a useful framework for reflecting on how to meaningfully engage key groups across the informal and formal phases of a rulemaking process.

This strategy and plan were informed by Sacramento State's *Assessment Report*, developed from interviews with nearly 60 interested parties, from manufacturers to utilities, community-based organizations, and housing and building sector professionals. These interviews were intended to shape our engagement strategy and identify key issues that CARB staff should be focusing on in the rulemaking process. This assessment report was published alongside CARB's outreach and engagement strategy in December 2023.

After the strategy was released, CARB opened a *solicitation* for "public experts," as noticed on our public website and listserv, to invite interested and knowledgeable individuals, companies, and organizations to participate in more detailed, informal meetings with one another and with CARB staff, to supplement our traditional public workshop. Listening session co-hosts were identified through this public solicitation, where individuals and organizations had the opportunity to propose potential listening session locations. Community-based organizations and individuals were eligible to request funding to fulfill this scope of work. *Appendix A* provides a current list of public experts. In our 2023 strategy and plan, CARB staff also noted several key initiatives organized at the agency level: CARB's Environmental Justice Advisory Committee, Tribal Listening Sessions, and Community Environmental Justice Tours.

Staff appreciated the opportunity to share highlights from this report at a staff presentation to the Environmental Justice Advisory Committee on April 14, 2025. CARB staff note that this report was drafted before the Environmental Justice Advisory Committee Resolution on Building Decarbonization was adopted at a public meeting on August 15, 2025. Staff look forward to further dialogue and engagement with EJAC to address their recommendations in the Resolution.

Although staff committed to participating in and attending Tribal Listening sessions in 2024, there were no Tribal listening sessions hosted by CARB that year. We will be collaborating with CARB's Tribal Liaison to plan engagement with Tribes in 2025 and 2026.

In the 2023 plan, CARB zero-emission space and water heating staff also discussed participating, where possible, in agency-organized Environmental Justice Community Tours in 2024. Although some of our listening sessions did include site visits. Where relevant, staff look forward to participating in future tour opportunities.

The remainder of this report summarizes the engagement activities organized by CARB staff and with the support of Sacramento State and co-hosts in 2024, reflects on learnings from public engagement, progress toward overall outreach and engagement goals, and notes follow-up activities in planning for 2025 and 2026.

2024 Engagement Events

Public Workshops

In 2024, CARB staff hosted two public workshops to provide an overview of regulatory analysis and concepts, and request alternative concepts. Materials from workshops are available at *Zero-Emission Space and Water Heater Standards | California Air Resources Board*

- **February 28, 2024: Public Engagement and Staff Analysis Overview**
  - Shared information about the public engagement process
  - Shared initial regulatory concepts under development
  - Shared an overview of staff analysis work underway to develop zero-emission GHG space and water heater standards.
- **May 19, 2024: Regulatory Proposal Update and Request for Alternatives**
  - Solicited input on an updated draft regulatory proposal.
  - Requested feedback on zero-emission technology types, costs, and adoption rates to include in the modeling work to estimate emission reduction and cost impacts for the regulatory proposal.
  - Solicited input on suggestions for alternative regulatory concepts for inclusion in the Standardized Regulatory Impact Assessment that will be prepared for this regulatory action.
  - Served as the California Environmental Quality Act (CEQA) scoping meeting to solicit input on the scope and content of the Environmental Impact Analysis to be prepared for the proposed project.

CARB staff will host further public workshops after the regulatory proposal is refined, potential alternatives are identified, and preliminary analysis is complete.

Technical Feedback Meetings

In 2023-2024, CARB staff held six technical feedback meetings with public experts and public agency staff to request initial feedback on our core analysis areas. At these meetings, staff provided an overview of the various methods staff planned to use to estimate the costs

and impacts of a potential regulation, and requested feedback to fill specific knowledge gaps and improve assumptions. These presentations expanded on the content delivered at the public workshops, and were open to all who expressed interest in the relevant topics when they applied to the public expert solicitation.

Meeting topics included:

- **Emissions Modeling:** approach to estimating emission reductions from zero-emission heating.
- **Building Retrofits:** potential retrofit needs related to installing zero-emission equipment in the residential and non-residential sectors
- **Market and Technology:** currently available zero-emission space and water technology options for residential and non-residential sectors
- **Cost Analysis:** approach for estimating the statewide economic impact including equipment, labor, energy, permitting, and maintenance cost assumptions
- **Equity Analysis:** approach to assessing different local conditions and barriers, and how they vary across geographic and demographic dimensions
- **Pool and Spa Heaters:** zero-emission technology options, costs, and modeling assumptions

In the first quarter of 2025, CARB staff also distributed preliminary written methods descriptions to public experts and other agency staff to receive preliminary feedback on our approach to costs, emissions, and building retrofit modeling. After updating staff methods based on this preliminary feedback, CARB staff will share updated documentation with analysis outcomes as part of the revised regulatory proposal. There will be further opportunity for public comment during the formal rulemaking process.

Briefings from Public Experts

In addition to requesting public expert feedback on staff analysis approaches, CARB staff received briefings from public experts. These topics and presenters included:

- **"Affordable Housing Decarbonization: Utility Allowances" by Climate Action Campaign**. Executive Director Ayn Craciun presented work on implementing housing decarbonization in a building operating with public housing authority utility allowances, illustrating the challenges affordable housing providers can face in paying for decarbonization.
- **"Tenant Protections for Equitable Building Decarbonization" by Strategic Actions for a Just Economy**. Chelsea Kirk, Director of Policy and Advocacy for Climate and the Built Environment, highlighted how retrofit work can leave tenants vulnerable to eviction, harassment, and financial strain, and offered policy recommendations to prevent evictions tied to renovations.

- **"Single-Family Building Readiness" by Energy Solutions.** Sandy Fischler-Laube, Fellow, prepared a detailed brief on California's single-family housing stock with estimates of retrofit needs for zero-emission space and water heating.
- **"Affordable Housing Retrofit Needs" by Association for Energy Affordability**. Amy Dryden, Director of Strategic Innovations, presented examples of multifamily housing retrofit projects, including common challenges and creative solutions the program implementer has developed to successfully decarbonize space and water heating.
- **"Residential Heat Pump Sales Projections" and "Heat Pumps Can Lower Energy Bills for California Homes" by RMI.** Jack Teener, Senior Associate and Ryan Shea, Manager in the Carbon-Free Buildings Team, presented projections of heat pump sales in California, as well as estimates of bill savings when upgrading to high-efficiency heat pumps.

CARB staff are scheduling similar briefing meetings through the remainder of 2025. The *public expert application* remains open to voluntary participants who would like to present a briefing to CARB staff, other public experts, and staff from other public agencies.

Listening Sessions

Listening sessions gave CARB staff a window into varied local perspectives on the implications of a potential zero-emission regulation. CARB intentions for listening sessions were to:

- Share clear and consistent, locally relevant information about potential standards – receive feedback from co-hosting partner to develop effective educational/presentation materials.
- Learn directly from local communities about their concerns and hopes related to potential rules. Approach different regions and communities in a culturally appropriate and sensitive manner.
- Expand the reach and relevance of CARB's engagement work.
- Build local relationships and identify opportunities for further in-person engagement, including site visits.
- Connect people with relevant state resources and contacts, including at other agencies.
- Continuously learn from this process and track outcomes to plan for future engagement work.

CARB goals for the listening session:

- Share the current status of regulatory concepts/proposal.
- Receive and respond to questions and concerns from the public.
- Help an audience to understand its purpose and potential benefits.

- Identify issues and needs as they relate to the specific region where the event is occurring.
- Present and hear feedback on region-specific barriers to implementation and approaches to addressing them.
- Collect information that will meaningfully inform the regulation analysis, design, and implementation.

The Sacramento State Consensus and Collaboration program staff co-organized the listening sessions and developed a session-by-session summary of the feedback, questions, and perspectives shared by public participants. That summary, a companion to this update report is available here (hyperlink OR appendix).

2024 Listening Session Locations and Dates

Co-Hosted, Virtual

- August 22: Climate Action Campaign, Orange County

Co-Hosted, In Person

- September 9: Sierra Energy Reimagined, Nevada City
- September 18: Allensworth Progressive Association, Tulare County
- September 24: SPUR, San Francisco
- October 1: Construction Trades Workforce Initiative, United Association of Plumbers and Pipefitters Local 342 Training Facility, Concord
- October 9: Climate Action Campaign, National City
- October 23: Climate Resilient Communities, San Mateo
- September 26: Sierra Energy Reimagined, Nevada County

CARB-Hosted, Virtual

- October 22: Southern California
- October 28: Central California
- October 29: Northern California

Listening Session Process Feedback

After each listening session, co-hosts debriefed with CARB and Sac State staff, and completed a written evaluation about their experiences.

Broadly, co-hosts shared positive experiences with CARB staff taking time to share information and listen. Some funded partners commented that the $4,950 event budget was appropriate for the work involved, while others said this funding level was not sufficient. In some regions, virtual meetings work much better for reaching those spread over large areas. In others, especially rural areas with unreliable internet service, in-person

opportunities were effective. Staff recognize that there is always room to be more intentional and specific when requesting feedback from the public.

Most of the listening sessions were held in the evenings, and we found with our virtual meetings that this did not necessarily draw a new audience compared to CARB public workshops – with the exception of a contractor who otherwise would not have been able to attend. From CARB staff perspective, co-hosts helped CARB reach people outside of the agency's list-serve network, and enabled us to hear from those who do not typically participate in our workshops.

Interpretation resources require advance planning to ensure community access. Depending on the co-host preferences, the listening sessions included interpreters that co-hosts frequently contracted with, or those hired by CARB. Interpretation services contracted through CARB require a one-month lead time prior to the event. All online listening sessions included Spanish interpretation. Three of seven in-person listening sessions included interpretation, with need for interpretation informed by the co-hosts.

At one session, CARB staff had not been able to secure interpretation services in advance, so bilingual CARB staff stepped in to interpret. In the future, if staff know in advance that the majority of the audience are Spanish-speaking, we will plan to have the main presentation in Spanish (with English interpretation offered). In the future, CARB staff will prioritize language planning earlier in the listening session process. .

As CARB staff consider future public engagement work, we also acknowledge the further suggestions we heard from co-hosts around supporting a cultural shift toward buildings-based climate solutions, asking deeper questions to help meet people where they are, and trying different event formats, including more community speakers, artists, and other voices that help engage people on a deeper level. We also heard a desire for more focused and detailed conversations with subject matter experts to create robust implementation strategies.

Public Engagement Themes

This section distills themes heard during 2024 public engagement activities and highlights related staff actions at CARB and other public agencies.

Installation costs are high, and available incentives may be insufficient

CARB staff heard a range of concerns related to the cost impacts of climate policies, particularly on affordability and equity. Some participants worried that a potential regulation could increase the cost of living, especially for those with lower incomes. Others shared concerns about costs to small businesses and middle-income households who are not eligible for incentive programs. Others noted that climate action is essential since the

climate-driven disasters also have a significant financial impact on individuals and communities.

Several commenters noted that CARB staff may not be adequately assessing the cost impacts of potential regulations, and that available incentives might be insufficient to cover costs for those unable to afford zero-emission technologies. Some participants worry that clean technology markets may increase the risk for predatory financial models if consumer protections are not in place.

Participants emphasized the need to improve the accessibility and consistency of incentive programs. One experienced heat pump contractor said that she personally helps clients access incentives and suggested that other contractors adopt the same practice to better support customers.

CARB and other agencies' related actions

CARB staff aim to develop a regulation that encourages a more abundant and price competitive supply of zero-emission equipment in California. This increased market availability could help drive down prices and support achieving cost parity between zero-emission and emissive alternatives.

CARB staff prepared in-depth documentation of the cost analysis methodology for review by public experts and has received constructive feedback. Two equitable decarbonization research contracts funded by CARB are studying incentive availability and implementation. One of these contracts includes a team at the University of California (UC) Berkeley who is doing a participatory-action research project in partnership with the Building Energy Equity and Power (BEEP) coalition of environmental justice organizations, measuring the potential benefits of equitable housing decarbonization, and studying program implementation.

CARB's team managing the California Climate Investments program also supports other agency staff implementing weatherization and equitable building decarb investments through guidelines and quantification approaches under the Greenhouse Gas Reduction Fund.

The California Energy Commission (CEC) leads state policy work on building efficiency including buildings codes, buildings R&D and energy efficiency and implements many state and federally funded renewable energy, grid reliability, and building decarbonization incentive programs such as the *Equitable Building Decarbonization* program. The California Public Utilities Commission oversees all incentive programs funded both by ratepayers and state funds, and implemented by third-party implementers who are competitively selected by investor-owned utilities, such as the statewide HVAC incentive programs for heat pumps, Energy Savings Assistance (ESA) program for low-income customers and, previously have funded efforts like the *Switch is On* and the *Codes and Standards Enhancement* team. Incentives through the *TECH Clean California* Initiative are also available to non-equity

residential customers and the *Self Generation Incentive Program (SGIP)* HPWH program, housed under TECH, offers incentives to commercial customers.

Strategies to control and lower energy costs are essential to successful implementation

Energy costs are a key factor influencing the affordability of switching to zero-emission technologies. Many listening session participants highlighted California's rising energy costs and energy cost burdens. They noted that the relative costs of fuels can make it difficult to achieve long-term cost savings, even when zero-emission equipment uses less energy. Energy cost savings are most easily accomplished when decarbonization retrofits are performed alongside building energy efficiency and energy envelope upgrades.

For example, the Tenderloin Neighborhood Development Corporation (TNDC) illustrated the challenges of financing zero-emission retrofits in affordable housing. To make such investments viable, affordable housing providers need to recoup upfront costs through future energy savings. In one case, TNDC opted to convert only the water heating system to zero-emission due to cost constraints. They explained that retrofitting all their buildings to zero-emission technologies on the timeline presented by CARB's regulation concept would not be financially feasible, due to an inability to finance the retrofit costs and to recoup them through energy bill savings.

Participants offered a broad range of suggestions to address energy cost barriers. Ideas included increasing taxes on fossil gas, changing utility rate structures to maintain at least a 4 to 1 cost ratio between electricity and gas, and investing in more localized clean energy resources to help lower energy costs.

CARB's related actions, and the role of other agencies

CARB staff include energy costs when assessing cost impacts from a zero-emission heating measure. This analysis will also include case studies to explore the influence of different rate designs.

At the listening session presentations, CARB staff and co-hosts shared locally relevant information about cost-saving strategies, including the CARE (California Alternative Energy Rates) and FERA (Family Energy Rate Assistance) rate discount programs, decarbonization-friendly rates, and technologies that program heating to avoid peak rates. The California Public Utilities Commission (CPUC) oversees energy rate setting for investor-owned utilities in California, which serve about 75 percent of customers. Per Assembly Bill (AB) 205, the CPUC is moving ahead with *new rate design approaches* including an income-graduated fixed charge to help alleviate electricity costs for low-income Californians.

Customers of investor-owned utilities receive a biannual Climate Credit funded by the Cap-and Trade Program implemented by CARB. This climate credit is funded by the auction of

GHG allowances that are given to investor-owned utilities to help offset the energy cost increases that may be a result of pricing GHG emissions.

Other state and local agencies are the primarily policymakers in this domain. In addition to utilities regulated by the CPUC, public utilities such as the Los Angeles Department of Water and Power (LADWP) and Sacramento Municipal Utilities District (SMUD), set energy rates under the oversight of their local governing boards, and also offer rate discounts and decarbonization incentive programs. The Legislature makes decisions related to any new taxes or fees.

Renters could become more vulnerable, and guardrails are needed to avoid adverse impacts

Renters shared experiences of landlords making repairs at the least cost, sometimes sacrificing quality. Tenants expressed concerns that some landlords may be unaware of, or choose not to comply with, a future potential regulation. A few commenters also asked whether tenants would be held responsible for compliance. (They would not, since the regulation would focus on equipment manufacturers and sellers, not end users).

