



March 27, 2024

California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

**RE: Comments on CARB Zero-Emission Space and Water Heater Standards**

Dear Board Members and Staff,

Thank you for the opportunity to provide these comments on the California Air Resources Board's (CARB) February 28, 2024 Public Workshop (Workshop) for the agency's Zero-Emission Space and Water Heater Standards (Standards), submitted on behalf of the 15 undersigned organizations.

CARB's commitment to develop zero-emission space and water heater standards is a vital part of a broad portfolio of strategies to advance an equitable transition to non-polluting buildings. Fossil fuel combustion in the state's residential and commercial buildings is responsible for more than 45 million metric tons of greenhouse gas emissions annually, nearly 30% more than the entire electric

power sector generates each year.<sup>1</sup> Along with these climate-warming emissions, fossil fuel building equipment releases approximately 34,000 tons of nitrogen oxides (NO<sub>x</sub>) pollution and 3,000 tons of fine particulate matter (PM<sub>2.5</sub>) into California’s outdoor environment each year, nearly seven times the NO<sub>x</sub> and three times the PM<sub>2.5</sub> emissions as come from the state’s power plants.<sup>2</sup>

The state is well-positioned to adopt these vital Standards. In just the last few years, California has made remarkable progress on an equitable transition to healthy and decarbonized buildings, including the following notable developments:

- Governor Newsom set a Clean and Healthy Buildings target of 3 million “climate-ready and climate-friendly” homes by 2030 and 7 million by 2035, supported by 6 million heat pump installations in homes by 2030, with 50 percent of investments directed to low-income and disadvantaged communities.<sup>3</sup>
- CARB’s 2022 State Strategy for the State Implementation Plan (SIP) and 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) both dedicated sections to acknowledging the central role that building emissions reductions will play in achieving our critical climate and clean air targets, and both documents laid out zero-emission standards on space and water heating as a key emissions reduction solution.<sup>4,5</sup> In the case of the State SIP Strategy, this included a commitment by the state to pursue these Standards in order to attain binding federal air quality standards enforced by the U.S. Environmental Protection Agency (EPA).
- Nearly 2 billion dollars in funding has been secured from state and federal sources in the last few years to develop and implement groundbreaking programs to electrify new and existing buildings and prioritize investments in low-income communities.<sup>6</sup> These funding programs include [TECH Clean California](#), which has allocated a minimum of 40% of program spending to equity customers; the Building Initiative for Low-Emissions Development ([BUILD](#)), which dedicates its full budget to low-income properties; and the [Equitable Building Decarbonization Program](#), a direct install electrification program to support low- and moderate-income Californians in multi-family housing. This also includes federal programs, such as the Home Efficiency Rebates (HER) and Home Electrification and Appliance Rebates (HEAR) from the Inflation Reduction Act of 2022, which sets a target for 40% of funding to disadvantaged communities.<sup>7</sup>
- The California Public Utilities Commission (CPUC) ended gas infrastructure extension subsidies for new construction effective July 2023, finding that “the upfront costs of building homes with fossil gas infrastructure in investor-owned utility service territories, which represent nearly all of residential fossil gas customers in California, are now at least three

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<sup>1</sup> U.S. Energy Information Administration (EIA), “[Energy-Related CO2 Emission Data Tables – Sectoral specific emission tables by state](#),” July 2023.

<sup>2</sup> U.S. Environmental Protection Agency (EPA), [2020 National Emissions Inventory](#), March 2023. Appliance emission estimates include residential & commercial emissions for the gas, oil, & other fuel categories, with commercial emissions adjusted to exclude certain non-appliance sources like pipeline compressor stations and industrial-size boilers. All commercial nonpoint source emissions are included, and commercial point source emissions are included if they have input heat capacities less than 10 million Btu/hr or if they are classified as space heaters.

<sup>3</sup> Office of Governor Gavin Newsom, “[Governor Newsom Calls for Bold Actions to Move Faster Toward Climate Goals](#),” July 2022.

<sup>4</sup> California Air Resources Board (CARB), [2022 State Strategy for the State Implementation Plan](#), September 2022, pp.101-103..

<sup>5</sup> CARB, [2022 Scoping Plan for Achieving Carbon Neutrality](#), December 2022, p.215 & Appendix F pp.38-40.

<sup>6</sup> SPUR, [Closing the Electrification Affordability Gap](#), November 2023, p.16.

