AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE

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

Re: AHRI Comments on Initial Study 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) Initial Study (Study) 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) (The Initial Study).

AHRI represents more than 300 manufacturers of air conditioning, heating, commercial refrigeration, and water heating equipment. It is an internationally recognized advocate and technical resource for the heating, ventilation, air conditioning, and refrigeration (HVACR) and water heating industries and certifies the performance of many of the products manufactured in these industries. 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.

<u>Overview</u>

The BAAQMD Study evaluates the potential environmental impacts of the proposed requirements to reduce nitrogen oxide emissions from Furnaces, Boilers, and Water Heaters. The Study concludes that there would be benefits from reductions in nitrogen oxide emissions, and separately, there could be impacts from additional power generation facilities needed to provide electricity to new equipment, including the impact of emissions from new facilities. Loss of efficiency due to source emissions compared to on-site emissions should be included in any detailed evaluation.

As decarbonization policies become more pervasive, load on the grid increases which could limit energy reliability in California. Additional infrastructure will need to be built to support the doubling or more of demand for electricity.[1] On top of the required infrastructure upgrades, such as panel upgrades, that will be required due to the increase in electric space and water heating demands, the upgraded infrastructure will need to be developed with enough capacity to accommodate anticipated growth in building stock. This infrastructure will be particularly costly and will need to demonstrate reliability in natural disasters and high wind conditions. Additionally, grid reliability becomes increasingly more important as electricity becomes the only energy source for the public's safety and comfort. This effort will be complicated by the need for reliable power during the infrastructure upgrade process. As such, the District should ensure that grid updates and capacity are capable of meeting this increased demand prior to enacting rules that will require residents to adopt all electric appliances. The Air Districts should work together and in conjunction with other state agencies to ensure that these upgrades can be made effectively and capacity in California can be increased simultaneously before these zero NOx standards are in effect.

Separately, BAAQMD has not incorporated the impact of consumer behavior into the Study. A transition away from utilizing fossil-fuels for space and water heating presents significant challenges in terms of physical infrastructure and electricity grid modernization, on-site installation and intended application, permitting logistics, consumer awareness and acceptance, and costs. The California Public Utilities Commission (CPUC) has proposed a set of incentives that range from $7,200 to $9,200 per household and between $50,000 to $300,000 per project for multifamily and commercial installations respectively for conversions of fossil-fuel fired water heating equipment to electric heat pump water heating equipment under its Self-Generation Incentive Program (SGIP).[2] While these "electrification" costs are estimates in an evolving regulatory and private market environment, the costs associated with converting millions of housing units and commercial buildings within the District from fossil-fuel fired equipment would cost several billion dollars.[3]

Prior to the pandemic, consumers tended to make decisions to repair less efficient, more emissive equipment based primarily on cost[4]. With the advent of pandemic-related, supply chain shortages, replacement may simply not be an option, even in emergency situations,

[1] T.D. Inoue notes that the additional electric appliances in winter months can double the electricity demand for a household in cold months for heating alone without heat pump water heating demand due to the increase in the amount of heating degree days (HDD). https://tedsenergytips.com/2019/01/06/what-are-the-biggest-electricity-consumers-in-a-typical-home/ (accessed Oct. 31, 2021).

[2] *See generally,* Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the Self-Generation Incentive Program and Related Issues No. Rulemaking 20-05-012, April 16, 2021.

[3] Estimation based on 2,691,883 total housing units (single family and multifamily dwellings) in the District: U.S. Census, 2010 American Community Survey, inclusive of Alameda County, Contra Costa County, Marin County, Napa County, San Francisco County, San Mateo County, Santa Clara County, Solano County, and Sonoma County.