Participants emphasized the importance of ensuring that landlords and building owners are informed about incentive programs, so tenants can also benefit from the health and safety improvements offered by heat pumps and other zero-emission heating technologies.

Commenters also called for state agencies to play a more active role in enforcing tenant protections, and for changes to state policy to prevent pass-through costs and strengthen protections from renovictions or evictions tied to building upgrades. Participants encouraged CARB to continue engaging with environmental justice and tenants' rights organizations to develop a regulation that is as protective as possible.

CARB's related actions

Protective housing policies are primarily controlled by local governments, with some statewide tenant protections established by the Legislature. CARB does not make or enforce protective policies for tenants.

However, CARB staff recognize the importance of these protections. As such, we will continue working to understand how the presence or absence of tenant protections may affect the implementation of a zero-emission space and water heater measure. This understanding will help inform the design of a regulation.

To explore this further, CARB is funding a UC Berkeley contract to update and expand their anti-displacement policy inventory maps. Staff intend to use this policy data, alongside data related to owner/renter occupancy, to inform our distributional equity analysis of the costs and affordability of a potential regulation.

Building and infrastructure conditions can create hurdles to decarbonizing

During site visits and listening sessions, CARB staff heard details about specific issues that could limit the feasibility of installing zero-emission space and water heating equipment. Key issues include:

- Space constraints: Especially in older or larger buildings with limited utility closet space, fitting zero-emission equipment can be difficult. At the Association for Energy Affordability briefing and during a site visit to Tenderloin Neighborhood Development Corporation properties, staff learned about creative solutions for siting compressors and storage tanks. These included using outdoor areas, rooftops, and various underutilized spaces throughout buildings.
- Permitting barriers: Permitting requirements pose a barrier, especially for water heater replacements that typically occur during emergency replacements. During a mobile home site visit including staff from CPUC and HCD, CARB staff learned how installing a split heat pump water heater with the condenser outside the home could be a solution when existing water heater closet sizes cannot accommodate the larger form factor of most heat pump water heaters. Often, external closets are used to overcome this barrier, but this workaround could raise permitting compliance issues. For space heating, CARB staff also heard about an issue where local, historic preservation rules prevented the installation of packaged terminal heat pumps in windows, even when they would be the only cost-effective zero-emission heating option.
- Electrical panel capacity: Service panel limitations can also be a barrier. One participant shared that, even with a 200-amp panel, their home's electric system was strained after adding an electric vehicle and would likely need to upsize their panel to accommodate additional loads from zero-emission heating.
- Grid infrastructure: If an electrical panel upsizing is needed, utility-side upgrades, such as transformer upsizing, can add time and be costly. This is especially true in dense urban areas that have a secondary grid to reduce vulnerability to outages.
- Well water: Staff also heard concerns related to the compatibility of heat pump water heaters with well water systems, which can present unique installation and performance considerations related to high mineral content in the water. Well water challenges exist across many water heater types, not only zero emission.

CARB's related actions, and highlights from other agencies

CARB funded a study to assess *residential service panel capacity statewide*, which found that 3 percent of single-family and 10 percent of multi-family residential buildings could require service upsizing to decarbonize, and that 32 percent of single-family and 59 percent of multi-family buildings would likely require additional load management systems to

decarbonize. CARB is also investigating non-residential building retrofit needs through a contract with TRC Engineers, Inc (TRC).

CARB staff shared the methods used to assess building retrofit needs with public experts and received a number of constructive comments to help improve them.

The California Energy Commission funds a range of supportive research and pilot projects to address energy technology needs. For example, the forthcoming *Residential Decision Tool* research project (under EPC-24-005) will help homeowners determine their electrical panel capacity, identify a path to electrification with the use of low-voltage appliances and load controlling devices (such as circuit sharers and smart panels), and help avoid costly electric service panel upsizing.

The Public Utilities Commission, through their *building decarbonization proceeding*, has encouraged panel optimization (strategies and technologies that support efficient use of the available capacity in an electric service panel) and load monitoring to avoid costly upgrades to electric service by directing the TECH Initiative to create resources that would guide contractors and customers on strategies to avoid panel and service upsizing. To *reduce energization timelines* for electric infrastructure upgrades, they have required utilities to evaluate specific devices (called Meter Socket Adapters) for building electrification that can be used to avoid costly panel upgrades. They have approved "common facility cost treatment" for under-resourced customers undergoing building electrification through a program, so that the costs for upsizing their electric service line, if needed, will be borne by the utility rate base and not fall on the individual customer. They have also reduced the line extension subsidies granted to builders to disincentivize emissive equipment being installed in new buildings.

Lawrence Berkeley National Lab (LBNL) with support from the U.S. Department of Energy (DOE) has been working with the National Electrical Manufacturers Association (NEMA) to adapt their National Electric Code for panel sizing to accommodate additional loads. DOE has launched efforts such as the EZPrice to develop innovative solutions for maintaining panel size.

Rural areas and off-grid buildings face more challenges switching to zero-emission

Listening session attendees living with frequent storm-related outages and entirely off grid in Nevada County shared their experiences. Especially in colder parts of the state, having a reliable heating source is a matter of health and safety. Those who rely on woodstoves for heat underscored the benefits for managing woody debris and forest thinning for fire risk management. Participants shared requests for propane and wood fuel exemptions.

CARB's related actions

CARB's regulation will be fuel neutral, focused on limiting GHG emissions from heating sources, rather than regulating or exempting based on a given fuel type. Basic health and habitability needs must continue to be met under any future zero-emission measure. CARB has a research contract with the consulting firm TRC to better understand propane and wood use, which comprises roughly 5 percent of heating fuel use statewide, to inform our approach to a regulation, and staff are working with CPUC staff to analyze grid issues including reliability, interconnection capacity, and energization timelines.

Preparing the workforce for widespread zero-emission space and water heating adoption

CARB staff heard a range of perspectives related to zero-emission workforce at several listening sessions across California. On the challenging side, participants in Allensworth shared their challenges and frustrations with utility subcontractors involved in implementing affordable energy pilots, citing poor communication and project execution. Fortunately, CPUC staff attending the listening session were directly able to address residents' concerns and begin follow-up efforts. On the positive side, a contractor participating in a virtual listening session described how she helps her clients navigate the often-complex incentive landscape. This proactive approach highlights the important role that informed contractors can play in promoting the adoption of zero-emission technologies.

At United Association of Plumbers and Pipefitters Local 342 site visit and in discussion with the Construction Trades Workforce Initiative and the High Road Training Partnership (HRTP), staff heard about the benefits of high-road workforce policies such as community benefit agreements, prevailing wage requirements, and family-supporting benefits that help build and sustain a skilled decarbonization workforce. HRTP shared findings showing that the broader social benefits of high-road policies outweigh the additional labor costs associated with them.

Finally, staff heard requests for clearer training and education for building workforce on zero-emission technologies. Many emphasized that workforce training is essential to increasing awareness, building confidence with new technologies, and expanding willingness to recommend zero-emission technologies.

CARB's related actions

CARB staff coordinate with the team responsible for integrating Senate Bill 680 *workforce recommendations* into CARB's climate investment planning.

Staff are also developing an analysis of workforce availability statewide to better understand where current contractor availability might present obstacles to zero-emission equipment adoption.

Workforce awareness and readiness for zero-emission equipment is another key focus of the California *Heat Pump Partnership* CARB is participating in.

CARB coordination with other public agencies

Staff heard about the importance of statewide coordination and planning to ensure resource adequacy and align with California's clean energy and climate goals. Participants noted the need to connect the GHG benefits of a zero-emission standard and the state's broader goals of achieving 100% clean energy, expanding access to energy efficiency, and supporting distributed energy resources such as solar and battery storage.

There were also clear requests to improve statewide implementation of rebate and incentive programs by making them more consistent, accessible, and effective. Participants urged CARB to coordinate more closely with other agencies during public engagement efforts on the zero-emission measure. Key areas for inter-agency coordination include:

- Protective housing policies to ensure tenant protections during retrofits needed to install zero-emission technologies.
- Workforce readiness to support a trained labor force for installation and maintenance.
- Long-term affordability, including equitable incentive design and energy rate structures.
- Implementation support, such as integrated energy system planning and building permit streamlining.

CARB's related actions, and highlights from other agencies

CARB staff are aligning strategy with other state agencies that lead energy and building sector policies and planning. For example, staff work with colleagues at the California Energy Commission to include scenarios related to the zero-emission space and water heater standards in the *Integrated Energy Policy Report* to inform long-term energy resource planning by the California Public Utilities Commission. The California Energy Commission proposes and adopts California's Building Energy Efficiency Standards, including statewide requirements in the development of Title 24, Part 6 (Energy Code), and voluntary energy efficiency standards in Title 24, Part 11 (CALGreen), Title 20 appliance efficiency standards, and load management standards. CARB staff have also offered technical recommendations to the Department of Housing and Community Development for potential zero-emission building codes.

The California Public Utilities Commission is also advancing complementary efforts by reducing ratepayer-funded investments in new gas infrastructure where avoidable[3], accelerating interconnection timelines, piloting equitable rate designs, and launching zonal decarbonization initiatives. CARB staff also meet regularly with Air Districts that are considering or have adopted zero-NOx standards for space and water heaters.

Governor Newsom's goal of deploying 6 million heat pumps by 2030 has been a great catalyst for deeper collaboration. This includes the formation of the *California Heat Pump Partnership*, a public-private partnership, where CARB is working to ensure that equity remains a central priority as the state scales heat pump adoption.

CARB participates in a range of interagency coordination efforts and strategic planning venues, including:

- Air District meetings
- Bimonthly calls between CARB, CEC, CPUC, and the California Department of Housing and Community Development (HCD) staff
- California Heat Pump Partnership
- CEC Integrated Energy Policy Report and Energy Action Plan
- Joint Agencies Steering Committee focused on long-term electric grid planning and includes the California Independent System Operator (CaISO), CARB, CEC, and CPUC
- Gas Joint Agencies Working Group focused on long-term gas planning and includes CARB, CEC, and CPUC
- Local climate action plan engagement
- Scoping Plan Updates

Our team will continue to faithfully consider related policies, and work on including other agency perspectives at future workshops and engagement opportunities.

Outreach and education recommendations

In addition to feedback related to the regulation design, CARB staff also heard valuable comments about who we should be reaching, both as we develop as the regulation and in preparation for potential implementation.

In terms of feedback on the regulation development, we received requests to expand our outreach to key groups, including building owners, financing experts, trade associations, and segments of the business community. While we are already engaged with CARB's Ombudsman and small business advisory boards and have received comments from many

[3] This is being done by ending the *gas line extension* and *electric line extension* subsidies.

local chambers of commerce, we recognize the need to create more opportunities to engage in productive dialogue with these groups, so they can share their perspectives as we are considering regulatory pathways.

We also heard several recommendations for improving public outreach and education to raise awareness of zero-emission equipment options and how to install them in homes and businesses. Commentors recommended a range of resources, including guides, site visits, training programs, and robust educational resources with a particular emphasis on strategies that avoid costly panel upsizing. CARB staff anticipate focusing more on outreach and education once we have a revised regulatory concept.

Suggestions for the regulation proposal

During the listening sessions, CARB staff shared a regulation concept that included compliance dates ranging from 2027 to 2033. We received a wide range of feedback in response to this concept. Some participants expressed support for the proposed approach, while others offered recommendations for refining and changing the scope of the regulation. Some suggestions include:

- Incorporating exemptions and flexibility for certain situations.
- Adjusting compliance timelines.
- Including warranty and labor provisions to protect consumers.
- Exploring credit or market-based programs.
- Requiring labeling or stickers on heating equipment.

Additionally, some commenters requested CARB to consider non-regulatory alternatives, such as encouraging local jurisdictions to use voluntary local standards (like *reach codes*, local building requirements that exceed the state code), and developing an interagency strategy to advance building decarbonization.

Staff are taking all this feedback into consideration to inform a full regulatory proposal. Current staff efforts are focused on developing the proposed regulation structure and timeline, outlining equipment certification processes, and designing compliance and enforcement pathways. A revised regulatory concept will be presented at a future public workshop for additional public input.

Outreach Engagement Strategy and Plan: Progress Toward Goals

CARB Staff's Outreach and Engagement Strategy and Plan, published in December 2023, established several goals for the outreach and engagement process. Those goals are written below, with updates on progress and potential next steps.

Consistently coordinate with staff at other agencies around analyses, timelines, and engagement efforts.

Actions towards goal

- Continuing to meet at least bi-monthly with staff from CEC, CPUC, and HCD.
- Working closely with the CEC's Integrated Energy Policy Report (IEPR) team around building decarbonization assumptions used in scenario planning for utility resource procurement.
- Exchanged knowledge about listening session planning with CEC staff engaged in the *Equitable Building Decarbonization* program and the *California Building Energy Performance Strategy Report* development project.
- Invited CPUC staff to attend a listening session where we expected significant feedback shared on a CPUC program.
- Including interagency staff in research progress meetings, CARB staff analysis methods presentations, and public expert presentations, to build a shared conversation and knowledge base around intersecting building decarbonization issues.
- Participating in several interagency strategy efforts related to building decarbonization, including the *CEC 2025 Building Energy Action Plan* review.
- Shared listening session learnings and proposed responses with other agencies, the public expert community, and the broader public at several presentations.

Next steps

- Continue coordinating with other agency staff through regular check-in meetings, peer review, shared engagement opportunities, and focused collaboration on key topics.

Provide updates on interagency coordination at public meetings, such as by including presenters or panelists to speak directly to their work in support of California's decarbonization goals.

Actions towards goal

- Included California Energy Commission, California Public Utilities Commission, and Bay Area Air Quality District leadership at our 2023 kickoff public workshop.

Next steps

- Include presentations from other agency staff and leadership in upcoming public workshops.
- Discuss other agencies supportive policies and programs in staff proposal and implementation plan.

Exchange knowledge with other agencies to deliver consistent, standardized information to the public. Educate the public so that there is a common "language" and understanding of zero-emission standards and related issues.

Actions towards the goal

- Consistently exchanging draft reports, presentations, and other materials with partner agency staff for peer review to convey standardized and accurate information to the public.
- Integrating material from other state agencies in presentations to the public.
- Where relevant, including other agency materials in presentations, and co-presenting when possible.
- Sharing updates on our work with other agencies at regular update meetings.

Next steps

- CARB staff will include interagency staff in reviewing collaborative outreach/educational materials for the public, when possible.
- CARB will develop materials to better communicate the impact of potential standards to a broad audience.
- CARB and Sacramento State are working together to produce public-facing fact sheets about zero-emission standards and aim to seek input and review from community-based organizations to ensure the materials are appropriate and meaningful for the intended audiences.

Engage with and, as feasible, compensate potentially affected persons and organizations to ensure that diverse, expert, localized perspectives are integrated into CARB analysis.

Actions towards the goal

- CARB held a public expert solicitation from December 2023 to February 2024, recruiting over 30 public experts across a wide range of geographies and fields.
- Sacramento State funded 8 public experts from community-based organizations or who are low-income individuals through sub-contracts.
- CARB staff held technical feedback meetings and shared written methods documentation for preliminary review and comment from public experts, covering cost, emissions, and retrofit analyses. The same methods documentation will be shared with the broader public as part of a regulatory proposal.

Next steps

- Although the Sacramento State contract is multi-year, the limit for public expert subcontracts under this scope of work cannot be raised. For any additional funded public expert work, CARB would need to identify additional funding or work with external partners to leverage other funding.
- CARB is exploring more long-term solutions through an agency-wide compensation working group and needs assessment process.

Be transparent and forthright about limitations in the process and scope for developing zero-emission standards, to establish accurate expectations for the public process.

Actions towards the goal

- CARB staff presented the *Outreach and Engagement Strategy and Plan* in December 2023, including the Spectrum of Public Participation, and how engagement activities would fall within each engagement mode.
- CARB staff spent 6 months focused on collecting meaningful input on the regulatory concept described in the May 2024 workshop.
- CARB staff framed listening session questions broadly at this stage, to focus on building a more nuanced understanding of local issues. Broad questions help staff understand the full landscape of issues, and then identify areas where CARB's regulatory design can, and cannot, meaningfully address them, as context-setting for upcoming phases of feedback on specific elements of the proposed regulatory design.