<sup>7</sup> RMI, “[How to Upgrade and Electrify Millions of US Homes and Buildings](#),” August 2023.

times greater than the costs for building zero-emission homes."<sup>8,9</sup> The CPUC subsequently ended electric extension subsidies for mixed-fuel new construction, further improving the economics of all-electric construction.<sup>10</sup>

- During Climate Week in September 2023, Governor Newsom joined with the U.S. Climate Alliance (USCA) — a bipartisan group of 25 governors across the nation — in committing to a collective goal of 20 million heat pump installations across the nation by 2030 with at least 40% of benefits going to disadvantaged communities, effectively aiming to quadruple the adoption of heat pumps nationwide.<sup>11</sup>
- In October 2023, the California Energy Commission joined a public-private partnership with ten of the world's largest manufacturers, distributors, and suppliers of building HVAC (heating, ventilation, and air conditioning) and water heating equipment, signing a collaborative agreement committing to innovate, manufacture, and deliver the products necessary to meet the state's goal of installing 6 million heat pumps by 2030.<sup>12</sup> In March 2024, the same ten manufacturers plus the largest U.S. wholesaler published a "Joint Vision for a Decarbonized Marketplace" signaling support for building decarbonization and the critical role of well-designed state policies and regulations to advance heat pump deployment.<sup>13</sup>
- Building on the USCA commitment last fall, California joined eight other states from around the country in February 2024 in signing an agreement to ensure at least 65% of collective sales of residential HVAC and water heating equipment are heat pumps by 2030 — and 90% by 2040.<sup>14</sup>

All of these important building blocks set the state up for success in implementing innovative and impactful measures like the Standards. As it proceeds in developing the Standards, CARB should:

- I. Develop a statewide rule based on Air District measures,
- II. Broaden the analytical scope and data used, and
- III. Prioritize equitable implementation of the Standards.

## **I. Develop a Statewide Rule Based on Air District Measures**

At the Workshop, CARB presented the concept of a "Statewide Rule Based on Bay Area and South Coast Measures." The agency should pursue developing such a rule. The proposed effective dates presented on [slide 17](#) of the Workshop materials — drawn from the Bay Area Air Quality Management District's (BAAQMD) adopted zero-NO<sub>x</sub> rules<sup>15</sup> and the South Coast Air Quality

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<sup>8</sup> California Public Utilities Commission (CPUC), "[CPUC Decision Makes California First State in Country to Eliminate Natural Gas Subsidies](#)," September 2022.

<sup>9</sup> CARB, "[California Air Resources Board's \(CARB\) Suggested Changes for Zero-Emission Building Standards in the California Green Building Standards \(CAL Green\) Code](#)," Letter to the California Building Standards Commission et al., November 2023.

<sup>10</sup> CPUC, "[CPUC Eliminates Last Remaining Utility Subsidies for New Construction of Buildings Using Natural Gas](#)," December 2023.

<sup>11</sup> U.S. Climate Alliance, "[U.S. Climate Alliance Announces New Commitments to Decarbonize Buildings Across America. Quadruple Heat Pump Installations by 2030](#)," September 2023.

<sup>12</sup> California Energy Commission (CEC), "[Top Global Building Appliance Manufacturers and Distributors Commit to Help California Achieve Six Million Heat Pump Goal](#)," October 2023.

<sup>13</sup> Building Decarbonization Coalition, "[Joint Vision for a Decarbonized Marketplace](#)," November 2023.

<sup>14</sup> NESCAUM, "[A Multi-State Agreement to Accelerate the Transition to Zero-Emission Residential Buildings](#)," February 2024.

<sup>15</sup> Bay Area Air Quality Management District, "[Rules 9-4 and 9-6 Building Appliances](#)," February 2024.

Management District's (SCAQMD) proposed zero-NO<sub>x</sub> rules<sup>16,17</sup> — are the strongest path forward for the state for the following reasons:

- Alignment on effective dates among regulators at different levels of government will provide maximum consistency and predictability to equipment manufacturers, distributors, installers, and purchasers in all areas of the state.
- Alignment on dates will enable more concerted state and regional action on complementary measures necessary to successful and equitable implementation of zero-NO<sub>x</sub> standards, such as coordinated tenant, labor, and bill protections.
- Statewide application of BAAQMD and SCAQMD measures will achieve pollution reductions as soon as possible for the equipment categories where zero-emission products are available soonest, rather than waiting until 2030 to begin transitioning those end uses and leaving feasible emissions reductions on the table. Meanwhile, those product categories that may need a longer time to reach market maturation are granted additional product development runway through this proposal.
- These proposed effective dates come out of public processes at BAAQMD and SCAQMD that have already taken in a large amount of stakeholder feedback, and these compliance timelines have been thoughtfully selected to reflect the current and anticipated state of the market.
- A stepwise compliance approach may be more manageable for CARB from a resource allocation perspective, mitigating the need to address all administration, compliance, and enforcement activities for all space and water heating sources in all residential and commercial buildings across the state on the same day.

