



2311 Wilson Boulevard Suite 400 Arlington VA 22201 USA  
Phone 703 524 8800 | Fax 703 562 1942  
www.ahrinet.org

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February 6, 2023

Jennifer Elwell  
Bay Area Air Quality Management District  
375 Beale Street  
Suite 600  
San Francisco, CA 94105

RE: AHRI Comments on Staff Report for the Proposed Amendments to Building Appliance Rules Regulation 9: Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnace, and Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters

Dear Ms. Elwell:

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) welcomes the opportunity to comment on the Bay Area Air Quality District's (BAAQMD or District) Staff Report (Report) for the Proposed Amendments to Building Appliance Rules Regulation 9: Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnace (Furnaces), and Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers (Boilers) and Water Heaters (Water Heaters).

AHRI represents more than 330 manufacturers of air conditioning, heating, commercial refrigeration, and water heating equipment. It is an internationally recognized advocate and technical resource for manufacturers of heating, ventilation, air conditioning, and refrigeration (HVACR) and water heating equipment and certifies the performance of many of the products they manufacture. In North America, the annual economic activity resulting from the HVACR industry is approximately \$256 billion. In the United States alone, AHRI's members, along with distributors, contractors, and technicians, employ more than 1.3 million people.

AHRI and its members are committed to, and support, greenhouse gas (GHG) emission reductions, while promoting sustainable, safe, reliable, and affordable access to the essential air and water heating and cooling provided by the products they manufacture.

### **Product Cost**

The BAAQMD Staff Report (Report) specifies that the upfront installed cost of a Heat Pump is \$8,027 and a Heat Pump Water Heater is \$2,824.<sup>1</sup> When reviewing the most recent data for

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<sup>1</sup> Appendix C: Draft Socioeconomic Impact Report, of the BAAQMD Staff Report, at page 17.

installation costs of these products through the TECH Clean California webpage,<sup>2</sup> the numbers provided in the Report are significantly lower than the data provided by TECH for the Bay Area. When looking at all projects, TECH identifies an average project cost to replace bath space and water heating with heat pumps to be \$17,400 based on a total of 10,342 projects.<sup>3</sup> In the Bay Area, the TECH data shows water heating a minimum project cost of \$3,355 and a maximum project cost of \$60,428 for water heating, with an average cost of \$8,577 per water heater replacement.<sup>4</sup> Looking at the same data set for heat pumps, the TECH data shows a minimum project cost of \$3,500 and a maximum project cost of \$66,218 with an average cost of \$22,745.<sup>5</sup> The data shows a significantly higher cost than that specified in the Report which will have a significantly greater impact on consumers.

In addition, the analysis shows only the annualized cost to consumers for these replacements, which would imply the ability to finance the project cost over the life of the product. While this may be true in some cases, low-to-moderate income (LMI) households with potentially lower credit scores may be unable to secure financing for these products at a favorable rate, or at all, which would, for these consumers, increase the upfront cost of these projects. If financing is not an option, many LMI families may not be able to afford to replace their current products and may instead choose to repair them. Such an outcome subverts the intent of rule as it will keep higher NOx products on the market in excess of their expected life.

### **Utility Savings**

AHRI disagrees with the use of the E3 report<sup>6</sup> as the basis for savings on a consumer's utility bill. The analysis in the E3 report looks at different service districts and climate zones, such as SoCal SMUD and Bay Area, which do not relate back to the claims made in the report, specifically the claimed \$150 annual energy cost savings for space heating and the \$45 annual energy cost savings for water heating. The E3 report shows that for common high efficiency HVAC equipment in Climate Zone 4, consumers can expect \$100 in annual bill savings.<sup>7</sup> The same analysis for water heating shows that common high efficiency heat pump water heaters will have a net annual cost to consumers of more than \$75 in climate zone 4.<sup>8</sup>

In addition, PG&E did a cost study of switching from gas to electric water heating in their service territory<sup>9</sup> and compiled the cost-effective cases in which switching would have result in net savings for consumers. In reviewing PG&E's analysis, it is important to note the effect that proper installation, water storage temperature, ambient temperature, and proper sizing of the

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<sup>2</sup> <https://techcleanca.com/public-data/maps-and-graphs/>

<sup>3</sup> *Id.*

<sup>4</sup> *Id.*

<sup>5</sup> *Id.*

<sup>6</sup> Energy and Environmental Economics. "Residential Building Electrification in California". (April 2019)

<sup>7</sup> *Id.* Figure 3-10 at page 59.