Next steps

- Before the next round of broad public engagement, like the 2024 listening sessions, clarify areas within/outside of CARB control, and highlight other state and local venues for addressing issues related to implementing zero-emission space and water heater standards.
- After staff prepare a formal regulatory proposal, the informal engagement work will pause to ensure a transparent and well-documented written comment process to consider suggested changes to the initial regulatory proposal.

Create opportunities not only for information delivery, but for inclusive conversations between CARB staff and the public.

Actions toward goal:

- CARB staff held 6 public expert technical feedback meetings, where staff presented analysis approaches and requested feedback and guidance from public and interagency experts.
- CARB staff held 11 listening sessions, 4 virtually and 7 in-person. Of these, 8 listening sessions were co-hosted by public expert partners, community-based organizations with deep local expertise and strong connections and outreach capacity.
- CARB staff presented an overview of the regulation process to date at the April 2025 Environmental Justice Advisory Committee meeting, to begin dialogue with them about their goals for regulatory design and implementation.
- CARB offered Spanish interpretation at all public workshops and some listening sessions, where requested.

Next steps

- Continue providing opportunities for meaningful dialogue, while balancing time and energy spent on researching issues and questions raised by the public, and developing robust responses.
- Follow up meaningfully on key issues and themes raised by the public in future meetings. Build on information and perspectives shared thus far, advancing the conversation and expanding public knowledge of solutions available to address the key issues and concerns raised.
- Request iterative feedback on proposed solutions, encourage the public towards participating in meaningful dialogue in other agencies' projects and programs.

Use available resources to maximize accessibility and opportunities for public input in a wide range of locations, times, settings, and sizes of gatherings throughout the state and online. Ensure consistent availability and accessibility of information online.

Actions towards the goal

- Listening sessions and site visits were held during a range of hours, most often in the evening to support attendance after the end of a 9-5 workday.
- Website was kept up-to-date with recordings of public meetings, listening sessions, and information sessions.
- In addition to English, some website materials and recordings are available in Spanish.

Next steps

- Reduce delays in follow-up communications, including PowerPoint slides and streamlining Americans with Disability Act (ADA) compliance.
- Create fact sheets, infographics, and other accessible content beyond slide decks.

Seek out partnerships with diverse organizations (e.g., community-based organizations, nonprofit organizations) to deliver information and expand on the availability of engagement and outreach opportunities that cannot be achieved by CARB alone.

Actions towards the goal:

- As discussed above, CARB held a public expert solicitation and funded groups to participate in reviewing staff methods and co-hosting listening sessions. The benefits of co-hosting listening sessions were clear: CARB staff were able to reach groups who otherwise would not have known about or participated in feedback opportunities.

Next steps

- CARB staff will work to explore possible resources for future funded co-hosted listening sessions. CARB staff will coordinate with others within the agency who are reviewing compensation best practices and developing recommendations.
- Continue to onboard voluntary public experts who wish to support with the regulatory research and implementation planning process.
- After a regulatory proposal comes into focus, identify additional resources to support broad public outreach and education about forthcoming rules.

Pursue a steady state of improvement in the outreach and engagement processes by evaluating outcomes and adapting the process as needed.

Actions towards the goal:

- CARB staff collected and reviewed feedback from attendees at every listening session.
- Requested feedback from a student observer who had selected the CARB listening sessions for a course assignment.
- Completed debrief meetings with each co-host partner to review the meeting summary report for accuracy and completeness.
- Held meeting to share listening session findings back with the group of public expert co-hosts and requested their guidance on ways to improve our engagement work in the future.

Areas to grow:

- Listening session participant feedback form completion is low; identify better methods for collecting feedback on the engagement approach.
- Request that in-person listening session participants opt in to receiving communications from CARB on their sign-in sheets, reach out over email after the session concludes, and enroll them in the program list-serve.

Looking Ahead

After staff refine methods, get more feedback, and develop a staff recommendation, we plan to bring updates on our regulatory concept to our next workshop, which will help focus follow-up discussions on specific design elements and implementation needs.

After a regulatory proposal is clarified, staff will commence the "implementation planning" track of public expert work to follow up on the key implementation issues and needs that have been raised.

CARB staff will continue to engage with public experts, sharing briefings and offering technical feedback opportunities on methods during 2025. These methods will be available for full public review once the regulatory proposal is developed and published.

The public expert application remains open – those interested in participating are welcome to submit an interest form and reach out to CARB staff.

Appendix A: Public Experts

List of Public Experts for the Zero-Emission Space and Water Heater Standards as of August 25, 2025

- Allensworth Progressive Association (funded, listening session co-host)
- Association for Energy Affordability
- Building Decarbonization Coalition
- Carbon Free Palo Alto
- Ceres
- California Market Transformation Administrator (CalMTA)
- Channing Street Copper Company
- Climate Action Campaign (funded, listening session co-host)
- Climate Resilient Communities (funded, listening session co-host)
- Construction Trades Workforce Initiative (funded, listening session co-host)
- Consultancy to the National Propane Gas Association
- Earthjustice
- Emerald Cities Collaborative
- Energy Solutions
- Hearth, Patio, and Barbecue Association (HPBA)
- GRID Alternatives
- Individuals (2) (funded)
- Individuals (2) (not funded)
- Lawrence Berkeley National Laboratory
- Lennox
- Menlo Spark
- Natural Resources Defense Council
- Peninsula Clean Energy
- Pacific Gas & Electric
- Rinnai America
- Redwood Energy
- Rocky Mountain Institute (RMI)
- Southern California Edison
- Sierra Energy Reimagined (funded, listening session co-host)
- Silicon Valley Clean Energy
- SPUR (funded, listening session co-host)
- Strategic Actions for a Just Economy (funded)
- TRC Engineers, Inc.
- Tre' Laine Associates
- Western Propane Association

Appendix B: Sacramento State Listening Session Report

California Air Resources Board
Zero-Emission Space and Water Heater Standards
Fall 2024 Listening Sessions
Feedback Summary

Prepared for:

CALIFORNIA AIR RESOURCES BOARD

Prepared by:

SACRAMENTO STATE
COLLEGE OF CONTINUING EDUCATION

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Background and Purpose

California Air Resources Board (CARB) staff are developing statewide zero emission greenhouse gas standards for space and water heaters. These standards seek to reduce greenhouse gas (GHG) and smog-forming nitrogen oxide (NOx) emissions from new space and water heaters sold in the state to help meet California's climate goals and federal air quality standards.

CARB staff held a series of 8 listening sessions throughout California with the support of community-based co-hosts. CARB partnered with local community-based co-hosts to engage broader participation than those who typically attend their virtual, daytime public workshops. CARB also hosted 3 regional virtual listening sessions to provide additional participation opportunities.

The overall purpose of these listening sessions was to share information about the potential zero-emission space and water heater regulation and hear from the public across various regions in the state. CARB's aims for this listening session were to:

- Share the current regulatory concepts.
- Receive and respond to questions and concerns from the public.
- Help an audience previously unfamiliar with the proposed regulation understand its purpose and potential benefits.
- Identify issues and needs as they relate to the specific region where the event is occurring.
- Present and hear feedback on region-specific barriers to implementation and approaches to addressing them.
- Collect information that will meaningfully inform the regulation design, analysis, and/or implementation.

General Meeting Format and Approach

The structure and design for each meeting varied somewhat based on the co-host recommendations and anticipated attendance levels. However, in general the meetings began with opening remarks by the co-host and a presentation by CARB staff. The presentation for each meeting was tailored for regional issues but in general provided information about CARB, the need for space and water heater zero-emission standards, current concepts for these standards, existing zero-emission technologies, and typical questions that arise in transitioning to zero-emission equipment. A typical presentation and on-line meeting recordings are available on the CARB Zero-Emission Space and Water Heater Standards webpage. After the presentation participants asked questions and provided their feedback, in some cases within breakout groups.

Questions asked to prompt discussion generally included:

1. What are your experiences, if any, with space and water heating equipment replacement?
2. How do you feel about switching to zero-emission space and water heating?

3. Do you have other resources and ideas you would like to share with CARB staff and others in the listening session?
4. What should CARB staff bear in mind as they design a regulation and plan for potential implementation?
5. What/who is missing from the conversation so far? How can we reach and include them?
6. What information and resources would be supportive to you in preparing for switching to zero-emission equipment?

Summary Contents

This document summarizes feedback received at each of the meetings:

- Orange County, Climate Action Campaign (CAC), August 22, 2024, held virtually
- Nevada City, Sierra Energy Reimagined (SERi), September 9, 2024, held in-person
- Allensworth, Allensworth Progressive Association (APA), September 18, 2024, held in-person
- San Francisco, San Francisco Bay Area Urban Planning and Research Association (SPUR), held in-person
- San Juan Ridge, Sierra Energy Reimagined (SERi), September 26, 2024, held in-person
- Concord, Construction Trades Workforce Initiative (CTWI), October 1, 2024, held in-person
- San Diego/National City, Climate Action Campaign (CAC), October 9, 2024, held in-person
- Southern California Virtual, CARB, October 22, 2024, held virtually
- San Mateo, Climate Resilient Communities (CRC), October 23, 2024, held in-person
- Central California Virtual, CARB, October 28, 2024, held virtually
- Northern California Virtual, CARB, October 29, 2024, held virtually

The summaries are organized around topics including:

- Comments on the draft regulatory concept,
- Economic considerations,
- Technical and logistic considerations,
- Contractor availability/training/workforce considerations,
- Electrical grid considerations, and
- Public awareness, outreach and education.

The comments and feedback listed in this summary reflect statements made by listening session participants; they do not reflect CARB staff's views or positions.

1. Orange County, Climate Action Campaign (CAC), August 22, 2024

This listening session was co-hosted by Climate Action Campaign (CAC) during a regularly scheduled CAC meeting. It was held on August 22, 2024, from 6:00 to 8:00 pm, via Zoom. Approximately 40 people attended the meeting, including members of this and other community-based organizations (CBOs), a zero-emission appliance manufacturer, and a gas company. South Coast Air Quality Management District (SCAQMD) staff attended to help answer questions about its related regulations to reduce nitrogen oxides from space and water heaters. Spanish interpretation was provided.

The following summarizes participant feedback provided during this listening session.

Comments on Draft Regulatory ConceptDraft Regulatory Proposal

A suggestion was made to expedite the proposed residential water heater timeline, considering how long these heaters last (20 plus years).

Economic Considerations

Concerns, Challenges, and Barriers

Key feedback themes centered around the cost associated with appliance replacement and challenges related to accessing incentives. Feedback included:

- The upfront cost of replacing space and water heaters is a barrier, even if operating expenses are lower and there is a breakeven point.
    - Costs can be compounded by:
        - A potential need for new and/or upgraded electrical circuits and panels and the associated approvals process.
        - A potential need to relocate the heating unit.
- Challenges related to incentives aimed at reducing costs included:
    - Lack of public awareness about financial incentives.
    - Difficulty in accessing comprehensive information about existing and future incentives.
    - Complexity in obtaining rebates or other incentives.
- Concerns included:
    - Zero-emission space and water heater affordability and accessibility for low-income residents once the standards are in effect and natural gas options are no longer available.
    - Uncertainty about how landlords might pass heater replacement costs along to renters.

Suggested Solutions

Suggestions to address challenges related to cost and incentives included:

- Ways to reduce costs:

    - Streamline approval processes (reduce “red tape”) for panel upgrades.
    - Provide low interest financing.
- Cost information:
    - Provide a break-even analysis. For example, develop a chart for each type of heater replacement that provides the cost range, annual savings, and the break-even point with and without incentives.
    - Provide information about low interest financing.
- Incentives:
    - Provide a one-stop shop for building decarbonization incentives. This will help reduce confusion regarding available incentives and promote incentive stacking to further offset upfront costs.
    - Contractor awareness of incentives is key.
    - Contractor incentives streamline the process for residents.
    - Target incentives to low-income populations and residents of affordable housing units.

Technical and Logistic Considerations

Participants identified a varied list of technical and logistic issues that may create challenges (these also have cost implications):

- New electric space and water heaters may require new or upgraded electrical circuits or panels.
- Certain types of water heaters may require more space than is used by existing heaters.
- Asbestos in the attic complicates installation.
- The capacity and heating speed of currently available electric water heaters may not be adequate for multifamily building needs.
- Questions about zero-emission technologies include:
    - Are they reliable?
    - Do they last as long as current technologies?
- Homeowners Associations (HOAs) restrict or discourage homeowners from making changes.
- People who have newer space or water heating units may be reluctant to replace them.
- In some locations, space heating and cooling is not used often, reducing the incentive to install new equipment.

Contractor Availability/Training/Trust

Challenges

A key theme of participant feedback was the ability to find trustworthy contractors who are qualified and experienced in the installation of zero-emission space and water heating equipment.

Suggested Solutions

- Ensure the availability of qualified and trustworthy contractors.
- Provide contractor training.
    - An example is Southern California Edison's contractor training program (ItsaboutQ.net). The program educates contractors about heat pump installation.

Electrical Grid Considerations

Challenges

- Building electrification in tandem with electric vehicle adoption may strain the electrical grid.

Suggested Solutions

- Include utilities in discussions about the proposed standards.

Public Awareness and Education

Participants offered a variety of suggestions on how CARB can improve public awareness and education to improve the development and implementation of the proposed standards. These include:

- It is important that CARB explain why this regulation is needed in the context of both climate change impacts as well as air pollution.
- Convey the short- and- long-term health impacts of air pollution.
    - Describe how a heat pump works and its benefits.
- Include the following stakeholders in discussions about the standards:
    - Apartment owner associations.
    - Business associations.
    - Public health and healthcare professionals (e.g., American Academy of Pediatrics).
    - Installers.
    - Power providers.
    - Youth.
- Clarify how CARB reaches out to the public and where public events are held.
- Communicate in multiple languages.
- Provide avenues to access information.
- Target information about incentives to low-income populations and residents of affordable housing units.
- Local groups, such as Orange County Climate Coalition, can help expand outreach and connect people who are interested in finding out more information, networking, and learning from each other.

2. Nevada City, Sierra Energy Reimagined (SERi), September 9, 2024

Sierra Energy Reimagined (SERi) co-hosted this listening session on September 9, 2024, from 5:30 to 7:30 pm, at the Madelyn Helling Library Community Room, 980 Helling Way, Nevada City, CA 95959. Approximately 28 people attended the meeting, including local residents, many of whom live partially or fully off-grid, and some in the hearth industry.

The following summarizes feedback received at the meeting and provided to SERi prior to the meeting.

Comments on the Draft Regulatory Proposal

Support was expressed for the draft regulation's focus on manufacturers.

Questions were raised about the benefits and effectiveness of eliminating space and water heaters powered by non zero-emission fuels such as propane and wood. Given these questions, along with the need for back-up fuels (described below), additional options for space and water heating fuel sources were requested and recommended. Feedback included:

- Comments about the draft regulation's overall approach:
    - Environmental policies can expand choice, meet needs, and achieve climate goals. The proposed regulation would not accomplish these goals. It is not necessary to phase out certain fuel types.
    - Address the bigger picture rather than pieces of the problem. Begin by addressing transportation which has a greater impact.
    - Consider a lifecycle comparison of fuel emissions from cradle to grave.
    - Limit airplane trips instead of focusing on home appliances.
- Feedback related to propane:
    - Differentiate natural gas and propane. It was asserted that propane is much cleaner and generates very small amounts of Carbon dioxide (CO_2). (CARB notes that methane leaks have higher global warming potential, however propane produces greater amounts of CO2 during combustion.)
    - Data was provided to support an assertion that natural gas contains more trace elements than propane. Concern was expressed that the propane lifecycle and comparative benefits to natural gas are not being seriously considered.
    - There is a big difference in the quality and cleanliness of propane from California (which is produced in a refinery) vs Texas (from oil fields). Consider differentiating based on propane sources.
    - Propane condensing boiler efficiency is very good – uses only 3.4 gallons of propane per person per year. These boilers avoid the need for larger batteries and are necessary for living off the electrical grid.
    - Because propane demand condensing water heaters use small amounts of propane and generate very little NOx, it is a very poor solution to eliminate this choice for rural homes. A high efficiency demand condensing water heater uses so little propane per

year it would not make any difference in the emissions outcome. A heat pump water heater uses significantly more energy when considering the inefficient storage of hot water and the inefficient conversion of energy from solar to battery to power the heat pump to keep water hot for evening showers.