## **II. Broaden the Analytical Scope and Data Used**

On [slide 43](#) of the Workshop materials, CARB presents “Overall Questions for the Public,” soliciting feedback on several topics central to development of successful zero-emission space and water heating standards. These topic areas were informed and scoped by public input from CARB’s May 2023 kickoff workshop for these Standards and stakeholder interviews for the agency’s Public Engagement Assessment Report,<sup>18</sup> and staff has augmented its investigation and data sources in these areas through focused Technical Feedback Meetings with invited experts as well as through a formal Public Expert solicitation.<sup>19</sup>

While CARB’s deliberate preparation has positioned the agency well with respect to its data sources and analysis on these core topics, CARB should consider the following:

### **A. Expand Scope of Building Readiness Assessment**

- In addition to asking “Will buildings be ready to accommodate zero-emission space and water heaters?”, CARB should employ a proactive, forward-looking lens by considering “How can the state help buildings become ready before the rules take effect?” While it is of

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<sup>16</sup> South Coast Air Quality Management District (SCAQMD), [“Proposed Amended Rule 1146.2.”](#)

<sup>17</sup> SCAQMD, [“Proposed Amended Rules \(PAR\) 1111 and 1121.”](#)

<sup>18</sup> CARB/California State University Sacramento College of Continuing Education, [Public Engagement Assessment Report](#), December 2023.

<sup>19</sup> CARB, [“Public Expert Solicitation for Zero-Emission Space and Water Heater Standards,”](#) January 2024.

course necessary to understand the current landscape for building readiness, as the Workshop materials currently plot out, it is also critical that CARB seeks to:

- Understand the policy drivers at all levels of government needed to bring covered buildings to readiness by the time the rule takes effect;
- Assess active workstreams and upcoming policy advancement opportunities to that end across a wide variety of venues and weigh in when appropriate;
- Identify gaps in this work that still need to be filled in order to achieve smooth, timely, affordable, and equitable implementation of zero-emission standards; and
- Collaborate actively and across historical silos with other state agencies and market actors to produce needed solutions.

This proactive implementation planning approach is further expanded upon below in Section III.

## **B. Consider Additional Data Sources for Overall Cost Analysis**

- CARB should prioritize working with state, regional, and local entities to obtain real-world cost data wherever possible.
  - CARB should work with community choice aggregation programs (CCAs), distribution utilities, local and regional governments, and other state agencies to acquire cost data from ratepayer, state, and local programs that have already been implemented. In the Bay Area, program data from BayREN and regional CCAs like Silicon Valley Clean Energy should be utilized, and similar attempts should be made to add specific project costs from other regions of the state to create a more geographically complex and nuanced data set.
- To supplement labor costs that were calculated with RSMeans, CARB should engage directly with contractor networks for project cost data. Where this is infeasible or impractical, the agency should collaborate with contractor networks to validate the RSMeans outputs being utilized. While RSMeans offers valuable insight into labor costs, it does have limitations, noted below, which make it valuable to supplement with insights from local contractors.
  - There is not very much heat pump data in RSMeans, and the way in which cost data for heating equipment is organized is not consistent.
  - RSMeans cost data tend not to include contractor markups or profits, meaning that database outputs may be underestimating real-world costs.
  - Similarly, an RSMeans estimate is not going to consider the percentage of homes that need additional work like ductwork repair, a wiring safety upgrade, or a replaced service line as part of their heat pump installation.
  - In addition, RSMeans cost data may be too high-level to meet California's needs. The product uses national-average estimates that are then adjusted to a location based on one or more multipliers; however, that approach can't accurately reflect things like specific regulations, housing stock trends, or labor microclimates that make very specific types of work substantially more or less expensive.
- When considering operating costs, CARB should ensure it is adequately factoring in the sizes of air-source heat pumps and calculating the hourly air-source heat pump and heat

pump water heater efficiency. Suggested methodology for these elements can be found in the FAQ for RMI's [Green Upgrade Calculator](#).<sup>20</sup>