<sup>8</sup> *Id.* Figure 3-12 at page 61.

equipment had on the cost/benefit of the installation. At standard installation conditions, PG&E found a net cost to consumers of \$28-\$87, depending on if the customer was a CARE or non-CARE customer and if the customer kept the same capacity water heater or increased its capacity. PG&E furthered its analysis by reviewing different efficiency heat pumps and lower tank set points. However, this scenario cannot be assumed as the base case for BAAQMD's analysis as it requires the use of high efficiency heat pumps and lower tank temperature set points. These specific requirements cannot be mandated in the proposed rule. The analysis needs to be performed with the base efficiency heat pump at standard water storage temperatures, such as those put forth in Tables 2-1 and 2-2 of the PG&E report.

Given the projections from both reports, costs to consumers will vary because of a transition to heat pump space and water heating. This variability makes it difficult to justify the use of annual energy costs or savings based on a technology switch. Therefore, BAAQMD should adopt a position that there will be no significant financial impact to consumers as a consequence of this rule.

### **Emergency Replacements**

In most cases, space and water heating equipment is replaced upon failure of the appliance. If this occurs and the house needs a panel upgrade or other alterations to accommodate a zero-NOx solution, that house could without space- or water heating for several days if not weeks while the retrofits occur. If such an event were to happen during a cold snap, there could be significant concern for the health and safety of the occupant(s). The District needs to consider solutions to the emergency replacement issue, including proactive replacement programs, such that the impact of proposed Rules 9-1 and 9-6 does not compromise safe and reliable access to services.

The California Statewide Codes and Standards Reach Codes Team (Statewide Reach Code Team) performed a cost effectiveness study for upgrading existing buildings in 2019.<sup>10</sup> In its report, the team recognized the challenges associated with emergency replacements of space and water heating when moving from gas to electric, and outlined specific exceptions for these issues:

Exception 1: Non-ducted space conditioning systems and systems without central air conditioning.

Exception 2: Ducted space conditioning systems where only the gas furnace is replaced.

Exception 3: The main service panel does not have the capacity or space to accommodate an additional 240V, 30 A circuit, and the cost to upgrade the main service panel and run required electrical service to the heat pump air handler is prohibitive as determined by the jurisdiction.

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<sup>10</sup> California Statewide Codes and Standards Reach Codes, "2019 Cost-Effectiveness Study: Existing Single Family Residential Building Upgrades" Prepared by: Frontier Energy, Inc. and Misti Bruceri & Associates, LLC. (2019)

For heat pump water heaters, the Statewide Reach Code Team identified the need for the following exceptions:

Exception 1: The proposed location of the new water heater is located within conditioned space.

Exception 2: The proposed location of the replacement water heater is not large enough to accommodate a HPWH equivalent in size and one-hour capacity rating to the existing water heater or the next nominal size available.

Exception 3: The main service panel does not have the capacity or space to accommodate an additional 240 V, 30 A circuit, or the cost to upgrade the main service panel and run required electrical service to the water heater is prohibitive as determined by the jurisdiction.

Exception 4: A solar water heating system is installed meeting the installation criteria specified in Reference Residential Appendix RA4.20 and with a minimum solar savings fraction of 60 percent.

These cases need to be considered and addressed as they were by the Statewide Reach Code Team.

## **Recommendation**

### **The District should adopt Alternative 3**

For reasons outlined above and further in these comments the District should adopt a form of Alternative 3 from its analysis that includes the larger, commercial equipment. The Report itself states that a 6-year delay of compliance -- until January 1, 2035 -- would be considered the environmentally superior option.<sup>11</sup> Such a shift would allow time for utility scale solar and battery storage to be committed to and implemented, as opposed to just speculated. In addition, more time will afford the heat pump market to move in equilibrium with customer needs, including financing programs for LMI consumers, and an increased global manufacturing capacity. Moreover, additional time will be needed to ensure that a sufficient number of contractors and technicians are trained, for the purpose of ensuring quality installation. In addition to this rule, robust outreach and incentives for energy audits and early adoption of zero-NOx space and water heating equipment can reduce the need for emergency replacements, provide continued NOx reductions as the market matures, and drive consumer trust for these products.