- Allow burning of wood productively in wood stoves for heat, rather than wasting energy and producing smoke from controlled burns to manage forests. Carbon produced by wood stoves has a short-time cycle, as compared to carbon from burning fossil fuels.
- Allow more flexibility for rural areas where electrical power is not reliable. For example, allow a transition to propane fuel 94% efficiency condensing demand water heaters in rural areas.

Questions were also raised about the relationship of the proposed rules to other government programs:

- The federal government and Northern Sierra Air Quality Management District are offering payments for the installation of new high efficiency wood burning stoves. The Air District also offers a biomass tax credit for wood burning stoves. Are these programs counter to the zero-emission space and water heater effort?
- CARB needs to consider this regulation relative to US Environmental Protection Agency wood stove efficiency regulations.

Electrical Grid Considerations

A key feedback theme centered around the lack of sufficient and reliable electric power supply and the associated need for back-up systems.

Challenges

- To make the proposed transition, along with other electrification initiatives, electric supply infrastructure needs to be reliable and cost-effective. The electric grid in Nevada County is unreliable. It is old and not properly maintained.
- Pacific Gas and Electric does not have sufficient capacity. New transmission lines may be needed; this could delay the proposed regulation.
- Electrical outages occur in this area. Sometimes the outages last for days or longer. People may be stuck in their homes during winter storm outages, for example due to downed trees along the road; they need a back-up source of heat. In addition, storms are expected to become more severe due to climate change. Many residents are senior citizens. During very cold weather, lack of a backup heat source could be life threatening.
- Given the above, it is critical to allow non-electric backup options/redundancy to supply power during outages. These include wood stoves, propane heaters, and propane or natural gas backup generators.
- Although the need for backup is particularly important in rural areas, it is also appliable to urban areas.

- Some residents in this area live off the grid; they are not connected to public electric utility lines. They may have solar systems with batteries and/or propane fueled heaters, for example. Concerns were raised about the feasibility and cost of developing an off the grid system that generates sufficient electricity to power space and water heaters, along with other appliances such as electric stoves, and have a back-up supply, as discussed above.
- Small back-up generators are highly polluting and inefficient.

Suggested Solutions

- Invest in residential solar rather than large solar farms.
- Provide assistance for residential solar and battery systems.
- Promote community solar systems.
- Investigate local microgrids and local community power solutions.
- Develop energy efficiency strategies through energy auditors.
- Use potential energy (elevation changes) to generate power and feed that into the grid.

Economic Considerations

Challenges

- The cost of replacing heaters as well as operating electric heaters (due to high electricity prices) was a central feedback theme. Cost concerns included:
- There are many people in this area who cannot afford to replace space and water heaters, even with rebates.
- Additional retrofits needed to install new zero-emission heaters, such as upsizing an electrical panel, significantly add to these costs.
- The cost of electricity is high and has been increasing. It makes running a heat pump unaffordable to many.
- Nevada County includes a significant senior/retired population on a fixed income. Some receive support from Nevada County's senior wood heat program because they cannot afford propane or electricity. There are also low-income working populations.
- There is an economic inequity between people who can have their own solar system as compared to people who either cannot afford to install a solar system or whose homes are on lots that are not suitable for solar (e.g., wooded or with poor land orientation).
- Costs would be prohibitive for those who live off the grid to develop a system to supply sufficient electricity.

Suggested Solutions

Suggestions to address challenges related to cost include:

- Provide additional financial support beyond rebates.

- Reaffirm that there would be no requirement to replace existing space and water heaters until the end of their useful life
- Consider subsidies to cover additional costs associated with zero-emission heaters (above costs for natural gas heaters) in low-cost housing.
- Consider on-bill financing for replacing space and water heating. 30-year financing has been offered in the past as an on-bill discount.

Technical and Logistic Considerations

Challenges

Participants identified the following concerns associated with zero-emission technologies, based on their personal experiences:

- Electric space heaters do not always provide sufficient capacity.
- The outside air compressor for an electric space heater is very loud.
- It takes a long time for a user to figure out an electric heater system.
- Using well water with an on-demand electric water heater creates challenges. It may void the manufacturer's warranty.
- New technologies may not be reliable or last as long as existing technologies.
- A heat pump water heater is ineffective because it consumes more than half of its energy to keep water available.

Suggested Solutions

- CARB should require a warranty on zero-emission equipment and ensure the warranty is sufficient and comparable or longer than current technologies' warranties.

Contractor Availability

Challenges

- Contractors do not have experience with new equipment.
- Access to qualified contractors is a challenge in rural communities.
- Having to use contractors who do not live in the area increases the cost because they charge for travel and lodging.

Public Outreach and Education

Suggestions for additional people or organizations to include in conversations about this regulation:

- Low-income populations,
- The federal government,
- Pacific Gas & Electric (PG&E),

- California Energy Commission,
- Heating, ventilation, and air conditioning (HVAC) businesses, and
- Organizations that can provide financing.

Other comments related to public awareness and education include:

- Provided targeted outreach to landlords, especially for multi-family buildings, to explain how this regulation can benefit them.
- Provide opportunities for public input from people who are not able to attend public meetings (parents, those who work multiple jobs or in agriculture, etc.).
- Encourage Sierra College to teach a course about this topic.
- Develop a statewide education program and roll it out to local colleges.

3. Allensworth, Allensworth Progressive Association (APA), September 18, 2024

This listening session was co-hosted by Denise Kadara, President of the Allensworth Progressive Association (APA) on September 18, 2024, from about 5:00 to 7:00 pm, at the Allensworth Elementary School, 3320 Young Road, Allensworth, CA.

It was held during one of the APA's monthly "Cafecito" meetings. Approximately 15 people participated, mostly local community residents and some members of local environmental, environmental justice, and other community-based organizations. Many of the meeting attendees participated in a California Public Utilities Commission (CPUC) San Joaquin Valley (SJV) pilot electrification program, which provided free electrical appliances. A CPUC staff member was present to help answer questions and address concerns about the pilot program. Simultaneous Spanish interpretation and meeting materials in English and Spanish were provided.

The following summarizes feedback received at this meeting.

Comments on the Draft Regulatory Proposal

Participants expressed concerns about proposed regulatory timelines in relation to the community's electrical infrastructure readiness. Specific comments included:

- The proposed 2027 compliance date is concerning. The community lacks sufficient infrastructure to support this transition.
- Electrification is following similar patterns of previously unjust transitions. People who must wait years to get an electrical upgrade will be left behind. Without proper supporting infrastructure, the community will not be ready.
- CARB should look ahead to assess what infrastructure will be available in Allensworth and similar communities in the next few years, and reassess compliance dates accordingly.

Economic Considerations

Challenges

- How can the regulation's intended air quality benefits be justified when the proposed transition would result in significant financial burdens for people who cannot afford it?
    - We need to make sure people can feed their families before considering these new heaters.
- Tenants could face increased rents or evictions if landlords pass along the cost of new appliances.
- Landlords will incur additional costs.

Suggested Solutions

- Provide a robust program that subsidizes the cost of zero-emission heaters, as well as home weatherization.
- Provide assistance to low-income families.
- Battery storage is necessary to offset peak electricity costs.
- Protect tenants against increased rent and displacement.
- If landlords receive financial assistance, ensure savings are passed along to the renter.
- Ensure a variety of products are available/there is no monopoly.

Technical and Logistic Considerations

Challenges

- The time needed for electrical upgrades can be an issue.
- Building readiness can create challenges. As an example, for the SJV pilot program, many homes needed substantial repairs to qualify for free appliances. Most homes did not meet battery placement requirements related to the distance between the battery and a window.
- Many community members are afraid to apply to for free appliances because they fear building inspections.

Suggested Solutions

- Provide flexibility for battery placement requirements, for example allow them to be placed on concrete pads.

Electrical Grid Considerations

Challenges

- The electrical grid in this area does not have sufficient capacity or reliability to support the proposed regulation.
- Electrical outages occur regularly and are a major problem.

Suggested Solutions

- Provide staff that can offer support during electricity outages.
- Support communities with unreliable electricity by providing backup batteries.
- Strengthen the local electricity grid to improve reliability.

Public Outreach and Education

The following recommendations were made to improve communications with the community:

- Work with community organizations and leaders in the area. They know how to get information out in the community.
- Educate communities about their options.
- Require utilities to provide more education about bill discounts.

Concerns with the SJV Pilot Program

A substantial portion of the meeting focused on participants' experience with the CPUC's SJV electrification pilot program. This feedback has relevance in terms of issues related to transitioning to zero-emission equipment and lessons learned to inform future assistance programs.

- The pilot program did not understand or respect what people wanted. Community members wanted natural gas, but they were told they were going to receive electrification.
- There was a lack of clear information ahead about eligibility. Some people were initially told they were eligible but later told there was a mistake and they did not qualify, or only qualified for some but not all appliances offered.
- Contractors hired for the program did not provide the necessary communication, information, or follow-up. They did not have the sensitivity needed to work with disadvantaged communities (DACs). For example:
    - Appliances were installed without further information. There was no customer service support.
    - Contractors punched holes in peoples' walls and did not come back to repair them.
    - Contractors told people they would come back later to address various issues, but did not.
    - Contractors failed to communicate and provide information when some equipment stopped working. Examples of appliances not lasting long were cited, along with the difficulty of getting the contractor to repair it.
    - Although program implementers provided a list of equipment that was installed and warranty phone numbers, many people did not receive that information.
    - Program participants were told they qualified for a Tesla backup battery. It took 2 years for the contractor to obtain the batteries due to supply chain issues that were prevalent during COVID. People were told it would not be possible to install the battery once

inspectors came to install it, for example due to stringent Tesla battery requirements for placement in the home (too close to windows, in this case). This should have been known and communicated ahead of time. There were approximately 150-160 families that did not qualify for a Tesla battery. Providing electrical appliances without batteries was a disservice as the cost is far more than anticipated.

- The above caused distrust in the program. Community members felt they were not treated with dignity and received "marginalized" service. They felt they were talked down to because they are communities of color. A question was raised about whether this pilot was an "experiment" tested on this community.

The CPUC staff member present committed to following up with the community members to address these concerns.

4. San Francisco, San Francisco Bay Area Planning and Urban Research Association (SPUR), September 24, 2024

This listening session was co-hosted by the San Francisco Bay Area Planning and Urban Research Association (SPUR) and held on September 24, 2024, from 3:30 to 6:00 pm, at the SPUR Urban Center, 654 Mission Street, San Francisco, 94105. Approximately 24 participants attended the meeting, representing environmental and energy advocacy organizations, affordable housing developers, local government, energy providers, heating ventilation and air conditioning (HVAC) industries, air quality and energy regulators, and academia.

In addition to CARB's presentation, this meeting included the following presentations:

- Representatives of Mission Housing Development Corporation, a non-profit affordable housing developer in San Francisco's Mission District, discussed their experience developing all-electric Accessory Dwelling Unit (ADU) projects and associated challenges and opportunities.
- A Bay Area Air District (BAAD) staff member described the District's Rules 9-4 and 9-6, which will limit the sale of small space and water heaters to those with zero nitrogen oxide (NOx) emissions.

The following summarizes feedback received at the meeting.

Comments on the Draft Regulatory Proposal

Participants were generally supportive of the proposed regulation's purpose. Specific positive comments about the regulatory concept presented included:

- Beginning with smaller water heaters will be beneficial to monitor progress at the outset.
- The alignment of CARB's regulatory timeframes with those set forth in Bay Area and South Coast Air Quality Management Districts' (BAAQMD and SCAQMD) space and water heater regulations is helpful.

The following concerns were expressed:

- The compliance dates do not allow sufficient time for those with multiple buildings to complete the work required.
- Nothing should be mandated unless there is a permanent funding source for equipment costs as well as other costs, such as panel upgrades. The required transition is not financially feasible for many, including affordable housing providers.
- There will be a lot of opposition to this regulation due to increased operational (electricity) costs. People will not transition to electric appliances if their electrical bills will be higher.

Suggestions included:

- Combine zonal decarbonization with zero-emission heater regulations.
- Provide exemptions for difficult cases.
- Provide "carve outs" until better technology is available.
- Consider an exemption model similar to the SCAQMD's approach of allowing temporary low NOx equipment installation for difficult cases.
    - However, it was noted that this could lead to piecemeal decarbonization in equity communities.
    - Provide flexibility in rules for different types of buildings.

Cost/Financial/Equity Considerations

Challenges

- Upfront costs of purchasing and installing new equipment will be challenging for many people.
- The required transition is not feasible from a cost perspective for those who own large or multiple buildings. Central heating requires too much work. Existing incentive funding does not adequately cover the cost.
    - The potential need for panel upsizing and service capacity upgrades can lead to increased upfront costs.
- Current incentives do not sufficiently address upfront cost challenges.
- Current incentives would only cover about a very small portion of the necessary transition.
    - Utilities cannot provide sufficient incentives.
    - People do not know about incentives and how to access them.
- In addition to upfront costs, operational cost is a major challenge.
    - Electricity rates are currently high.
    - Electricity costs are variable over time; there is no certainty around rates.
    - Pacific Gas & Electric Company (PG&E) prices have increased substantially.

    - Electricity costs vary depending on the utility provider.
    - Complying with the proposed regulation will increase energy bills for most people. It will be difficult to tell people they must do something that will cost more. It will be difficult to justify investing in new technology that will be more expensive to operate.
    - The transition will not be accomplished if electricity rates are not lowered to be comparable to natural gas prices. Use of electric space and water heaters instead of gas heaters only makes economic sense if the cost of electricity is less than 4 times the cost of natural gas.
- The proposed regulation and associated cost increases would raise equity concerns by:
    - Dividing the population between those who can and cannot afford the cost of electrification.
    - Setting up situations where people who are served by different energy providers will be subject to greater costs impacts. The impacts of the regulation will be very different based on where you live and who provides electricity to your location.
- Because this program is mandatory, people may be pushed into financing, raising the possibility of predatory financiers. On-bill financing could result in scenarios in which a consumer cannot pay their loan payment but still needs to heat their home.

Suggested Solutions

- Suggestions to improve the effectiveness of incentives:
    - The State of California should provide additional incentives.
        - Sufficient incentives could bring cities to the table that want to do this transition. Then, these programs could eventually spill over to cities that do not currently have the political will.
    - Provide certainty about incentive programs.
- Design incentives around what makes heat pump upfront costs higher.
    - Provide incentives for panel upgrades as a standalone offering.
    - Pair incentive programs with energy efficiency upgrades.
    - Streamline all the incentives and make them point of sale. Make access to those programs as simple as possible.
    - To address issues related to the general population's knowledge of incentives:
        - Promote incentive programs more.
        - There are incentive models that work on the manufacturing side.
- Suggested options for lowering electricity rates and improving the cost of electricity relative to natural gas:
    - Implement a CARB cap and trade program on natural gas pricing.
    - Implement a policy mechanism to achieve a 4:1 ratio of electricity to gas rates.