[4] To Repair or Not to Repair: What is the Motivation? Scott et al. as viewed June 10, 2022

including catastrophic failures, within a reasonable timeframe. Significant additional costs, such as those identified by CPUC, exacerbate this issue. The negative environmental impact was not included in the preliminary Study. AHRI observes that the California Energy Commission (CEC) has estimated that it will cost up to $40 billion dollars to provide the necessary panel and service upgrades to the State's existing building stock to reach the States' building decarbonization goals,[5] which helps to define the scope of this potential issue.

AHRI strongly recommends that BAAQMD more fully consider consumer equity impacts to its proposed Amendments. Policies and regulations dependent upon building electrification as the primary mechanism to reducing greenhouse gas emissions, if not carefully executed, will disproportionately affect low-to-moderate income households.

Appliance Replacement

As mentioned previously, HVACR and water heating equipment is often replaced on a 24-hour emergency basis. In the case of furnaces, if residents in the Bay Area are forced to install an electric heat pump system, they may find themselves unable to install an in-kind replacement of their current fossil-fuel fired equipment and will be required to hire a contractor to install the equipment and an electrician to make the expensive upgrades to their current electrical system. These services will need to be scheduled and may trigger additional permitting and inspection obligations. The same would be applicable for water heating equipment. As detailed above, the CEC and CPUC have recognized that updating electrical panels to support the adoption of heat pumps for space and water heating may cost an individual household or small business owner thousands of dollars on top of the first cost of the equipment. This will be a heavy burden for families that may have little or no savings and can least afford these changes, not to mention placing more vulnerable residents at risk without heat or hot water for long periods of time and the additional electrical work could cost thousands of dollars which they may not be able to afford[6] .

AHRI recommends that BAAQMD perform a holistic cost-benefit analysis of any decarbonization policy and ensure that any recommendations are equitable to all its residents and the cost implications on consumer behavior needs to be incorporated into any environmental analysis.

AHRI, coupled with its members' extensive market experience, are prepared to partner with the District to assist it in developing and implementing a set of amendments to its Regulation 9, Rules 4 and 6 that are achievable and balance the equity needs of District residents and

[5] Testimony of Commissioner Andrew McCallister, Assembly Utilities and Energy Committee Informational Hearing on, "Beyond New Construction: Decarbonizing California's Existing Building Stock" August 25th, 2021.
[6] According to https://homeguide.com/costs/cost-to-replace-electrical-panel: Average panel upgrades cost $1,475 but can cost up to $4,000 in some cases.

businesses with the shared goal of reducing greenhouse gas emissions to improve air quality while simultaneously assisting California to reach its climate change mitigation goals, which will assist in gaining the greatest environmental benefits.

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

1. Scope of products in each phase:

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 opened up to *Stationary Natural Gas-Fired Furnaces* and excludes furnaces used in *Mobile Homes*. Neither of these terms are defined, which makes it impossible to understand what furnaces need to follow this standard and which are exempt.

Moreover, the inclusion of these products in section 9-4-301.3 presents the additional question of which requirements apply to these types of furnaces prior to January 1, 2029.

Finally, there is no discussion on *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.[7]

This clarification is needed for inclusion in the environmental assessment.

2. Dual Fuel Systems

Dual fuel systems are potentially an ideal solution for the ultra-low NOx requirements proposed in Section 9-4-301.2; however, the proposed regulation does not address *average NOx emissions* for a dual fuel system. The definition and calculation procedure for *average NOx emissions* should be included as dual fuel systems would lower NOx more on average than a standard gas-fired furnace. This proposed regulation should maintain focus on NOx emissions and BAAQMD's mission to improve local air quality for constituents rather than selecting specific technologies to attain those goals.

Consideration of dual fuel systems should be considered in 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:

[7] SCAQMD Rule 1111-1 (b)(17).