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<sup>11</sup> Draft Environmental Impact Report, Page 4-14.

## **A. Comments specific to Regulation 9 Rule 4: Nitrogen Oxides from Fan-Type Residential Central Furnaces:**

### **1. Scope of products in each phase:**

As stated in our previous comments, the current requirements of this regulation are unclear, and clarification is required for proper understanding. Section 9-4-301 outlines the NOx standards for *Stationary Natural Gas-Fired Furnaces*; whereas, Sections 9-4-301.1 and 9-4-301.2 refer only to *Stationary Natural Gas-Fired Residential Natural Fan Type Central Furnaces*. In section 9-4-301.3, the scope is expanded to *Stationary Natural Gas-Fired Furnaces*, which excluding furnaces used in *Mobile Homes*. Neither *Stationary* nor *Mobile Home* is defined, which makes it difficult for manufacturers to understand which furnaces would need to follow this standard and which would be exempt.

Moreover, the inclusion of these products in section 9-4-301.3 presents additional questions as to requirements applicable to these types of furnaces prior to January 1, 2029. The products discussed in the staff report include wall heating and other direct-vented products. These products are not typically marketed as furnaces, and the expectation that these products fall under the furnace definition in section 9-4-203 will add confusion to the market. Proper definitions that align to the U.S. Department of Energy definitions should be used to ensure that the scope of the rule is clear.

Finally, there is no discussion of *weatherized* units in this section. *Weatherized* can be defined as “designed for installation outside of a building, equipped with a protective jacket and integral venting, and labeled for outdoor installation.”<sup>12</sup>

### **2. Dual-Fuel Systems**

AHRI requests that the District reconsider its exclusion of dual-fuel systems as a compliance pathway for the ultra-low NOx requirements in Section 9-4-301.3. Dual-fuel systems provide an ideal pathway to lower NOx emissions and a way to reach the average NOx emissions of less than 14ng/j required in the section. The Report specifies that it is not intending to specify technologies to meet these NOx goals; however, not allowing for a pathway to dual-fuel compliance is effectively specifying ultra-low NOx burners as the only path to comply with this section. Not only would a dual-fuel pathway limit NOx emissions but it also would help homeowners move to heat pumps sooner, at a reasonable cost, and provide increased resiliency to the grid by reducing winter peak loads.

**BAAQMD should include a definition of dual-fuel systems in the proposed rule with control requirements to ensure the weighted average NOx emissions are below the requirements.**

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<sup>12</sup> SCAQMD Rule 1111-1 (b)(17).

**Dual fuel systems also should be considered as an option in the environmental analysis, especially given the impact to low- and medium-income consumers.**

**B. Comments specific to Regulation 9 Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters:**

**1. Commercial Applications**

The current proposed amendment to Regulation 9 Rule 6 specifies a zero-NO<sub>x</sub> requirement for water heaters greater than 75,000 BTU but less than 2,000,000 BTU by 2031. Currently the only solution on the market for zero-NO<sub>x</sub> water heating is heat pump water heaters (HPWHs). In commercial applications these products are nascent and typically designed to work at lower internal tank temperatures. Process applications in commercial settings such as hospitals, healthcare facilities, universities, commercial laundries, as well as large restaurants require water temperature up to and greater than 180°F for meeting sanitation requirements. Hence, HPWH-only systems are not currently commercially viable and may not prove to be cost-effective solutions for these commercial applications given the delivered cost of electricity in the Bay Area. The District needs to ensure that these applications can be met with current technology before putting this rule into place. The Report does not discuss the requirements of process applications and simply mentions that industrial product greater than 2,000,000 BTU would be addressed in a separate rulemaking for Regulation 9 Rule 7. While AHRI appreciates this distinction, there are products less than 2,000,000 BTU that are used in commercial sanitization applications. Waiting until 2 years prior to compliance to review and assess this market through the interim report is insufficient. If suitable analysis cannot be performed and a feasible solution identified for these applications, there needs to be an exception in place for these products to ensure that there safe, reliable, affordable access to critical hot water for public health. More specifically, an exception should be added for equipment covered in 9-6-303 that is used exclusively to provide service hot water at temperatures of 180° F and greater. In addition, similar to AHRI's request for space heating, BAAQMD should include a definition of dual-fuel systems in the proposed rule with control requirements to ensure the weighted average NO<sub>x</sub> emissions are below those requirements and include these products in their environmental analysis.