- Senate Bill 1221 provides an opportunity to improve the cost ratio through zonal decarbonization.
    - Municipal electricity providers can offer lower rates.
        - Utility providers such as PG&E should not be legally allowed to provide electricity for profit.
    - Remove wildfire funding.
    - Try new energy rates based on income tiers.
    - Provide strong equity program financing.
    - Tax natural gas.
    - Pass legislation forcing utilities to recoup more costs through natural gas customer rates.
        - Add income tiers to ensure equity.
        - Provide a climate credit to help equity customers come out neutral.
- Do not rely solely on approaches such as Community Choice Aggregation (CCA) to address electricity rates. These may result in equity issues because they would benefit some places such as Sonoma, Berkeley, and Sacramento, but not other places such as Fresno.
    - CARB should extensively collaborate and partner with the California Public Utilities Commission on electricity rates.
- For buildings where transition is difficult:
- Consider programs like SCAQMD alternative pathways for compliance that gives people more time with an ultra-low NOx unit instead of zero NOx. However, this raises equity issues in that those people will have to pay for installation costs twice.
    - Loaner programs.
    - On-bill financing.
    - CCAs could subsize heat pump loaner projects, but this carries risks.
- Assure that people are not vulnerable to predatory lending.
- Leverage lessons learned in other industries, such as solar power, regarding residential consumer financial protections.
    - There might be an option where green banks provide financing through contractors.
    - Consider on-bill financing.
- However, as noted above, on-bill financing could result in scenarios in which a consumer cannot pay their loan payment but still needs to heat their home.
- Identify strategies to avoid the need for panel upsizing and servicing capacity upgrades, thereby avoiding associated costs. See also Technical and Logistic Considerations below.

Technical and Logistic Considerations, Particularly in Dense Urban Settings

Challenges

- Installation of new zero-emission heaters in larger buildings is complex.
- Increased electrical loads may cause the need for panel upsizing and service capacity upgrades.
- Heat pumps require more space for hot water storage, which allows for water heating during off peak hours. The physical space needed is about 3 times as much as current systems. Not all properties have space to accommodate this. Existing boiler rooms are very small. Often, the rooftop is the only option.
- Some projects install additional systems to provide redundancy due to the risk of losing hot water, but many buildings do not.
- Many contractors believe that heat pumps must be installed with back-up electric resistance. When water temperature set points are very high (140°F), winter bills have gone up because resistance heaters are working all the time.
- Many heat pump systems are installed without controls and diagnostics to monitor system efficiencies.
- Technicians who used to operate steam powered building appliances must be trained to operate these new systems. Building owners, tenants, and operators need to be able to monitor operations, especially for affordable housing. They are not used to dealing with controls.
- Window units are easy to tamper with and present security issues at multifamily housing projects. Code requirements may also necessitate installation of a permanent HVAC system.
- Plug in units are louder due to their fixed speed. They also require emptying out the condensate pan.
- Installation of additional electrical equipment raises challenges and questions about the need for new or upgraded transformers, where transformers would be placed, if they would be required onsite, and who would bear the cost.
    - The need for transformers varies for each utility.
    - Regarding placement of transformers:
        - Building owners do not have much say in where transformers are located.
        - There is not much room under sidewalks.
        - If transformers are placed under sidewalks, who pays for the sidewalk work?
        - Would the cavity need to be enlarged and weatherproofed?
        - It is difficult to obtain utility approval for installation of the transformer underground.
        - Building space may be lost to accommodate a transformer.
        - Installing underground transformers can take a long time (potentially up to five years). This time delay is particularly challenging for affordable housing projects, which have funding tied to completion dates.

    - When a building is sold or abandoned, there may be no party responsible to maintain the transformer.
- Although most statewide zero-emission space and water heaters would fall outside of impacted circuits, highly impacted circuits can be an issue.
- The proposed regulation's compliance dates do not allow sufficient time for those with multiple buildings to complete the work required. The time necessary for Pacific Gas and Electric (PG&E) upgrades further constrain the ability to meet the compliance dates.
- Landlords and tenants may distrust program administrators coming onto their property because of other code violations.
- It may be harder to transition to zero-emission space and water heating in rural counties.

Suggested Solutions

- Identify strategies to minimize the need for panel upsizing and servicing capacity upgrades. Possible solutions include low-amp equipment, such as a 120-volt heat pump water heater or a 120-volt induction stoves with built-in in batteries, and pairing a 100-amp panel with a battery.
- Suggested solutions to overcome space challenges:
    - Rather than one large 1,000-gallon tank, a few parallel smaller tanks could be an option.
- Divide the new equipment required among different floor levels within a building.
    - Use an integrated heat pump water tank (packaged units).
- Aris Hydronics, funded by the US Department of Energy (DOE) may be an innovative solution for multifamily building decarbonization in the future.
- Use novel form factors for heating, such as the "Gradient" window unit.
- Since storage space is limited, there could be more opportunity for innovation. How much energy can you store in a lithium battery versus water storage tank? Perhaps there could be more innovation grants, such as through the CEC's Electric Program Investment Charge (EPIC) program.
- Develop optimization strategies to scale up systems for redundancy.
- It may be in CARB's authority to require some sort of diagnostic in the heat pump equipment. It would be helpful to have controllers that can track multiple buildings. On-site maintenance staff should be trained to not turn off controls.
- Monitor electrification projects with goal of being able to do demand response.
- Provide a new training program for building operators to learn the basics with operating new space and water heating systems.
- Promote heat pumps rather than electric resistance heat.
- Set standards or best practices for HVAC installations regarding backup electric resistance. The vast majority of California's climate does not need backup electric resistance, especially with variable speed heat pump space conditioning systems.

- Use technologies such as onsite solar systems or direct current (DC) microgrids to address challenges associated with electric utility grid.
- Land use density provides an opportunity for shared district systems.
- Address highly impacted circuits through technologies such as smart panels.
- Identify potential locations for zonal decarbonization, where equipment at the end of its life would be replaced.

Aligning Municipal Planning with Clean Air Rules

Challenges

- Installing new equipment in compliance with different, and sometimes competing, standards from various agencies (e.g., historic preservation, Americans with Disabilities Act (ADA)) presents a challenge for property owners.
- Different rules across local jurisdictions would present a challenge to property developers.

Suggested Solutions

- The following support from CARB was suggested to help local governments implement the proposed regulation:
    - Provide funding and technical assistance to support the transition.
    - Provide exemptions or additional technical assistance for difficult cases; clarify how to treat these cases.
    - Allow local governments to focus on implementation.
    - Be aware that local government is not a single entity – it includes many different departments, which may or may not be on the same page and could vary from city to city.
    - Clarify whether building departments will have an enforcement role for the proposed regulation.
    - Do not add a barrier by adding more permitting requirements. Make permitting easier.
    - Assure cohesive and consistent rules across cities. Ensure consistency with building codes.
    - Address competing priorities of different agencies that add challenges for homeowners and property owners.
    - Coordinate messaging among various agencies.
    - Conduct outreach to and education for municipal agencies (especially building inspectors)

- To encourage building decarbonization in general:
    - Support building decarbonization with funding, perhaps from a carbon tax or impact fee, and provide equity provisions.
    - Support zonal decarbonization/strategic neighborhood gas decommissioning.
    - Find ways to align zonal decarbonization with equity and cost priorities (reducing cost of gas system).
    - Partner with public utilities.
    - Connect housing and climate organizations.
- There may be an opportunity for communities to opt in where building decarbonization is a priority based on local Climate Action Plans.

Workforce Considerations/Contractor Availability

Challenges

- If contractors do not have an existing relationship with a client, their instinct and incentive may be to make projects as comprehensive as possible, to over build rather than under build. Reduced costs for a project could be loss of revenue for a contractor.
- There are many areas of the state where there are very few contractors with sufficient expertise and technology is not as accessible. These communities are often reliant on wood heat.

Suggested Solutions

- Ensure contractors receive training on the front end. Focus on the skills and capability of technicians who are running space and water heating systems. Contractors should be encouraged to be more creative and develop modular heat pump systems integrated with solar systems.
- Develop a set of messaging for contractors that conveys win-win situations. For example, if projects are proposed with longer timelines, the contractor could end up with two projects instead of one project, which would provide more revenue.
- Educate contractors about when upgraded electrical panels are and are not required.

Public Outreach and Communications

Challenges

- There is a need for clarity, outreach, and education.

Suggested Solutions

- Outreach and communications related to development of the regulation:
    - Reach out to chief operating engineers for feedback. They deal with these systems holistically.

- Conduct more sessions like this one.
    - Outreach and communication about the regulation once adopted:
- Messaging:
    - Make the importance of space and water heating more apparent.
    - Explain costs vs. climate, care for home and environment.
    - Focus on benefits beyond air quality.
    - Different approaches are needed for emergency replacement vs. pro-active replacement.
    - Promote efficiency programs to affordable housing.
- Who to reach out to:
    - Contractors. Focus on contractors as point of communication with consumers. Homeowners will not know about the rule but will hear about it from contractors.
    - To do so, reach out to contractor trade associations. Distributors/distribution centers could be a good place to help train contractors.
    - Different trade associations, e.g., those focusing on commercial and residential, multi-family and single family residential, new construction and renovation.
    - Municipal building inspectors.
    - Heat Pump Partnership.
    - Underserved populations.
- Methods
    - Public media.
    - Social media.
    - Spread the word through community based and other organizations.
    - Marketing approaches.
    - Include messages about the rule in Bay Area Regional Energy Network (BayREN) flyers about saving energy.
    - Let cities focus on getting the word out to residents.

5. San Juan Ridge, Sierra Energy Reimagined (SERI), September 26, 2024

This was the second listening session co-hosted by Sierra Energy Reimagined (SERi). It was held on September 26, 2024, from 5:30 to 7:30 pm, at the North Columbia Schoolhouse Cultural Center, 17894 Tyler Foote Road, Nevada City, CA 95959. Approximately 20 people participated in the meeting, primarily area residents and some members of energy, environmental, fire, tax, and other community-based organizations.

The following summarizes feedback received at this meeting.

Comments on the Draft Regulatory Concept

Feedback about the draft regulatory concept centered around the need to consider and tailor regulatory requirements for conditions specific to this rural area, such as a substantial off-grid population (residents who are not connected to the local electrical supply grid), regular power outages due to winter storms or fires, and the essential need for reliable winter heat. Those who live off-grid rely on propane, wood, and/or solar power.

Comments included:

- Take a slower approach; extend the compliance schedule.
- Provide carve-outs and exemptions for people in rural areas who are not able to replace their appliances with zero-emission equipment.
- Allow for more heating options.
    - Allow wood stoves and heating.
        - Large properties (e.g., 30 acres) include ample wood to heat a household.
        - Wood stoves for heating assist with wildfire mitigation. Forest thinning is required in any case.
        - Wood is a reliable substitute for propane.
    - Consider biomass as a fuel for generating electricity.
    - Allow propane-fueled appliances.
        - They require very little power (they can work by hooking up to an inverter or operating on a 12-volt battery).
        - Propane is necessary to back up solar systems during times of year without sufficient sun exposure.
    - Consider geothermal technology, which is very energy efficient. It would need to be augmented with more heating sources, but it provides baseline heating needs.
    - Assess lifecycle emissions of zero-emission technology (e.g., battery production emissions).
- Specify complete, practical solutions with specific equipment and implementation steps. The regulation should not leave people to figure out how to make the transition on their own.

Electrical Grid Considerations; Solar Power

Concerns were raised about the electrical grid's capacity to accommodate increased demand. The need for easier access to residential solar power was highlighted.

Challenges

- The existing electrical grid does not have sufficient infrastructure to handle existing demands or additional load. Brown outs currently occur.
- Residential solar power is not accessible; concern was raised that Pacific Gas & Electric (PG&E) would discontinue supportive programs.

Suggested Solutions

- If regulations are imposed at a state level, the state needs to provide power.
- A major public works program is needed to expand the electrical grid.
    - More electrical poles would be needed in this area to accommodate zero-emission appliances such as heat pumps.
- Make individual solar power systems more accessible.
- CARB should work with utilities to improve programs that make residential solar power economically feasible.
- Ensure that PG&E continues programs that support the financial feasibility of residential solar systems.

Economic Considerations

Challenges

Cost and affordability were seen as a major barrier to complying with the proposed regulation. Concerns included:

- Residents in this area cannot afford to connect to the electrical grid (it costs about $30,000-50,000 for a hook up).
- The cost of retrofitting existing systems (such as propane) and living off grid is high.
    - Solar panels are costly with limited available incentives. Wood stoves provide a more economic and reliable source of heat.
    - Transitioning may necessitate changing the electrical panel and requires more space, further decreasing affordability.
- This regulation may not be affordable for people with low income and those living on a fixed income.

Challenges to receiving rebates were noted:

- Rebates are difficult to qualify for.
- The need for a permit is a major barrier for getting a rebate. People in rural areas do not want to allow inspectors on their property.

Suggested Solutions

Suggestions to address cost challenges include:

- Offer rebates now, make them easy to access.
- Provide rebates for the equipment and allow people to install it themselves.
- However, it was noted that installing equipment yourself may void the warranty.

Technical and Logistic Considerations

Challenges

- Installing zero-emission technologies can impact off-grid systems.
- Outages are a significant concern. This area has a history of power outages, often related to snow conditions. In some cases, power outages last up to two weeks.
    - People at the end of electrical lines are more susceptible to outages, especially during snowstorms.
    - People do not trust that PG&E will be dependable for the help needed during outages.
- PG&E is stopping its tree removal program, which will result in more power outages.
- Some properties have dense tree cover, limiting the hours of sun and making onsite solar power infeasible as an alternative to natural gas.
- A system run on propane with a backup generator provides sufficient heat; a generator is required for heating when snowed in for a few weeks.
- Heat pumps are not efficient for heating. This technology relies on circulation of air to heat a house. Solid mass heating is more efficient.
- Residents in this area fear having inspectors come to their home and having their home red tagged. People live in various unpermitted structures, such as yurts. In addition, the culture here is to not invite unknown people in.

Potential Opportunities

- Focus on lowering energy requirements through building architecture and insulation rather than using heat pumps.

Contractor Availability

- It is difficult to get contractors in this area.
- In some cases, contractors charge an additional fee just to come to the area.
- It can take a long time (weeks) for contractors to come to the area and provide an estimate.

Public Outreach and Education

- Government should learn the culture of the places and people they plan to regulate.
- Conduct outreach through the local radio station and hold meetings in person. Many in this area do not have high speed internet or television.

6. Concord, Construction Trades Workforce Initiative (CTWI), October 1, 2024

This meeting focused on workforce considerations related to the proposed regulation. It was co-hosted by Construction Trades Workforce Initiative (CTWI), with the aim to hear from labor and industry experts about high road strategies for developing and sustaining the necessary skilled workforce.

This listening session was held on October 1, 2024, from 11:00 am to 1:00 pm, at the UA Plumbers & Steamfitters Local 342 Apprenticeship Training Facility, 2450 Whitman Road, Concord, CA 94518. Approximately 35 people participated in the meeting, representing union and other labor organizations; building trade groups; energy and air quality regulators; energy, environmental, policy, and business organizations; local government; energy providers; and academia.

This meeting included, in addition to CARB's presentation, a panel discussion followed by general participant questions and comments. Panelists were:

- Andreas Culver, Alameda Building Trades Council
- Brad Hoover, DNV
- Mike Afonso, UA 342
- Tim Frank, CTWI

The following summarizes feedback received at this meeting.

Comments on the Draft Regulatory Concept

- Consider geographic/neighborhood decarbonization rather than transitioning appliances throughout the state. This could maximize benefits in areas where it makes sense to decommission natural gas and convert to all electric. Assembly Bill (AB) 1221 provides pilots for neighborhood decarbonization.
- Consider all those who will have to implement this regulation (cities, store owners, etc.). Identify the information and resources they will need. Build into the regulation time and resources to get people ready to make the program successful.

Labor/Workforce Considerations

Challenges

- Implementation of the proposed regulation requires the development of a highly skilled workforce. Workers need to be prepared for the work generated by the proposed regulation. It takes years of study and training to gain the necessary skills.