1. **Process applications**

As proposed, the Amendment would almost exclusively require Heat Pump Water Heaters (HPWH) to meet the proposed Zero NOx standard. Intrinsically, HPWHs have a lower output temperature than their gas counter parts. While the Amendment could potentially be implemented for residential applications, provided that infrastructure stability and cost consideration obstacles could be managed, it would be difficult to use HPHWs in large commercial settings such as hospitals, healthcare facilities, universities, commercial laundries, as well as certain sized restaurants, among other installations that require high temperature water, and larger hot water loads, to comply with strict sanitation obligations. These requirements could not be met consistently, if at all, solely with current HPWH technology on the market. BAAQMD should perform an analysis on high temperature water process applications to ensure that there will be no unintended consequences of the proposed Amendment, and if any are found there should be specific exceptions for those applications.

Exceptions should be excluded from the environmental assessment.

2. **Commercial Availability**

The effective transition date for this proposed regulation, and the potential to change the ultimate compliance date, creates a moving target for the entire supply chain including manufacturers, wholesalers and distributors, contractors/installers and technicians. Although there may be some commercially available products that meet the requirements set forth by this proposal, this technology is not ready for widespread adoption in the timeframe outlined in this proposed regulation.

During public proceedings on the Amendments, the coming availability of 120V HPWHs that could be substituted as a comparable product to a households' current fossil-fuel water heater was referenced as a justification for the current less than 75,000 BTU/hr transition date of 2027. While AHRI is aware of the nascent and emerging product class of 120V HPWHs, these products are not widely available in the market and perform differently compared to a similar gallon sized gas-fired water heater in residential applications. As such, there is no historical data on which to base unit and installation cost, performance, or reliability. The District needs this information before 120V HPWHs can be used to justify a transition date.

Moreover, while 120V equipment can be plugged into a standard home outlet, there are often still added installation costs associated with the use of such equipment. For example, utility closets used to house gas water heaters typically do not have standard 120V outlets readily available. Because of this, the installation of a 120V HPWH will still require an electrician to come and install an additional outlet for service, as well as a potential panel upgrade if the house has reached its current amperage capacity. 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. In commercial applications, heat pump water heaters are still evolving in design and application and have additional installation challenges that – at present – do not have a "one-size fits all" solution for existing buildings. Additionally, condensate management needs to be addressed in the analysis of these costs as older non-condensing equipment is often replaced by newer equipment that is condensing, which requires r condensate management solutions and imposes additional costs. All of these costs outlined need to be included in the cost analysis of the feasibility of these units as outlined in the interim report.

3. Timing

The effective transition date for this proposed regulation and the potential to change the compliance date creates a moving target for the entire supply chain as well as labor. Although there may be some commercial products that meet the requirements set forth by this proposal, this technology is not ready for widespread adoption in the timeframe outline in this Amendment.

Therefore, AHRI recommends that BAAQMD remove the differentiation between less than 75,000 Btu/hr and 75,001-2,000,000 BTU/hr units and create a single compliance date for this transition of January 1, 2040. This would provide the entire supply chain and labor sufficient time to ensure that any issues created by developing, testing, and commercializing these products are addressed.

C. Additional Technical Recommendations

1. Background Atmospheric NOx Measurements

Considering that the Amendments allow a pathway for fossil-fuel fired equipment to continue to be sold in the District in the interim period – as well as potentially in the future if a 0 nanogram NOx level can be certified – we recommend that emission levels set for NOx account for background atmospheric NOx. Background atmospheric NOx is not emitted directly from the combustion source, but rather formed by (photo-) chemical processes taking place in the atmosphere. If background NOx is not accounted for, even a unit that does not produce any NOx may result in measured NOx emissions and would be banned under a regulatory scheme that sets the limit at zero.[8]

[8] A similar situation arose in the context of the federal Clean Water Act, which mandates a "zero discharge" of pollutants into Waters of the United States unless authorized by a discharge permit. See Section 301. Courts were faced with the issue of whether the mere transfer of water from one body of water to another, without the addition of any additional pollutants, violated the Clean Water Act. The U.S. Supreme Court ruled that the mere removal of water from a waterbody and its subsequent return to a waterbody that is not "meaningfully distinct" does not constitute an addition of pollutants that requires a permit. *South Fla. Water Mgmt. Dist. v. Miccosukee*