- Additionally, the report “Heat Pumps for Hot Water: Installed Costs in New Homes” — and particularly its technical addendum — may be useful for system design and cost estimates, especially for central systems.<sup>21,22</sup>
- For completeness, the National Renewable Energy Laboratory has an additional database of measure costs that CARB could consider in its assessment,<sup>23</sup> though for the reasons stated above, the agency should strive to draw from California data sources wherever possible.
- Lastly, CARB should be sure to consider prominently the high cost of *inaction* associated with a failure to reduce these significant sources of pollution. The agency’s proposed health endpoints, featured on [slide 23](#) of the Workshop materials, are appropriately wide-ranging, and CARB’s health impacts analysis will be useful for framing this issue for the public, however the EPA’s updated social cost of carbon must also be included in this assessment. When climate change-associated damages to health, property, agriculture, infrastructure, and social stability are added to the public health impacts of building combustion pollution, it becomes very clear that California cannot continue to pay the price of fossil fuel building equipment — more than \$14.5 billion per year.<sup>24,25,26</sup>

### C. Broaden and Clarify Approach to Equity

- CARB’s regional equity analysis proposes to characterize differential impacts for vulnerable populations, however the agency should provide greater clarity and transparency into how it will *interpret* the indicator data that it collects. How is CARB planning to use these metrics to assess the equity of Standards, including across different geographies in the state? More importantly, how will an equity analysis influence steps the agency and its partners must take in order to make this transition an equitable one?
- CARB should also consider how it can employ an equity lens beyond the equity analysis that is scoped on [slide 38](#) of the Workshop materials. As it investigates other core topics, the agency should expand its Key Questions to include an equity overlay whenever possible. For example:
  - “What are the potential health benefits” — and how are those benefits distributed in disadvantaged and historically overburdened communities?
  - “Will buildings be ready” — and of those that are deemed “Not Likely Ready,” how are those distributed in disadvantaged and historically overburdened communities? What additional building readiness interventions are needed to ensure equivalent access to non-polluting equipment for vulnerable populations?

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<sup>20</sup> RMI, [Green Upgrade Calculator](#), March 2024.

<sup>21</sup> RMI, “[Heat Pumps for Hot Water: Installed Costs in New Homes](#),” July 2020.

<sup>22</sup> RMI, “[Heat Pumps for Hot Water Technical Addendum](#),” July 2020.

<sup>23</sup> National Renewable Energy Laboratory, [National Residential Efficiency Measures Database](#), January 2018.

<sup>24</sup> EPA, [CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool \(COBRA\)](#), April 2021. Analysis used selected subsectors: commercial coal, commercial gas, commercial oil, and residential other.

<sup>25</sup> EIA, “[Energy-Related CO2 Emission Data Tables – Sectoral specific emission tables by state](#),” July 2023.

<sup>26</sup> EPA, [Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances](#), November 2023.



- “How much would it cost” — and how are public education, technical assistance, incentive support, and utility programs being targeted to make resources truly accessible for underserved communities?

### **III. Prioritize Equitable Implementation of the Standards**

CARB’s approach and portfolio of data resources has largely set the agency on the right track to assess the current market and policy landscape, however CARB must also consider the evolving market and policy landscape and engage in proactive implementation planning to support an equitable transition when the rules take effect.

#### **A. Consider the Evolving Market and Policy Landscape**

The body of analysis scoped out in the Workshop aims to provide an accurate snapshot of conditions as they exist today — or perhaps as they existed in the past years that the various data sets used in the investigation were collected — but the proposed rule will not take effect until years from now, under a changed market and policy landscape. Thus, it will be important for CARB’s analyses to consider thoroughly the trends and factors that will impact the “Key Questions Guiding Staff’s Work” over the next three to ten years (based on the assumption of 2027–2034 compliance dates) and to ensure there is at least a well-reasoned qualitative assessment in the results presented to Board Members and the public of how the current snapshot may be expected to change by the time implementation dates arrive.

Specifically, CARB should ask and seek to answer the question, “What developments in policy, technology, and/or relevant markets are either underway or should be anticipated by 2027, 2029, 2031, etc., that will impact core focus areas like technology availability, building readiness, costs, and equitable implementation?” The complementary policies being pursued by partner agencies shown on [slide 7](#) of the Workshop materials are all relevant to include in this assessment, and insights from manufacturers, contractors, labor, and other constituencies should also be integrated.