- To ensure contractors are well trained to handle all situations they may face, a combination classroom and supervised on the job training is required for a State licensed apprenticeship program. For example, 1,070 classroom hours of training is needed for an HVAC technician. Short-form trainings are not a substitute for apprenticeships.
- Small non-union contractors may not have the resources to take on apprentices.
- Becoming a union signatory can give small contractors access to union training resources.
- Some of the zero-emission systems are complicated and require high quality installations. Residential appliance installations are often performed by non-union contractors, who may not be as well trained, affecting the quality of these installations.
- The proposed regulation has the potential to result in adverse impacts on workers if labor standards are not required. An example of such problems occurred with residential rooftop solar installations. Funding and subsidies were available, and many companies conducted residential solar rooftop installations with workers who were trained only for two weeks. Work was done primarily by non-union workers with lower pay and without opportunities to progress in their career. The work was short lived and not sustainable. Conditions were unsafe. The workforce had no transferable skills and collapsed.
- If contractors are not qualified, they may not do everything necessary to ensure that appliance refrigerant does not leak and that it is recovered at the end of appliance life, greatly affecting its global warming impact. This is discussed further below, under Technological and Logistical Considerations.
- The individual homeowners will go for the lowest bid and not necessarily the most highly trained contractors.

Suggested Solutions/Opportunities

- Design a regulatory program and implementation plan that:
    - Creates “high road” jobs.
    - Creates sustainability for workers.
    - Provides contractors a place to grow.
- CARB and other state agencies should implement strategies to encourage using trained/skilled labor.
- UA 342 can be a strong partner in this transition and training, as well as other key climate/decarbonization impacted trades such as International Brotherhood of Electrical Workers (IBEW) and Sheet Metal Workers (SMW).
- Apprenticeship programs provide the best training.
- Labor standards (prevailing wage, benefits, apprenticeships, etc.) are critical to provide qualified labor that will conduct quality installations (and prevent effects on the labor force that happened with the rooftop solar installations).
    - If contractors know they are being graded on workforce development, there will be more of a commitment to quality.

- The City of Berkley Just Transition Electrification pilot program provides a good example of decarbonizations projects with labor standards.
    - Encourage other agencies that are subsidizing electrification to include applicable labor standards.
- Make sure programs use project labor agreements (PLA) where applicable. PLAs do not apply to all kinds of programs. For example, rebate programs can't include PLAs, but some direct install program scopes of work can.
- PLAs allow union and non-union contractors to bid on projects.
- PLAs will ensure small contractors are trained before doing the work. It will also help them to become unionized.
- PLAs are most effective for direct install programs, where the public agency can pre-qualify contractors and select contractors. PLAs are not very effective for simple rebate models.
- The union will quickly rise to the challenge of a strategic opportunity. If the program is of a sufficient scale to provide certainty, high-road jobs will be created. Workforce development for high-speed rail construction is one example.
- Aggregate residential projects to achieve economies of scale and create projects that would be attractive to larger contractors (union or non-union) who will be able to provide apprenticeships and training.
    - Coordinate with the California Public Utilities Commission (CPUC) and California Energy Commission (CEC) on their programs that use skilled labor and encourage aggregation. Take a similar approach.
- Do not exclude trained workers who are not in a union.
- Include provisions in incentive programs that require quality installations by trained workforce.
- Turn this regulatory program into an opportunity for high road labor to address environmental justice issues. Moving low wage workers, particularly in disadvantaged communities, into middle wage work can help address social equity issues.

Incentives Considerations

Challenges

- Incentives to manufacturers or distributors:
    - Do not provide sufficient motivation to sell higher efficiency equipment and prioritize a qualified labor force.
    - Do not substantially reduce costs for the consumer.
- It is difficult to check that savings are passed to the homeowner with incentives given to manufacturers or distributors.
- Homeowners want a single point of contact, typically their contractor. Incentives can be difficult for contractors or customers to obtain.

Suggested Solutions

- Incentives provided to homeowners result in greater savings than those given to manufacturers and distributors.
- For incentives provided to manufacturers, to make sure funds are not misappropriated, there needs to be more monitoring of distributors and a better paper trail.
- Ensure that incentives are distributed to qualified installers.
- Shift incentives away from rebates, which generally benefit higher income residents, to direct installation for low income and disadvantaged communities.

Technical and Logistic Considerations

Challenges

- Some zero-emission systems are complicated and require high quality installations.
- Refrigerants that leak from heat pump space and water heaters due to poor installation or maintenance, or are not recovered at the end of existing equipment's life, have much higher global warming impacts than carbon dioxide, offsetting the environmental benefits of heat pumps.
    - Only 20% of refrigerants are recovered, despite existing federal Environmental Protection Agency (EPA) requirements. Leakage from one unit is equivalent to 15,000 miles of driving. 80% of refrigerants escape into the atmosphere.
- Emergency replacements create difficult situations for transitioning to new technology.
- Homeowners do not have the skillset to manage the appliance replacement process and all the different trades involved.

Suggested Solutions

- Local codes should ensure correct installations, for example placing a heat pump in an area where it can be serviced correctly.
    - If a heat pump is placed in an area where it can be serviced properly, it may be cheaper to install new equipment than service existing equipment if a malfunction occurs.
- To address refrigerant leakage or end of life loss:
    - Prioritize refrigerant emission reductions.
    - Ensure that new heat pumps are installed correctly, there is no leakage, and they operate as designed.
    - Ensure that contractors recover refrigerants from existing units that are replaced.
    - Include a provision in incentives that requires refrigerant recovery.
    - Consider including refrigerant management guidelines/provisions in incentive programs.
- Simplify the replacement process for consumers. Help the consumer understand and select the right package and how to get it permitted and find qualified contractors.

- Provide a program and funding for full home evaluations that would identify needs such as insulation and path for efficient decarbonization. If homes are not insulated, oversized units might be installed.
- Have temporary resources ready for emergency replacements. The City of Berkeley program was mentioned as one example, alongside programs through Community Choice Aggregators and the City of Palo Alto.
- CARB's effort needs to fit into the broader building decarbonization strategy in coordination with other agencies such as the CPUC and CEC.
    - This requires comprehensive evaluation and planning of how to approach decarbonization and there is currently no funding for that first step.
- Increase renewable energy sources to power zero-emission appliances.

Public Outreach and Education

- Others who need to be included in these discussions include:
    - Representatives of minority contractors.
    - All trades/crafts and general contractors (in addition to plumbing and heating, ventilation, and air conditioning).
- Opportunities for collaboration among CARB, labor unions, and other stakeholders to achieve decarbonization goals and provide economic opportunity:
    - Heater replacement involves other contractor trades such as drywall installer and painters. Include other unions so they know they have a part to play in the electrification movement.
    - Engage with all partners such as municipalities and building trades, and with people at all levels.
    - Increase awareness about the importance of labor standards.
    - Conduct additional forums like this one.
- Increase awareness about the importance of labor standards.
- Make sure people know they can communicate with unions to help with problems on the job.
- Change the conversation about the relationship between labor costs and total costs. Using trained labor increases costs by about 3-9% but yields benefits. This is based on the following reports:
    - Residential Decarb Study - Industry Analysis Aug 13 2024.docx (risingsunopp.org)
    - HRTP Economic Impact Assessment Aug 13 2024.docx (risingsunopp.org)

7. San Diego County, Climate Action Campaign (CAC), October 9, 2024

CAC co-hosted this listening session on October 9, 2024, from 6:00 to 7:30 pm, at the Lincoln Acres County Library Community Room, 2725 Granger Avenue, National City, CA. Seven people participated in

the meeting, including members of environmental organizations, air quality regulators, and a water heater manufacturer.

The following summarizes feedback received at the meeting.

Comments on the Draft Regulatory Concept

Support for the regulation's timing was expressed.

Other comments included:

- Mandating heat pumps limits consumer options, restricting access to other efficient technologies like gas tankless water heaters that may be more suitable for specific needs.
- There already are highly efficient, low emission tankless water heater technologies available. Mandating heat pumps would stifle innovation and development in gas-based low-emission solutions, which could offer comparable benefits.
- The proposed changes could violate the Energy Policy and Conservation Act (EPCA) by preempting federally regulated energy standards. Even if framed as targeting emissions, the law governs energy use broadly, as seen in the California Restaurant Association v. City of Berkeley case, where local regulations were overturned due to conflicts with federal law.

Economic Considerations

Challenges

- Upgrading older homes and buildings for zero-emission heaters is costly, with heat pump installations being 30 to 50% more expensive than gas tankless models, adding financial strain to consumers.
- The high upfront costs of zero-emission systems could delay consumers from replacing outdated and inefficient equipment, undermining the goals of the regulation.
- Heat pumps may perform poorly in colder climates especially when relying on electric heating elements, resulting in reduced efficiency and higher operational costs in specific geographic areas.
- With many Californians already facing a housing affordability crisis, this regulation could exacerbate the issue by increasing the cost of heating, pushing home ownership further out of reach.
- The aggressive 2030 timeline for implementing zero-emission standards may lead to supply shortages and increased prices, as the industry struggles to meet demand.
- The regulation risks undermining the natural gas industry, leading to job losses and increasing costs for remaining gas users, while reducing investment in natural gas infrastructure.
- Electricity rates in the San Diego area are much higher than in other areas. Operational cost increases would be exacerbated for space and water heaters in combination with electric vehicle charging.

- Impacts on renters:
- Without strong tenant protections, landlords will pass cost onto tenants.
- Rules that prohibit costs from being passed on to renters are not enforced.
    - If costs are passed on to renters, it may result in displacement.
    - In units with individual hot water heaters (common in small multifamily buildings), tenants will bear cost burdens.

Suggested Solutions

- Provide incentives and rebates to offset incremental costs.
- Provide a cost calculator for estimated monthly electricity costs, or provide a link on the CARB website to existing calculators, so people will know how to budget.

Technical and Logistic Considerations

Challenges

- Relacing a gas heater with a heat pump takes more time than replacing like for like equipment. It requires more than one trade and a permit. Sometimes heat pumps are not in stock, adding to the time delay.
- If people wait until their existing heater dies, they will have to replace it on an emergency basis. This would be challenging given the time required, as mentioned above.
- People have been satisfied with 120-volt water heater units (which only require 30 amps). More powerful ones draw additional power because of backup electric resistance and would only be required for large households.
- There is fear and uncertainty about whether existing electrical service panels can accommodate zero-emission heaters and if a replacement or additional panel would be required. . However, it was asserted that zero-emission heaters can be installed with the existing panel if done thoughtfully. A service panel increase is required in only a small fraction of cases.
- Heat pump water heaters are more efficient than instant (also referred to as on demand or electric resistance) hot water heaters.
- Replacement of on demand water heaters in smaller residences such as accessory dwelling units (ADU) will lead to space/design issues. These heaters are larger than the existing ones. ADUs may not have panel capacity to support electric resistance units.
- Space heating might require a greater variety of products to accommodate various duct sizes.

Suggested Solutions

- To address replacement disruptions and emergency replacement complications:
- Find a way to make replacement instant, perhaps by offering a pre-permit, or change the rules so that a permit is not required, or people can get the permit after installation.
    - Provide a loaner program. San Diego provides temporary heat pumps.
- Pre-stock heaters so they are more readily available.

- Consider requiring landlords to transition to zero-emission heaters between tenants, similar to requirements to paint and clean units between tenants.
- Provide incentives and encourage people to replace their heaters before the heaters' end of life.
- Lean into pilot programs as a bridge to successful implementation of the program.
- Phase in the rule and implementation.
- Provide funds and other resources for community-based organizations (CBOs) to conduct initial site visits to assess feasibility and capacity building. Technical support from local trusted sources would be important for community education.
    - Work with local partners who are trusted messengers and understand local issues.
- There may be a need for industry to produce a different kind of hot water tank (perhaps wall hanging exterior mounted).
- Having a large hot water tank would allow heating hot water when electricity rates are low and avoid the need for electric resistance water heating.
- Requiring people to check for and repair leaks from natural gas appliances would give people a reason to upgrade to heat pumps.

Public Outreach and Education

- Education is key to meeting the program's goals.
- Use the press extensively.
- Engage and financially support CBOs and other trusted partners to conduct outreach and education.
- Provide long term funding for education.
- Messaging should go beyond providing information. It should encourage a cultural shift by explaining why the transition is needed.
    - Decisions are driven not only by cost, but about what people want and their values.
    - Address cultural differences with more than language translation.
- Find out why this transition is important or not to people, why are people ok with having leaky gas appliances.
    - Collect data from all-electric communities as a case study to understand underlying motivations.
- Understand and address people's perspectives and attitudes first and then change the regulations.
- Begin educating communities earlier and more deeply.
- Include landlords and property managers in these conversations about the proposed regulation.
    - San Diego County conducted a study about landlords' perspectives on replacing water heaters that may inform the proposed regulation and implementation.

Electrical Grid Considerations

Challenges

- Widespread electrification could place significant strain on the electrical grid, leading to potential reliability issues and increased energy costs during peak demand.

8. Southern California Virtual, CARB, October 22, 2024

This listening session was hosted by CARB from 6:00 to 8:00 pm, via Zoom. Spanish interpretation was provided. Approximately 39 people attended the meeting, including members of environmental, climate change, energy, environmental justice, public interest, and business organizations; heating, ventilation, and air conditioning (HVAC) manufacturers; energy providers, associations, and regulators; air quality regulators; businesses; and individuals.

During CARB's 3 virtual meetings, an online tool (Mentimeter) was used to collect written responses to the above questions. Responses submitted via Mentimeter are attached as Appendix C to this document. Following review of written responses to each question, participants had an opportunity to provide verbal comments. Participants were also invited to continue the discussion and provide further feedback in smaller group discussions at the end of the meeting.

The following summarizes feedback provided at this meeting.

Comments on the Draft Regulatory Concept

Support was expressed for the proposed regulation's air pollution, health, and climate change benefits, as well as advancing more effective home heating and cooling. It was noted that such systems will be more critical for consumers as heat waves continue to get worse and as wildfire and other air quality problems make opening windows more challenging.

The avoidance of safety risks related to gas leaks, particularly in emergencies such as earthquakes, was also cited as a benefit. One of the hazards following an earthquake is that a gas leak can prevent rescue efforts at damaged buildings. An example was described in which this led to the loss of lives.

The following concerns and suggestions were expressed:

- A suggestion was made to focus more on manufacturing and industrial projects rather than residences. Concern was also expressed about whether this would apply to small manufacturers.
- Electric appliances are preferred rather than hydrogen appliances.
- Hydrogen fueled equipment should not be allowed in residences due to its nitrogen oxide (NOx) emissions and explosivity.
- There has not been enough time to collect a robust set of data and information regarding the overall impact these rules would have on business communities throughout Southern California.

Economic Considerations

Challenges

- The transition would impose substantial costs on residents for equipment and installations.
    - It may also result in the need to increase electricity panel size, which would add to the cost.
    - The expense of insulating older homes and buildings, including the need for new windows, in addition to installing new energy efficient equipment would further affect affordability for some.
- High electricity rates would add to financial impacts.
- Heat pump use caused someone to use Los Angeles Department of Water & Power's (LADWP) third tier electricity rates. They incurred DWP financial penalties for an entire year.
- Cost impacts and inequitable access to technologies raise equity concerns for low-income residents and renters.
- The regulation could result in unintended consequences on tenants including rent increases, displacement, and eviction for renovation work.
- Incentives may not be sufficient to overcome cost challenges.
- The proposed rules could have a significant negative impact on the housing market, which is already a point of contention for workers who live in California.
- Commercial businesses throughout California will be burdened with a lack of available choices when considering options for their facilities, making the cost of doing business more expensive.
- Adding new costs to employers could negatively impact the workforce.

Suggested Solutions

- To address challenges related to cost and rebates/incentives:
    - Identify accurate and complete costs and the rebate/support level that will make a difference.
    - Secure long-term/permanent funding sources.
    - Provide a one-stop shop for funding instead of piecemeal programs.
    - Provide rebates and incentive programs, particularly for those who cannot afford to implement the transition.
    - Upfronting rebates is important.
    - Provide zero percent financing and easy access to incentives to cover upfront costs of the appliances and any additional required expenses.
    - Ensure that environmental justice concerns are being considered and met, including the need for accessible and sustainable funding specifically for low-income communities to access all electric appliances, particularly through direct installation programs. Such programs should support a holistic home approach.