2. Equipment Measurement Capability

Equipment sensitivity needs to be included in this analysis. For example, if measurement equipment is not sufficiently accurate, reported NOx levels could only be reported within a very broad tolerance. As a result, this will potentially allow for units generating higher levels of NOx to be reported as 14ng/J NOx compliant in Phase[9] and on the other hand, this issue could block compliant units from being sold into the market given the tolerance of the measurement. BAAQMD should screen the current technology on the market to determine a reasonable accuracy, noting that the more stringent this level is set the larger the impact on equipment cost due to the cost of testing equipment. Therefore, we would recommend that the District avoid setting zero NOx emission limits and rather set limits such as '< 1 ppm' that will allow for reasonable variation in test equipment.

Additional Policy Observations:

A. Effective Dates and Review Period

If any changes are required by the interim report, planned for publication two-years prior to the zero NOx standard implementation, there will not be sufficient time for manufacturers and the rest of the supply chain to make adjustments and still comply with the compliance dates set herein. While AHRI is in favor of BAAQMD adding in a method to determine readiness and any needed delays to the effective date, the proposed publication time period for the interim report is too short for industry to adequately respond to major modifications.

The two-year period also does not address the time that the District Board needs to meaningful review and then to make a determination regarding the transition. Further, this proposed regulation does not define an action required from the Board upon receipt of the interim report.

Tribe of Indians, 541 U.S. 95, 97 (2004). Subsequently, the U.S. Environmental Protection Agency (EPA) promulgated its Water Transfers Rule, 73 Fed. Reg. 33697, 33700 (June 13, 2008), to clarify that water transfers from one waterbody to another, or the movement of water within the same waterbody such as water passing through a dam, does not require Clean Water Act permits "because they do not result in the 'addition' of a pollutant." EPA's Water Transfer Rule has been upheld by both U.S. Court of Appeals for the Eleventh and Second Circuits. *See Friends of Everglades v. S. Fla. Water Mgmt. Dist*., 570 F.3d 1210, 1228 (11th Cir. 2009) and *Catskill Mountains Ch. Of Trout Unlimited, Inc. v. EPA*, 846 F.3d 492, 533 (2d Cir. 2017). Accordingly, to prevent the unintended consequence of every piece of equipment that emits ambient air from violating the zero NOx standard, the regulations should account for ambient atmospheric levels of NOx.

[9] By way of hypothetical example, a 14ng/J appliance tested on NOx combustion analyzer with an error of +/- 3ng/J could result in an unacceptable value of 17 ng/J and prohibited from sale in Bay Area, while a 20 ng/J appliance tested on an analyzer with an error of +/- 10 ng/J could result in a reported NOx of 10 ng/J and be sold in the Bay Area.

A report that could change the course of the regulation, without including the timeline for any necessary rulemaking, creates significant uncertainty for manufacturers. Manufacturers 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 (DOE) final rule, two to five years[10] 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.

A timeline that fails to allow for the supply chain to be prepared for any transition will prevent environmental benefits from being realized. This should be included in any environmental evaluation by BAAQMD,

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 district's working to align on NOx requirements so that there is one clear, consistent path forward in California for manufacturers. Early adoption should be incentivized, 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 of emergency replacements. This approach will also allow for optimal environmental benefits.

AHRI recommends that all of the concerns above be addressed and that BAAQMD align its proposed regulation with the current requirements outlined in SCAQMD for Regulation 9 Rule 4 while maintaining the 2023 transition date. For Regulation 9 Rule 6, AHRI recommends BAAQMD to revise the regulation to include an effective date of January 1, 2040 to allow for proper implementation of this regulation.

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

Sincerely,

Helen Walter-Terrinoni
VP Regulatory Affairs

[10] 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(I)(2).

cc: K. Bergeron
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