As an illustration of why a prospective evaluation is needed, consider once more a selection of the last two years of developments in this space. In July 2022, Governor Newsom pushed state agencies for more aggressive action on the state’s climate goals, including the installation of 6 million heat pumps by 2030.<sup>27</sup> The state’s Equitable Building Decarbonization program was established in statute late in 2022<sup>28</sup> and will offer hundreds of millions of dollars in statewide incentives as well as “(l)ow-or no-cost retrofits for low- and moderate-income households throughout the state.”<sup>29</sup> Also in 2022, the subsidy for existing homes in Pacific Gas and Electric (PG&E) service territory that need an electric service line upgrade increased by more than 50%,<sup>30,31</sup> covering all electrical upgrade costs in more than half of projects.<sup>32</sup> Meanwhile, the CPUC ended line extension subsidies for new natural gas hookups effective July 2023<sup>33</sup> and went on to eliminate

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<sup>27</sup> Office of Governor Gavin Newsom, “[Governor Newsom Calls for Bold Actions to Move Faster Toward Climate Goals](#),” July 2022.

<sup>28</sup> California State Legislature, “[Bill Text - AB-209 Energy and climate change. \(2021-2022\)](#),” September 2022.

<sup>29</sup> CEC, “[Equitable Building Decarbonization Program](#).”

<sup>30</sup> Pacific Gas and Electric Company (PG&E), [Electric Rule No. 15 - Distribution Line Extensions](#), January 2024.

<sup>31</sup> PG&E, “[Revisions to Residential Allowances Gas Rule No. 15.H.2 and Electric Rule No. 15.I.2](#),” September 2021.

<sup>32</sup> Rincon Consultants, “[Zero-NOx Appliance Cost & Technical Challenges Findings](#),” January 2024, p.17.

<sup>33</sup> CPUC, “[CPUC Decision Makes California First State in Country to Eliminate Natural Gas Subsidies](#),” September 2022.

electric line extension subsidies for new construction projects that use fossil fuels effective July 2024,<sup>34</sup> further improving the economics of all-electric construction. Plus, the federal Inflation Reduction Act of 2022 will provide incentives and tax credits in the coming years to residents and building owners upgrading to zero-emission HVAC systems and water heaters.

A backward-looking snapshot analysis in 2018 or 2020 likely would not have captured these developments, which have significantly shifted the building equipment market to the point that heat pump sales outpaced gas furnace sales in 2022 and 2023.<sup>35</sup> CARB should engage in deep collaboration with partner agencies, local governments, and market actors to qualitatively forecast as best it can the changes in policy, technology, and markets that will impact the implementation of these Standards.

It is already known that the California Energy Commission (CEC) will adopt a new Building Standards Code in the near future that will impact the space and water heating landscape.<sup>36</sup> Meanwhile, the CPUC, CEC, and CARB just released a Joint Agency Staff Paper on Progress Towards a Gas Transition<sup>37</sup> that reflects a coordinated vision for reducing fossil gas demand and planning for the future of the gas system, work that will induce many changes in the market over the next decade and beyond. CARB must ensure that any market analysis conducted for this rulemaking captures anticipated actions such as these to the maximum extent feasible.

### **B. Provide a Statewide Blueprint for Equitable Rule Implementation**

In order to execute an equitable, smooth, timely, and affordable transition to zero-emission space and water heating equipment, it will be critically important for CARB to focus proactively and collaboratively on what is needed to prime the market for each category in turn, what workstreams are already happening elsewhere in other venues to achieve those changes, what components of the path forward are still missing, what party or parties (if not CARB itself) will be enlisted to work on those solutions, and when and how that process will unfold by the time the rule takes effect.

A successful and equitable transition will involve unprecedented collaboration across agencies and levels of government on complementary programs like low-income incentives, tenant protections, contractor training, utility rate reform, permitting changes, provision and targeting of financing, long-term gas planning, public education, and more. CARB should consider how these complementary actions should advance together and offer a blueprint for state actors to collaboratively achieve a statewide transition to pollution-free building equipment. When policies in flux will influence equitable rule implementation, CARB should as a policy offer public comment, especially in regional and municipal settings where tenant and labor protections will need to be implemented.