- Coordinate with other regulatory agencies such as the California Energy Commission (CEC) and California Public Utilities Commission (CPUC), and housing departments to provide equitable access to programs for low-income communities, even if these issues are outside of CARB's purview.
- Identify cost effective solutions for medium-income families.
- Provide tax credits, or another way to offset installation costs, including the cost of increasing panel capacity.

To protect against impacts to renters:

- Stronger tenant protections are needed as well as coordination among agencies to enforce laws.
- Work with the state legislature to ban pass-through costs, create stronger statewide rent caps, remove substantial remodel as a basis for eviction, and push the California Department of Housing and Community Development to enforce these rules and better regulate construction and rental units.

To address electricity costs:

- Ensure that people who transition to and use electric appliances do not get penalized due to utility rate design.
- Find a way to alert people before they reach peak electricity rates (third tier), so they can avoid associated fees. Perhaps an application could be developed that would notify people before they access third tier rates, similar to water usage applications.

Technical and Logistic Considerations

Challenges

- The time it takes for electrical panel upgrades/permits can present a logistic challenge, particularly for emergency replacements.
- There are many low-income homes with poor conditions that limit the ability to fully electrify.

Suggested Solutions

- Provide ubiquitous loaner programs to replace heaters in emergency situations.

Contractor Availability/Training

Challenges

- There are not enough HVAC technicians to meet California's six million heat pump goals.
- Not all plumbers offer heat pump water heater installations. More contractors who offer these services are needed.

Suggested Solutions

- Workforce development is critical to ensuring a supply of qualified electricians and plumbers.

Electrical Grid Considerations

Challenges

- Utility companies throttle down their transmission/transformers/localized energy networks, affecting service reliability.

Suggested Solutions

- Pressure utilities to provide reliable service.

Public Awareness and Education

Challenges

- People are not aware about these impending regulations and need to be informed so they can prepare their budgets.
- There is a need for widespread education about the benefits of zero-emission space and water heaters.

Suggested Solutions

- To increase awareness and education:
    - Conduct public outreach.
    - Social and other media can be used to reach a broader audience.
    - The best way forward is through a comprehensive approach and inclusive dialogue to address the state's infrastructure needs, and that includes business leaders and impacted sectors.
- Provide tours of homes that have gone zero-emission and show emissions and air quality with an indoor air quality monitoring device.
    - Consider having town halls in environmental justice communities along with tenant rights organizations.
    - Conduct outreach with culturally competent information and use other languages in addition to English.
- To support those implementing heater transitions:
    - Landlords need technical support.
    - Information about which parts of the electric service system are owned by homeowners and which are owned by the utility will be helpful.
- Include the following people/groups in CARB's conversations about these regulations:
    - Furnace and water heater manufacturers.
    - Utility providers.
    - Landlords and property managers.
    - Experts on funding options.

    - The business community.
    - California Department of Housing and Community Development.
    - The public at large.
    - Low-income tenants and environmental justice communities.
- Conduct public dialogues and workshops with CEC and CPUC and include other agency presenters, so agencies can understand how their building decarbonization policies impact each other's state regulatory work and successfully develop and implement programs that will address equity issues.

9. San Mateo/Redwood City, Climate Resilient Communities (CRC), October 23, 2024

This listening session was co-hosted by Climate Resilient Communities (CRC) and held on October 23, 2024, from 6:00 to 7:30 pm, at the PAL Center Redwood City, 2299 Bay Road, Redwood City, CA. Approximately 39 people participated in the meeting. Most participants were local community members, most of whom were renters and many were Spanish-speaking. Spanish interpretation was provided during the presentation and small group discussions were held in English or Spanish. Members of two local environmental organizations, Menlo Spark and 350 Silicon Valley, also participated and supported small group discussions as well.

The following summarizes feedback received at this meeting.

Comments on the Draft Regulatory Concept

Support was expressed for the following benefits of the proposed regulation/switching to zero-emission space and water heaters:

- Environmental benefits by not using fossil fuels.
- Health benefits associated with avoiding potential methane or propane exposure and less indoor pollution.
    - Some noted that using gas heaters results in a smell, caused headaches, and can make eyes itchy.
- Safety benefits associated with avoiding concerns about trees falling on propane tanks.

Economic Considerations

Challenges

- The high cost of installing new heaters is an impediment (a homeowner stated they have gone without heat due to the cost they were quoted to install a mini-split unit).
- Electricity bills are currently high and would increase with use of electric space and water heaters.
- Landlords might raise rents after installing new space and water heaters.

Suggested Solutions

- Provide more support and protections for renters.
- Provide a list of available incentives.

Technical and Logistic Considerations

Challenges

- Renters should have access to improved heating equipment, but they do not have control over these decisions.
    - Most resources and support are only for homeowners and not renters. Renters are being overlooked because they are low-income and not homeowners.
    - Landlords might continue to patch and repair old heating equipment rather than upgrade with new equipment.
    - Landlords might conduct unsafe or incomplete remodeling and upgrades.
- Emergency situations create a challenge for transitioning to zero-emission equipment. Most water heaters are replaced when they break, and people want them replaced the next day or so.
- Electrical shortages can cause fires. Electricity issues seem to cause fires more than gas.

Suggested Solutions

- Help landlords understand the benefits of transitioning to zero-emission equipment.
- A requirement to replace a water heater after a certain age would address landlord hesitancy and continual repairs of existing appliances.
- Provide more government support and enforcement to protect against unsafe installations or remodeling work.
- Provide information on heater maintenance and upkeep to renters in addition to landlords.

Electrical Grid Considerations

Challenges

- Electricity is vulnerable to outages, including during storms. Participants have experienced power outages during 2023 storms that lasted 3 days.
- Utilities may not be able to meet demands generated by crypto currency and additional housing across the state.
- Rats chew on electrical wires.

Suggested Solutions

- Back-up generators and rechargeable batteries would help address electrical power outages.
- Provide emergency centers and assistance for power outages.

Public Outreach and Education

- Help renters learn about their options.
- Provide information at the neighborhood level.
- CARB and partner groups could educate the public about the fact that most modern gas appliances require electricity to operate, and therefore transitioning to electrical appliances would not cause additional inconvenience during outages.
- Provide plumbers with a water heater sticker that lets people know the date at which replacement will have to be zero-emission.
- Additional people to include in these conversations about the proposed regulation:
    - Landlords. Contact can be made via tax assessor communications.
    - Property managers, beginning with larger ones.

10. Central California Virtual, CARB, October 28, 2024

This listening session was hosted by CARB from 6:00 to 8:00 pm, via Zoom. Spanish interpretation was provided. Approximately 11 people attended the meeting. Some represented heating, ventilation, and air conditioning (HVAC) manufacturing; energy supply; energy and air quality regulators, environmental and energy consulting; and local government.

The following summarizes feedback provided at this meeting.

Comments on the Draft Regulatory Concept

Support was expressed for the proposed regulation, as well as the following concerns, suggestions, and questions:

- Address the needs of rural residents, especially those who are low income and/or rely on propane.
- Will there be exemptions for rural areas that lack reliable access to electricity? In the past, power has gone out for two weeks during a snowstorm. Propane is the sole source of heat for many elderly residents.
- Why transition away from natural gas? The commenter asserted that natural gas is more efficient, cheaper, and less damaging to climate than production and maintenance of wind and solar products. It is irresponsible not to figure in the environmental costs of clean energy production.

Economic Considerations

Challenges

- The cost of electrical heater replacement and service panel upgrades is a challenge.
- Building electrification poses potential significant impacts to low-income residents and renters.
- Rural areas do not have tenant protections. They will have to rely on the State for protections.

Suggested Solutions

- Provide protections for renters and low-income communities.
- Provide incentives, including ones geared towards landlords.
- Ensure that gas and electricity rates are price competitive.
- Bulk buying of heaters would allow contractors or programs to have them on hand at good prices.
- Carefully consider equity as new measures are developed, particularly in areas such as such as the San Joaquin Valley, which is the home to some of the most disadvantaged communities in the state.
- Highlight the importance of rural and other communities' needs in developing an equitable and feasible approach for technology transitions. Thoroughly analyze the impacts to rural communities that use propane devices.

Technical and Logistic Considerations

Challenges

- Coordinating with utilities on service upgrades can be challenging.
- Large multifamily buildings present logistics challenges.

Suggested Solutions

- Make the process faster, easier, and simpler.

Contractor Availability/Training

Challenges

- There is a need for workforce development.
- Most contractors are very familiar with installing single- or two-stage heat pumps, but not variable flow heat pumps. Variable flow heat pumps are quieter and provide electricity load relief, especially during peak demand periods. Load and peak reductions result in significant electricity bill savings.

Public Awareness and Education

Challenges

- Most people are not interested in the topic of space and water heating.
- It is difficult to educate people with so much else going on.
- There is always a delay in awareness. This is especially the case with lower income populations, due to a lack of outreach, information, and education. When people do not understand they have more resistance.

- The general public, contractors, and possibly some government agencies, do not understand the differences between single/two-stage heat pumps and variable flow heat pumps, which are described above (see Contractor Availability/Training).

Suggested Solutions

- Make zero-emission heaters the most obvious option when a heater breaks.
- Promote landlord awareness of incentives.
- Provide more outreach and education on available technologies, including the differences between single/two-stage heat pumps and variable flow heat pumps.
- Include the following people/groups in CARB's conversations about these regulations:
    - Contractors and contractor organizations.
    - Homeowners and purveyors of self-install devices.
    - Health advocates and people with asthma and other related health conditions.
    - Current heat pump owners.

11. Northern California Virtual, CARB October 29, 2024

This listening session was hosted by CARB from 6:00 to 8:00 pm, via Zoom. Spanish interpretation was provided. Approximately 32 people attended the meeting. Some represented climate change, energy, environmental justice, and policy organizations; air quality and energy regulators; trade associations (pool and spa, building industry, and propane gas); and an electric utility.

The following summarizes feedback provided at this meeting.

Comments on the Draft Regulatory Concept

Support was expressed for the proposed regulation as follows:

- Regulations at the point of sale are critical for achieving statewide climate goals.
- Decreased emissions will result in immediate and substantial health benefits.
- Phasing out methane use, and associated leakage, will result in immediate climate benefits to help address the climate crisis.

The following concerns and suggestions were expressed:

- The regulation may be subject to federal preemption claims.
- Align exemptions with those included in the Bay Air Quality Management District (BAAQMD) zero NOx rules.
- The regulation must recognize geographic and environmental differences of California's 16 climate zones.
- The rule needs to recognize that potential intermittent loss of heating (for example, due to a power outage) in some climate zones would result in a health and safety issue.

Economic Considerations

Challenges

- The affordability of transitioning to zero-emission heaters is of concern. Rebates may not be sufficient.
- Financing for upfront costs of equipment, electrical upgrades, labor could add costs. There may not be entities willing to underwrite these expenses to provide financing.
- The cost to address an insufficiently sized electrical line serving a house would be very high.
- Relying on a single source of energy makes residents vulnerable to the market price and without other options.
- The cost of climate change solutions is a regressive tax that adds to the current inflation and cost of living crises for the middle class and people on fixed incomes.
- Incentive availability varies widely across the state depending primarily on the electricity provider.
- The middle class will experience disproportionate impacts as they will not be eligible for low-income assistance programs.
- Propane space and water heating equipment are some of the most affordable and reliable choices for consumers, especially in rural areas and cold climates.
- CARB's cost analysis upfronts benefits that are technically only realized over long term implementation and under assesses cost impacts. The analyses typically do not account for long-term projections of electricity cost increases.

Suggested Solutions

- Provide incentives.
- Ensure lower-income households are connected to Equitable Building Decarbonization (EBD), or similar programs, to minimize installation costs and receive EBD tenant protections.
- Additional targeted funding is critical for low-income installations at or below cost parity.
- Provide an additional funding source for low-income retrofits.
- CARB should consider hiring staff to help coordinate rebates.
- Provide guarantees against drastic electricity cost increases.
- Costs associated with increased utility service (e.g., new transmission/distribution lines) should be paid by the utility, not the customer.
- Use real costs to consumers in the assessment of economic impacts.
- Group purchasing would reduce costs.
- Implementation will not be affordable, equitable, and successful without policy changes by the California Public Utilities Commission (CPUC), Department of Housing and Community Development (HCD), and other state and local partners, often on long-stagnant issues. CARB needs to drive change.

Technical and Logistic Considerations

Challenges

- Installation of zero-emission heating equipment can be time-consuming and frustrating.
- Site-specific constraints and older infrastructure can affect the installation process.
- Residences may not have sufficient space to install heat pumps water heaters. Mobile home closets do not provide adequate space.
- Electric equipment can impact onsite electrical loads/capacity.
- California has over 100 individual Reach Codes, which create a daunting complexity for implementation and enforcement of the proposed regulation.
- Power draws in California's 16 climate zones are fundamentally different.
- Pool heaters are used primarily to heat in ground spas, which are typically used less than 30 times a year. Existing pool heaters take about an hour to heat a spa. A heat pump water heater running on electricity would take six hours or longer to do the same job, depending on the climate. This will drive additional electricity costs for consumers and the grid also will set up a situation where consumers will be very unhappy with wait times and increased costs.

Suggested Solutions

- CARB should consider hiring staff to help with planning system replacements on a business and household level.
- Make the transition process as simple as possible, including permits that are easy to obtain.
- Consider older buildings and infrastructure in developing the regulatory timeline.
- Coordinate with other state agencies and the legislature so that residents do not have to.
- Provide funding to address space needs for heat pump water heaters.

Contractor Availability/Training

Challenges

- Contractors need education and training on zero-emission technologies as well as available incentives. They will be the primary implementers of this rule.

Suggested Solutions

- Mandate education and training for space and water heating technicians.
- Ensure availability of vetted installers with clear guarantees.
- Provide extensive training and outreach so contractors are aware of incentives and requirements.

Electrical Grid Considerations

Challenges

- Implementation of the proposed regulation will increase demand on the already loaded power grid. Rolling power outages are common during hot summer months.
- It will also create electricity demand peaking issues during low-supply winter months. This will drive out-of-state electricity importation, which generates more pollution and is subject to fewer environmental standards.

Suggested Solutions

- Consider necessary additions to the power grid when developing the regulatory timeline.
- CARB should advocate with the CPUC to allow more community solar, rooftop solar, and batteries.

Public Awareness and Education

Challenges

- It will be a huge lift to get people most in need educated about these rules and connected to programs to ensure a just transition.
- Most people who would be impacted by such regulations do not have the time or inclination to attend workshops or programs.

Suggested Solutions

- Educate people about:
    - The regulation and available rebates.
        - Switchison.org is a good site for incentive information for consumers.
    - What heat pumps are, how they work for maximum efficiency and comfort, and differ from gas heaters.
    - The advantages of heat pumps, including air pollution and climate change benefits.
    - How to go about obtaining and installing a heat pump.
    - Whether panel upgrades are needed.
    - Planning ahead rather than waiting until an old water heater breaks.
- Use the following methods to inform, educate, and increase awareness:
    - Provide vetted and authoritative resources for answers to specific questions.
    - Make local staff available to answer questions and direct people.
    - Provide public service messages on TV and fund advertising.
    - Publish short informational pieces in newspaper columns and via social media (Facebook and Nextdoor).

    - Take a more active role to inform people, such as going door-to-door and holding neighborhood meetings.
    - Engage tenant, equity, and environmental justice organizations directly to share information, receive feedback, and design the regulation to best protect vulnerable communities and build their support.
    - Provide summaries and concepts in short format online and updated often.
    - Speak at group meetings, such as conventions.
    - Coordinate efforts across agencies.
    - Collect knowledge from existing Bay Area groups that are promoting space heaters and water heaters, particularly for low-income people.
    - Refer to heat pumps as heat/cool pumps as they provide both heat and air conditioning. Most people are not aware that a space heating heat pump is also an air conditioner.
- Include the following people/groups in CARB's conversations about these regulations:
    - Industry.
    - Rental property owners.
    - Heating, ventilation, and air conditioning (HVAC) contractors.
    - Contractors who specialize in zero-emission installations.
    - Middle-class families and those outside the subsidy bracket for government programs.
    - Environmental justice communities and Assembly Bill (AB) 617 working groups.
    - Public health experts.
    - Low-income residents.
    - Local agencies responsible for building permits

Appendix A: Virtual Meetings - Written Feedback Submitted Via Mentimeter

This appendix lists responses to discussion questions provided via Mentimeter during three regional virtual listening sessions. These responses are presented below as submitted.

