

March 27, 2024

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Public Workshop: Zero-Emission Space and Water Heater Standards

Dear Building Decarbonization staff:

Thank you for the opportunity to comment on the materials presented at the California Air Resources Board (CARB) February 28, 2024 Public Workshop on Zero-Emission Space and Water Heater Standards.

With a global team of nearly 100,000 experts in more than 150 countries, Johnson Controls (JCI) offers the world's largest portfolio of building technology and software as well as service solutions from some of the most trusted names in the industry. We are committed to leading and addressing climate change, helping our customers and industries around the world pursue goals for best in class environmental targets in carbon and water. Since 2020, we have been transforming our business to focus on decarbonization and water conservation through the trifecta of low-carbon, energy efficiency, electrification, and digitalization. By 2030, we have committed to cut our Scope 1 and 2 absolute emissions by 55% and in FY23 have reached 44% reduction since 2017. Our 2030 Scope 3 target is to reduce product in use emissions by 16% and as of FY23, we reduced emissions 27% since 2017. These ambitious emissions reduction targets have been approved by the Science Based Targets initiative. We are also committed to achieving Net Zero Scope 1 and 2 emissions and 100% renewable electricity by 2040.

Johnson Controls strongly supports California's goal to achieve net zero emissions by 2045, including through measures targeting net zero emissions in the built environment in the State Implementation Plan (SIP). As a solutions provider with one of the most comprehensive heat pump portfolios in the world, JCI is pleased to see that CARB has proposed to address not just residential building emissions, but also complex commercial and industrial applications, with the establishment of zero emissions standards. In October 2023, JCI publicly committed to support California in installing 6 million heat pumps by 2030, the achievement of which will slash emissions across multiple building sectors that are ripe for decarbonization.

While JCI supports CARB's consideration of zero emission appliance standards, we wish to engage further with the agency and all affected stakeholders to ensure that zero emission standards consider energy source emissions, maximize the benefits of space heating electrification, and smooth the transition to fully electric, zero emission buildings. This can be achieved with a reasonable level of regulatory flexibility; a staged approach that starts with a heat pump mandate but where either electric or gas supplemental heating can be used, followed by longer-term strategic removals of fuel combustion backup heating in all of California's buildings.

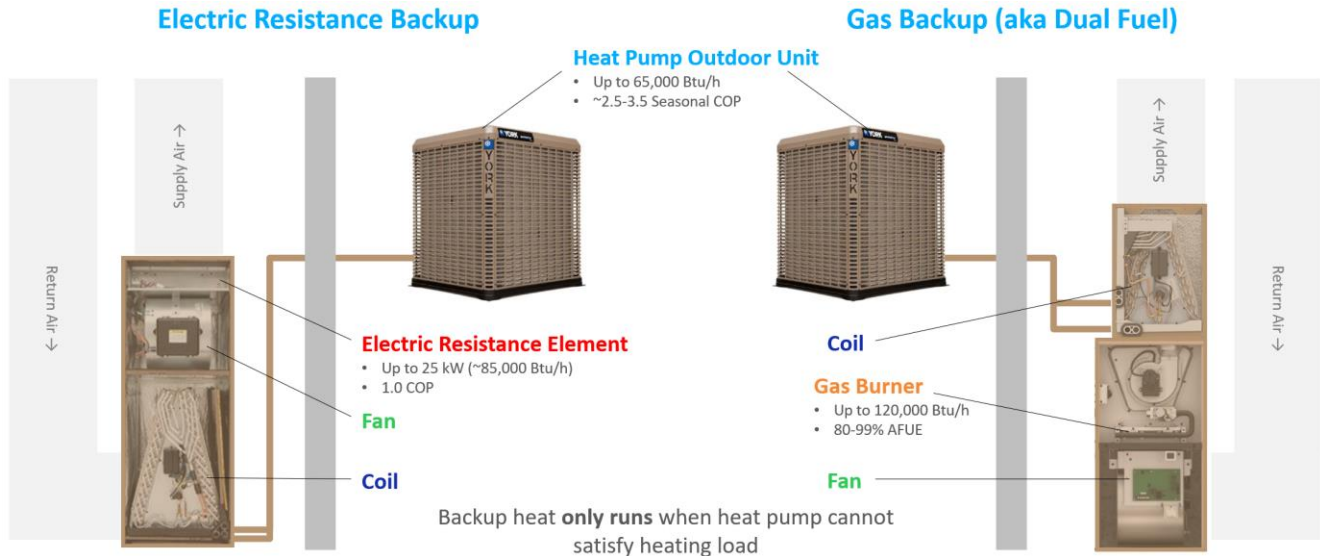
In further engagement with CARB and other affected stakeholders, we urge consideration of the following:

(1) California can require heat pump installation and retain critical supplemental heating functionality with a flexible emissions standard for space heaters

In virtually all air source and water source heat pump applications, some form of supplemental heat is installed for periods where the building's heating demand exceeds the heat pump's heating capacity. For example, the heating capacity of an air source heat pump decreases as outdoor ambient temperatures

decrease. While it may occur only rarely, there are periods of time where the heat pump cannot meet the required heating load and supplemental heating is required. This level of resiliency is needed to ensure building occupants can maintain a safe and comfortable indoor environment during the coldest periods of the year.

Supplemental heating is often installed as a separate device from the heat pump, as shown in the graphic below of a residential split air source heat pump with different sources of supplemental heat:



Electric resistance backup, while technically producing zero on-site emissions, is highly energy inefficient with a COP of 1.0. Compared to a heat pump with a seasonal COP of 3.0, electric resistance consumes 3 times the electricity to produce the same amount of heat. By contrast, gas backup produces site emissions when operational, but consumes no electricity to generate heat.

Both electric resistance and gas supplemental heating present their own unique challenges to transforming the space heating market in California. By setting appliance standards that move the market to heat pumps but are also flexible enough to allow both supplemental heating types, the state can better manage these barriers and unlock rapid heat pump deployment.

(2) The benefits of electrification can be maximized through a flexible approach to zero emissions standards for space heating equipment

The optimal source of heat pump supplemental heating requires a nuanced analysis and will differ based on building characteristics, energy prices, electricity sources during peak periods, and how often supplemental heating is required. Maintaining the flexibility for buildings to utilize the optimal heat pump supplemental heating source will help avoid unintended consequences and ensure maximum beneficial electrification outcomes in two critical areas:

Consideration of Source Emissions: the operation of heat pump supplemental heat will correspond with winter coincident peak periods on the electric grid. Much of this electric load is met with “non-baseload” generation resources that are emissions-intensive relative to average electricity generation in California. Given its inefficiency, the electricity consumed by electric resistance supplemental heating during these periods will have significant source emissions, often higher than the site emissions of a gas supplemental heater meeting the same load. Having the flexibility to install heat pumps with gas supplemental heating will improve electric load management and minimize accompanying source emissions.

Minimize Consumer Burdens: completely replacing a fuel combustion space heater with a heat pump and electric supplemental heating can be costly and burdensome, as the amps required by an electric resistance supplemental system can necessitate electric panel upgrades. Further, given the inefficiency of electric resistance and the significantly high retail cost of electricity in California

relative to retail gas rates, gas supplemental heating has a lower operational cost compared to electric supplemental heating. Without the option to use gas for supplemental heating, it is likely that some consumers who replace their existing furnace with a heat pump will face a significantly higher upfront cost than expected and see a net increase in monthly utility bills. Avoiding these potential negative consumer experiences is critical and can be better managed through a phased approach to zero emission standards which will allow time to address the challenges of widespread heat pump deployment noted above.

Market transformation may be required, but 6 million heat pumps deployed by 2030 and net zero emissions from the built environment by 2045 are within reach and can be achieved through sound regulations with appropriate flexibility. As supplemental heating would be used infrequently, GHG reductions could remain obtainable through a heat pump mandate, while allowing flexibility for the supplemental heating fuel source. JCI is eager to constructively engage with CARB and other stakeholders to design zero emission standards that achieve what we view as shared goals: maximize heat pump deployment in the near term, align with a strategic decommissioning of fossil fuel systems in the long term, and ensure the benefits of electrification are accessible to all Californians. We look forward to future discussion on these topics.

Sincerely,

A handwritten signature in cursive script that reads "Chris Forth".

Chris Forth
VP Regulatory, Codes, and Environmental Affairs
Johnson Controls