[Appendix F](#) of the Scoping Plan and the policy landscape presented on [slide 7](#) of the Workshop materials (“Key Complementary Policies”) represent positive foundations to CARB’s thinking in this regard. CARB should expand this landscape to include other collaborators and other categories of

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<sup>34</sup> CPUC, “[CPUC Eliminates Last Remaining Utility Subsidies for New Construction of Buildings Using Natural Gas](#),” December 2023.

<sup>35</sup> Canary Media, “[Heat pumps outsold gas furnaces again last year — and the gap is growing](#),” February 2024.

<sup>36</sup> CEC, “[2025 Building Energy Efficiency Standards](#).”

<sup>37</sup> CPUC, “[Long-Term Gas Planning Rulemaking Issues Joint Agency White Paper and Draft Scope and Schedule for Comment](#),” February 2024.



policies — for example, local governments controlling the many local changes to permitting and zoning/siting ordinances that may be needed to remove existing barriers to heat pump installation across California’s 482 cities.

Further, the agency should deepen its thinking to assess the current and anticipated developments within this policy universe that will support transitioning each equipment category to zero-emission alternatives, consider what gaps exist to achieving those outcomes successfully on the proposed compliance schedule, and outline how those remaining needs may be addressed by the responsible parties on the needed timeline, with an eye toward minimizing the need for future exemptions.

Importantly, CARB should recommend clear strategies for achieving equity and energy justice in the transition to pollution-free building equipment in its implementation planning. The Building Energy, Equity & Power (BEEP) Coalition has both published and previously submitted to CARB recommendations that illuminate what equitable building decarbonization can and should look like in California.<sup>38,39</sup> For instance, BEEP has called for holistic building upgrades to ensure households see lower energy bills after installing electric appliances and working with local tenant rights groups to adopt renter safeguards in building programs statewide.<sup>40</sup>

In forthcoming comments responding to the Workshop, the BEEP Coalition rightly recommends that CARB prioritize low-income tenants in the Equity Analysis, analyze how the regulation will improve the air quality in overburdened communities, and identify significant sources of funding to ensure zero-emission appliances are more affordable than polluting alternatives and that households can make the necessary upgrades to accommodate electric equipment. CARB should work directly with the BEEP Coalition to incorporate their recommendations into its implementation plan along with concrete direction to state actors to ensure these necessary actions are fulfilled before the rules take effect.

A robust and proactive gap analysis of this sort, framed around agencies with responsibility over elements of the clean buildings transition collaborating across silos and scoping workstream milestones out to the rule’s future effective dates and beyond, will enable California to achieve a successful and equitable transition to zero-emission HVAC and water heating.

CARB has taken a crucial first step toward aligning California’s buildings sector with the state’s climate goals by proposing statewide zero-emission standards for all space and water heating. Thank you for considering these comments. We look forward to engaging with CARB as it continues to pursue equitable building decarbonization in California.

Sincerely,

Jed Holtzman, Senior Associate, **RMI**

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<sup>38</sup> Building Energy, Equity & Power (BEEP) Coalition, “[Achieving Energy Justice & Real Climate Solutions in California: Principles for Equitable Policymaking](#),” June 2021.

<sup>39</sup> BEEP Coalition, “[Re: Equitable Building Decarbonization - NEW REPORT](#),” Letter to CARB, March 2022.

<sup>40</sup> Ibid.

Lauren Weston, Executive Director, **Acterra**

Leslie Alden, Executive Director, **Act Now Bay Area**

Jose Torres, California Director, **Building Decarbonization Coalition**

Bruce Hodge, Chair, **Carbon Free Palo Alto**

Fernando Gaytan, Senior Attorney, **Earthjustice**

Angela Evans, Director of Electrification, **Menlo Spark**

Julia Hustwit, Director of Codes & Policy, **New Buildings Institute**

Merrian Borgeson, Director, California Climate & Energy Policy, **NRDC**

Dr. Robert M. Gould, President, **Physicians for Social Responsibility, San Francisco Bay Chapter**

Julia Hatton, CEO & President, **Rising Sun Center for Opportunity**

Melissa Yu, Building Electrification Senior Field Organizer, **Sierra Club California**

Sam Fishman, Sustainability and Resilience Policy Manager, **SPUR**

Anne Pernick, SAFE Cities Senior Advisor, **Stand.earth**

Andrea Gara, Co-Lead, **350 Silicon Valley Palo Alto Climate Team**

Jonathan Klein, CEO & Co-Founder, **UndauntedK12**