**2. Residential Applications**

As referenced in the Report, there are residential 120V HPWHs that have been announced and are undergoing field studies in California. However, these products are not yet widely available for consumers, and utilities are still compiling performance data on these units. While AHRI members remain confident that the 120V product class will have intended applications and be utilized in the marketplace, it is premature for the District to use this product class as an empirical justification for the Amendment. AHRI would remind the District that notwithstanding 120V HPWHs ability be “plugged in” to a standard 120V outlet, most utility closets, basements,

and garages do not currently have a 120V outlet located by the water heater. This means that even when these products are readily available, an electrician would be required to install a dedicated outlet for the water heater. Further HPWHs require condensate removal. If a drain does not exist near the water heater, a plumber would be required to install one. These are just a few of the technical barriers and costs that need to be considered for the wide-scale adoption of these products, which are not accounted for in the Report's analysis.

A rushed technology transition may lead to unintended consequences with respect to installation and performance of the products, which would only serve to damage public perception and slow the adoption in other jurisdictions. Given the current status of this market, the 2027 transition date is unreasonable. Furthermore,, having the compliance date for these products potentially moved forward to 2025 due to the interim report creates uncertainty for the entire supply chain. A reasonable timeframe must be established for these products to be developed and matured such that the supply chain can handle this regulation and contractors and technicians have time to be trained in proper installation and maintenance.

#### **Additional Policy Observations:**

##### **A. Effective Dates and Review Period**

AHRI reiterates concerns raised in our previously submitted comments<sup>13</sup> that while AHRI is supportive of the evaluation process covered thoroughly in the interim report, 2-years is not sufficient for manufacturers and the supply chain to make the necessary adjustments in time to comply. Further, the 2-year window does not allow the BAAQMD Board sufficient time to properly review the report and make informed decisions. This process needs to have a concrete timeline for review and determination from the Board to provide manufacturers certainty and properly plan for implementation. Lack of a clear timeline for compliance or deviation from this rulemaking creates significant uncertainty for manufacturers, which need time to develop compliant products and initiate production. Less than two years between report publication and a compliance date is not enough time for industry to accommodate any equipment redesigns that may be necessary. For example, after publication of a U.S. Department of Energy final rule, two to five years<sup>14</sup> is required before the compliance period for any new regulation, acknowledging the time needed to design compliant HVAC equipment and to retool necessary manufacturing equipment.

**The effects of this moving target and shorter timeline were not evaluated in the Report and need to be fully considered prior to implementation of the amendments.**

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<sup>13</sup> AHRI Comments on EIR for Proposed Amendments to Regulation 9 rules 4 and 6. Submitted on June 22, 2022

<sup>14</sup> ASHRAE Products have 2 or 3 years in accordance with 42 U.S.C. 6313 § (a)(6)(D). Residential Products have 5 years in accordance with 42 U.S.C. § 6295(l)(2).

## Conclusion

Two fundamental pillars of industry are certainty and consistency. The above proposals address certainty for industry. Consistency can only be achieved by local air quality management districts working to align on NOx requirements so that there is one clear, consistent path forward for manufacturers in California. Incentives should be provided for early adoption, and programs should be put in place to help low-income households afford this transition. This approach will aid in an equitable transition and remove the main hurdle for emergency replacements, which is cost. This approach will also allow for optimal environmental benefits.

We appreciate the opportunity to provide these comments. If you have any questions regarding this submission, please do not hesitate to contact me at [kbergeron@ahrinet.org](mailto:kbergeron@ahrinet.org).

Sincerely,

A handwritten signature in black ink that reads "Kyle Bergeron" with a long, sweeping horizontal line extending to the right.

Kyle Bergeron  
Senior Regulatory Engineer

cc: Helen Walter-Terrinoni