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November 1, 2021

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

Re: Bay Area Air Quality Management District Proposed Update to Regulation 9, Rule 6

Dear Ms. Elwell,

We write regarding the Bay Area Air Quality Management District's (BAAQMD) proposed update to Regulation 9, Rule 6, which was released on Monday, October 18, 2021. The proposed rulemaking states as follows:

9-6-301 Natural Gas-Fired Storage Tank Water Heaters with a Rated Heat Input Rating Capacity of 75,000 BTU/Hour or Less:

301.5 No person shall sell, install, or offer for sale within the District any natural gas [1] fired storage tank water heater that is manufactured after January 1, 2027, and that emits more than 0 nanograms of nitrogen oxides (calculated as NO₂) per joule of heat output. This subsection shall not apply to mobile home water heaters.

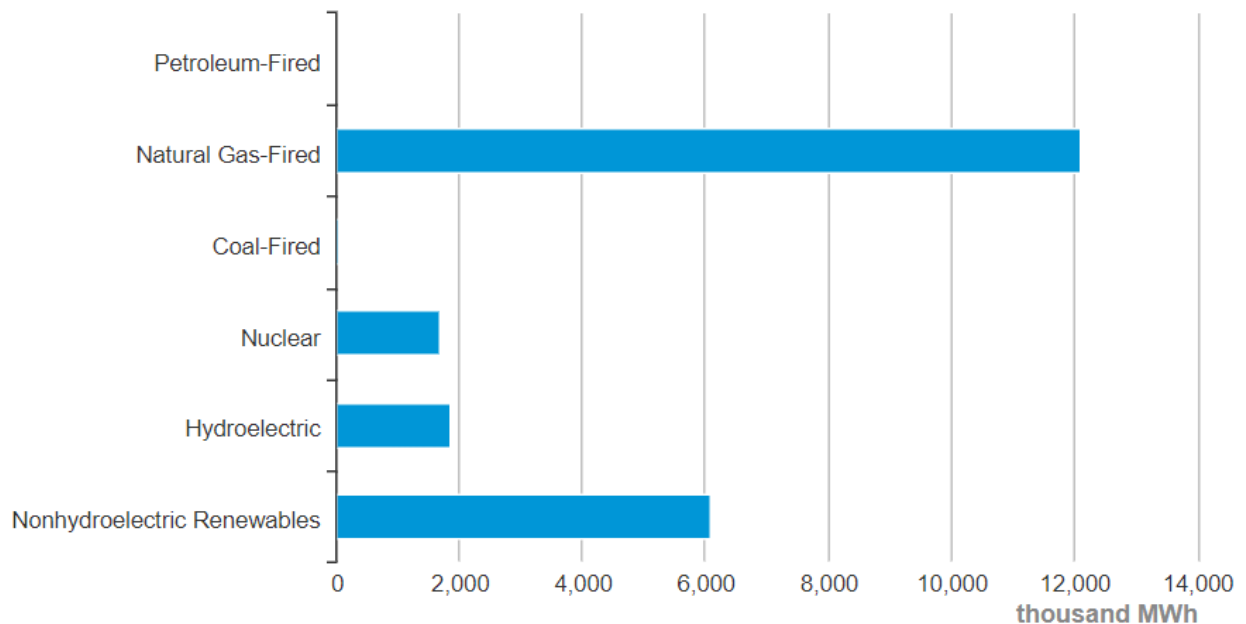
9-6-303 Natural Gas-Fired Boilers and Water Heaters with a Rated Heat Input Capacity of 75,001 to 2,000,000 BTU/Hour:

303.5 No person shall sell, install, or offer for sale within the District any large natural gas-fired boiler, storage tank water heater, or instantaneous water heater with a rated heat input capacity from 75,001 to 2,000,000 BTU/Hour, inclusive, manufactured after January 1, 2031, that emits more than 0 nanograms of nitrogen oxides (calculated as NO₂) per joule of heat output, or more than 0 ppm NO_x at 3% O₂, dry.

By reducing the NO_x emission limits for the above-described equipment to 0 nanograms, the net result of the proposed rulemaking is to effectively ban the sale of natural gas-fired boilers and water heaters with rated input capacities of 2,000,000 BTU/Hour and below in the nine counties comprising the BAAQMD as of the dates outlined above.

While we understand concerns over greenhouse gas emissions and global warming, we disagree that the correct approach is an outright ban on natural gas-fired boilers. As shown below, the majority of electricity in California is produced from natural gas:¹

California Net Electricity Generation by Source, Jul. 2021



 Source: Energy Information Administration, Electric Power Monthly

Using heat derived from natural gas to produce electricity and then convert the electricity back to heat is a terribly inefficient process—approximately 35% for an electric resistance boiler when accounting for line transmission losses. By contrast, condensing natural gas-fired boilers are up to 99% efficient depending on their operating conditions and return water temperature. Given this data, over-reliance on electricity for heating could in fact simply cause a shift (and increase) in emissions to the site of power production rather than a true reduction.

It is true that heat pumps have higher coefficients of performance and are thus more efficient than electric resistance boilers. However, it will likely prove difficult and costly to convert existing hydronic systems utilizing gas-fired equipment to electric systems with heat pumps or variable refrigerant flow given inherent differences in how those two types of systems are designed (e.g., use of refrigerant (itself a global warming risk) and the temperatures and temperature differentials across heating coils required to heat the space, to name a few).

¹ Source: Energy Information Administration, available at <https://www.eia.gov/state/?sid=CA#tabs-4>

Other systems (including many in San Francisco) utilize low pressure steam for building heat while hospitals², laboratories, and kitchens use steam for processes such as sterilization, humidification, steam kettles, etc. Heat pump technology is not able to produce steam, and thus a ban on natural gas-fired boilers will require use of electric resistance boilers for steam production.

While the current trend in California is increased utilization of renewable energy sources, it is hard to envision renewables displacing the majority portion of electricity currently produced in California using natural gas. It is also hard to imagine all the additional demand for electricity that will be created by using electric boilers and heat pump systems being supplied from renewable sources. By way of illustration, one (1) electric resistance boiler of roughly 2,000,000 BTU/hour input will require an amp draw of 694 amperes at 460 volt/3 phase power. All the additional power demand from these electric conversions will almost certainly require electricity produced by natural gas. Operation of such a unit will also be much more expensive for the building owner, assuming the power required is even available.³

For the above reasons, we disagree that an outright ban on natural gas-fired boilers is the appropriate solution to concerns over global warming. In our opinion, a more measured approach that still allows for the use of high-efficiency natural gas-fired boilers in hydronic and steam systems makes much more sense.

If you have any questions or wish to discuss, please do not hesitate to contact me.

Sincerely,



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² Hospitals also have back-up fuel requirements that should be taken into consideration, especially given that electrical outages have become more common as of late due to changed weather patterns and wildfires.

³ In addition to the cost of electricity to run such a unit, another consideration is the cost of service. Replacement of natural gas-fired boilers with electric units with large amperage loads will require strict use of personal protective equipment (PPE) as well as clearance and service procedures under the National Fire Protection Agency (NFPA) which governs the servicing of electrical equipment. This in turn creates several major issues: (1) few service contractors who are familiar with servicing natural gas-fired boilers have processes and procedures in place that meet the more stringent NFPA requirements; (2) service contractors will need to acquire PPE, receive training, and implement NFPA-compliant processes and procedures, causing service costs to skyrocket; and (3) large amperage loads combined with water-containing vessels can pose safety issues to the service contractor if the processes and procedures required by NFPA are not properly followed.