Southern California, October 22, 2024

1. What are your experiences with space and water heating equipment replacement?

- Focus more on manufacturing and industrial projects
- Emergency replacement & DIY installation
- How much will this cost?
- To align business project development; From People To Planet - Human Agriculture - Commodity - Semiconductor - Pharmaceutical - Space Industry
- I had a heat pump HVAC installed two years ago. Love it. Not seeing a higher bill.
- #GHG #ESG adaptation continuous reviewing countries update on national plans, law and policies for businesses project development and remain focusing 9 sector - specific on Transition to Net Zero
- None
- I assist running incentive programs that provide rebates for these items
- Supporting CEC Heat Pump Public Private Partnership, contract.
- I just got a ducted heat pump two years ago through the switchison.org but the LADWP rebate was not included and took 13 months to get after assistance from city councilmember office
- As air district staff I am interested in this rule development to determine if we need to develop a similar rule or if we should just wait for local installers to comply with CARB's rule.
- Went through an emergency water heater replacement at a rented house; also involved in local regulation of the same devices
- Working on engaging low income communities to equitable decarbonize their home
- Upfronting rebates is important.

2. What should CARB staff bear in mind as they design a regulation and plan for potential implementation?

- The true costs of installation and the rebate/support that will move the needle
- The extra burden on homeowners to replace their electric panels. My 200 amp panel supports a heat pump and barely can support 1 EV. Adding a water heater will require spending more money.
- Costs of equipment and installations. Time for how long electrical panel upgrades/permits may take.
- The expense of insulating older homes and buildings such as the need for new windows, in addition to installing new energy efficient equipment can be unattainable.
- High costs for electric equipment and electricity rates; limited and long-term availability concern of grant funding in proposed reg time periods; equity concerns with renters and low-income residents
- Landlords need technical support
- What is this going to cost the consumer? Will there be enough incentives? How will you keep electricity rates down?

- Are there GHG emissions associated with heat pumps?
- Unintended consequences on tenants including rent increases, harassment and eviction for renovation work. Stronger tenant protections are needed as well as coordination among agencies to enforce laws
- The unintended consequences such as high electricity bills, displacement, inequitable access to technologies
- There's a need for widespread education about the benefits of electrification.
- Upfronting rebates is very important
- Are the costs of these new units with the low GWP refrigerants known?
- There needs to be accessible, sustainable funding for low-income communities to access all-electric appliances. Direct-install programs are most accessible and should support a holistic home approach
- These rules could have a significantly negative impact on the housing market, which is already a point of contention for California's resident workforce.
- Commercial businesses throughout California will be burdened with the lack of available choices when considering options for their facilities, making the cost of doing business more expensive.

3. What could help make a switch to zero-emission space and water heating smoother for you, your neighbors, and your communities?

- Rebates
- Tax credits for electric panel upgrades resulting from any equipment mandate.
- Incentive programs
- Public outreach
- Contractors that offer heat pump water heater installation/services. Spoke with a plumber recently and they did not offer heat pump water heater installations
- long-term/permanent funding sources; one-stop shop for funding instead of piecemeal programs; ubiquitous loaner programs to replace devices in emergency situations which are most common.
- Knowing how much this will actually cost.
- Cost effective solutions for medium income families.
- My neighbors don't know this is happening, people should be informed. CARB could utilize the media to let people know so they can prepare their budgets.
- Providing zero percent financing and easy access to incentives to cover upfront costs of the appliances and any additional required expenses
- Direct installation programs for low-income renters and homeowners
- To have some tours of homes that have gone all electric. Show CO2 emissions & air quality with an Aranet device or similar. Upfront the rebates and make them user friendly

4. What else would you like to share with CARB staff?

- Appreciate the space to share
- Thank you for the diagram of who owns what between the utility and the homeowner. Super helpful.
- Consideration of the combined financial impact of increased electricity rates in combination with zero-emission appliances, vehicles, etc., and any necessary panel upgrades that might be necessary

- There has not been enough time to collect a robust set of data and information regarding the overall impact these rules would have on the business communities throughout Southern California.
- Thank you!
- The best way forward is through a comprehensive approach and inclusive dialogue to addressing the state's infrastructure needs, and including business leaders and sectors that would be impacted here.
- So much gratitude for the listening session. CARB should consider having town halls in environmental justice communities along with tenant rights organizations.

5. What/who is missing from the conversation? How can we include them?
- Unsure
- Furnace and water heater manufacturers; utility providers; property managers; landords
- Experts on the funding options.
- The business community needs to be included. Adding new costs to employers can negatively impact the workforce.
- California Department of Housing & Community Development needs to be involved in conversation, also engagement/listening sessions with low-income tenants and environmental justice communities
- Ensuring we have qualified electricians and plumbers.
- The public at large
- CPUC, CEC , Housing Departments
- Social media or media can be used to reach a broader audience

Central California, October 28, 2024

What city or county do you live in?
- Sacramento
- Santa Cruz
- Listening in with CPUC
- Listening in
- Fresno

What is your professional field of work?
- Environmental nonprofit
- CCA Customer Programs Building Decarbonization
- Equity considerations

1. What are your experiences with space and water heating equipment replacement?
- I have always rented so I have never experienced space or water heating replacements. I would love to replace my gas-powered furnace with a heat pump!
- As a renter, I've lived in units where both space and water heating equipment has been replaced during my rental period. My experience has varied depending on the landlord.
- A family member got a new gas water heater from a contractor who recommended it. Then they got on the contractor's email list which told them about heat pump incentives.

2. What should CARB staff bear in mind as they design a regulation and plan for potential implementation?

- Rental protections, large MF project logistics, coordinating with utilities on service upgrades.
- Rental protections, service panel upgrades, incentives

3. What could help make a switch to zero-emission space and water heating smoother for you, your neighbors, and your communities?

- Incentives that landlords are aware of, more education on available technologies, ensuring that gas and electric rates are price competitive.
- Contractors offering it. Faster, easier, simpler. Bulk buying of appliances so contractors or programs have them on hand at good prices.

4. What else would you like to share with CARB staff?

- If a landlord chooses not to comply with the regulation and goes outside of CA to buy a cheaper gas-powered tech would the renter be liable or the landlord.
- I'm very supportive of this rule, but I do think we need to make sure there are the right protections for low-income communities and renters.
- Most people will never be fascinated by space and water heating. And that's fine, not something to change. We need ways to make it the most obvious option when an appliance breaks.

5. What/who is missing from the conversation? How can we include them?

- Most people
- Today anyway - contractors and their orgs. Homeowners and purveyors of self-install devices. Health advocates/folks with asthma etc. Current heat pump owners.
- Frustrating that Menti doesn't offer "skip" or "go back" buttons.

Northern California, October 29, 2024

What city or county do you live in?

- Sacramento
- San Jose
- Sacramento
- Sacramento
- Sacramento
- Sacramento California
- San Francisco
- Oakland
- Benicia Solano County Green
- Sacramento
- Sunnyvale
- Alameda County
- San Jose Santa Clara
- Butte County
- Santa Cruz

What is your professional field of work?

- Nonprofit
- Utility
- Architect
- Utility
- Government Energy
- Govt affairs California
- Environmental policy
- Residential HVAC
- Retired engineer
- Energy Consultant Policy Director
- Teaching law activist
- Physician
- Climate policy
- EHS
- Weatherization energy
- Energy policy

1. What are your experiences with space and water heating equipment replacement?
    - Local ordinances & utility incentive programs
    - Expensive, time-consuming, and frustrating. And that's with ample product stock and multiple energy sources available to me.
    - Design professional, homeowner, code and regulatory consultant
    - Design architect including nearly 2000 residential customers over the last 45 years; homeowner; code and regulatory consultant for American Institute of Architects California
    - I represent the CA Pool & Spa Association. We represent pool builders, pool heater manufacturers and distributors
    - It's my day to day business
    - Sacramento
    - Code, programs, policy, residential, commercial
    - One year with a heat pump water heater. Self-installed. Works well with no issues.
    - Not much, we do have natural gas space and water heaters in our facility in both the manufacturing buildings and also the support/office buildings
    - My personal experience is getting quotes for heat pump space heating and heat pump water heaters. I found the quotes for heat pump water heaters to be higher than expected.
    - A neighbor installed a heat pump water heater in their basement but removed it due to excessive noise throughout the home.
    - I have replaced my gas furnace and water heater with a heat pump heating system, and an electric water heater. Since I live in a single family home that had preexsiting duct work it was easy to insta
    - Landlord only replaced water heater when it exploded
    - Overall Excellent: Replaced both space and water gas heaters to heat pumps last summer. Took some effort to deal with inspections and get rebates.
    - Replacing them. Testing for CO emissions. Zone testing of water heater locations
    - Home performance contracting company
    - Energy Consultant preparing compliance documentation for permitting

- Growing program participation in residential sector
- Slower uptick for commercial sector, but growing interest
- Propane space and water heating equipment are some of the most affordable and reliable choices for consumers, especially in rural areas and cold climates
- Testing for emissions. Repair and replacement. Looks at problems with older buildings conforming to current codes. Testing duct systems. Making the appliances more efficient.
- We did not know about the heat pump water heater and my husband went with an electric water heater which was probably not wise. We had to add a electrical outlet.
- I'm happy there are now heat pump water heaters that can use a 110 outlet. I believe that more options will be available in the future and when we replace it we will be more knowledgeable.

2. What should CARB staff bear in mind as they design a regulation and plan for potential implementation?

- You have not considered disproportionate impacts on middle class families that are not subsidized by low-income assistance programs. They are caught by price spikes for goods, services, and elec.
- Second, you have not considered the massive cost of finance to underwrite the appliances themselves, the equipment needed to upgrade electric infra, nor the finance costs of construction and labor.
- Considering site-specific constraints in the process
- Feasibility through many lenses: cost, market place, population, personal preferences and requirements, equipment characteristics including but not limited to size, installation requirements
- Feasibility, technology, costs and consumer satisfaction
- How does it affect electrical load on the facility
- Does this affect existing equipment or only new equipment?
- Third, this will create an additional bump on the duck curve during low-supply Winter months... driving importation of out of state electricity that is dirtier, subject to fewer environmental standard
- Potential Federal preemption claims
- Implementation will not be affordable, equitable, and successful without CPUC, HCD, and other state and local partners making policy change, often on long-stagnant issues. CARB needs to drive change.
- Incentive availability varies widely across the state depending primarily on one's CCA/utility, and additional targeted funding is critical in order for low-income installs at or below cost parity.
- Propane is not included in Air District rules because the original rules that were amended have always only been for methane gas-burning units, however propane users will save the most from HPs.
- Align exemptions with air districts. Ensure lower-income households are connected to EBD (or similar programs) to minimize installation costs and receive EBD tenant protections.
- It will be a huge lift to get people most in need educated about these rules and connected to programs to ensure a just transition. It is so important to coordinate work across agencies.
- Need to mandate that education and training be mandated for heating and water heating technicians.

- CARB should consider hiring it's own people to help with planning out the systems replacements on a business and household level and coordinating the rebates
- Increased electrical demand on the already loaded power grid-what happens during rolling power outages or times of fire in the summer? Rolling power outages are common in the hot summer months
- The most expensive problem is if a line to the house is not big enough. Those people really need info about the options and perhaps more funding if it is necessary.
- CARB needs to be pushing to allow more community solar and rooftop solar and batteries and make sure the PUC turns around their policies.
- When all the energy coming into your home is single sourced, you can put yourself in a vulnerable position as you will be stuck paying whatever the market price is and will not have an out

3. What could help make a switch to zero-emission space and water heating smoother for you, your neighbors, and your communities?

- Incentives; easy to obtain permits; vetted installers with clear guarantees
- resource for answers to specific questions that is well vetted and authoritative
- Knowing the timeline
- Considering older buildings and infrastructures
- Considering the addition to the power grid"
- Providing me with a guarantee that having a singular source of energy into my home -- that could be cut off at a moment's notice -- won't skyrocket in price in the future.
- If all costs associated with increased utility service (as in new transmission/distribution) lines were paid by the utility, not the customer.
- outreach to end user on how heat pumps work (far different than gas) for maximum efficiency and comfort.
- Do not try to force a square peg into a round hole. Use real costs to consumers, not wishful thinking.
- Extensive contractor training and outreach so they are aware of incentives, requirements, etc. Contractors are the frontlines and will be the primary implementers of this rule.
- Group purchasing that would reduce costs. Can CARB help do that.
- Please coordinate with other state agencies and legislature -- do not make everyday people do this.
- An additional funding source for low-income retrofits
- Having many local people that are available to answer questions and put people on the right track. People should also be putting in solar and batteries to make all of this cheaper and offset costs
- That is the problem. The state has to be more active if we really want to do this. You could go door to door and inform people and have a program all set up. Have neighborhood meeting, next door etc

4. What else would you like to share with CARB staff?

- California has a reach code landscape that includes over 100 individual codes; created and maintained at great cost. The complexity of this landscape for implementation and enforcement is daunting

- Consideration for the increased electrical load and consideration of existing equipment in older infrastructure
- The arrogance of thinking that the real logistical, cost, and implementation challenges of touching every home in California can be hand waved away is stunning. Even for CARB.
- The prohousing program has had success with the PR value coupled with some financial incentives to drive participation
- Heat pumps are already outselling furnaces in the US, and the highest penetration of heat pumps in the world are in Norway, Sweden, and Finland.
- Make things as simple as possible. Replacement should happen as current equipment needs to be replaced and I expect equipment will get cheaper and better as the regs are put in place.
- We are in a climate crises and methane must go.
- How will the cost of this new requirement be handled? Will it be put back on the renter? Each individual owning or renting a property? How will this affect the middle class specifically?
- We are in an inflation and cost of living crisis with staggering consequences for the middle class and folks on fixed incomes. All of the climate change changes are an additional regressive tax
- The decrease in emissions will have immense health benefits in addition to climate benefits immediately and will help us phase out methane leakage which has the greatest immediate climate benefits.
- Can CARB start doing columns for newspapers or to put on facebook and nextdoor to start spreading the word. Just short pieces with basic explanation and then info about rebates.
- Engage tenant, equity, and environmental justice organizations directly to share the regulation, get feedback & shape the regulation to best protect these vulnerable communities and build support.
- Importance of state action to accelerate the market, bring costs down, and ensure that all households can benefit from zero-emission equipment, and prepare for longer-term escalation of gas costs
- We are starting to see how expense the climate crises in with insurance rate increases. Nothing costs more than replacing your home and all of you belongings lost in that fire, flood, hurricanes.
- Regulations at point of sale is critical for statewide climate goals and for equipment conversions in existing buildings
- Switchison.org is a good site for incentive information for consumers

5. What/who is missing from the conversation? How can we include them?
- industry
- All of the rental properties in the area
- All contractors working in the Bay area on HVAC
- Most people who would be impacted by such regulations do not have time or inclination to attend workshops or programs. Summaries and concepts should be available in short format online, updated often
- Middle-class families and those outside of the subsidy bracket for government programs. And the people who will actually have to install all these things.
- Residents from environmental justice communities, AB 617 working groups, public health experts
- Contractors who specialize in ZE installs

- Since I don't know who is here that is difficult to answer. We need to hear from low income people, technicians and people who don't know what a heat pump is.
- Include local agencies with responsibility for building permits; critical touch point to support the reg. Without local touch points, risk of out-of-state markets/resale of old equipment
- CARB needs to go to groups and speak, for example at conventions.