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on Staff Draft Report Building Decarbonization Assessment

Additional submitted attachment is included below.

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June 11, 2021

Mr. Heriberto Rosales
Mr. Michael Kenney
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Public Comments, Staff Draft Report Building Decarbonization Assessment (19-DECARB-01)

Dear Mr. Rosales and Mr. Kenney:

Johnson Controls is grateful for the opportunity to provide comments on the California Energy Commission (CEC) Staff Draft Report Building Decarbonization Assessment in response to California Assembly Bill 3232 (AB 3232).

Johnson Controls (JCI) is a leading global provider of heating, ventilating and air conditioning equipment, building controls, security and fire/life safety solutions which includes brands such as York, Metasys, Simplex, Grinnell, Zettler and Tyco. The company has roughly 105,000 employees and 2,000 locations across six continents. JCI first set sustainability goals in 2002, and the company has reduced its greenhouse gas emissions intensity from our global operations by 64%. Since then, JCI has committed to meeting science-based targets by 2030 that are aligned with a 1.5°C pathway for global temperature rise, and to achieve net-zero carbon emissions from its operations before 2040. Further, we are AAA rated by MSCI and are recognized in the Climate Leader band by CDP.

JCI strongly supports California's pursuit of economy-wide decarbonization, including the goal of 40% reduction of GHG emissions in the buildings sector by 2030 as established in AB 3232. The organization prides itself on providing solutions to help our customers reduce their carbon footprint while maintaining superior building performance, in alignment with our vision for healthy people, healthy places, and a healthy planet. To that end, we urge the CEC to consider all pragmatic pathways to deliver deep decarbonization of building space heating end uses, including the replacement of combustion heating equipment with gas-electric hybrid systems. Such systems typically utilize a heat pump and a combustion heating appliance, connected by a controls strategy to ensure that the heat pump is used as the primary source of heating and the combustion appliance operates only as a backup heating source.

The Draft Staff Report presented at the CEC Commissioner Workshop on May 21, 2021 concludes that a 40% direct emissions reduction by 2030 is only achievable when pursuing aggressive building electrification scenarios. The report also concludes that aggressive electrification measures come at some of the highest costs per ton of CO_2e abated as compared to other measures. However, it is not clear if the Fuel Substitution Scenario Analysis Tool (FSSAT) used by the CEC is able to model the significant *displacement* of combustion space heating at the building level made possible by hybrid heating systems, or if electrification measures modelled by FSSAT assume an "all-or-nothing" *replacement* of the combustion appliance.

If it has not done so already, JCI urges the CEC to consider in its Staff Report building electrification scenarios where a certain percentage of existing buildings displace combustion heating end uses by utilizing hybrid heating systems. If done strategically, this decarbonization strategy can displace the same

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amount of natural gas consumed as the efficient aggressive scenario modelled by FSSAT, but at a significantly lower cost to California residents.

JCI submits these comments for the purpose of illustrating the benefits of hybrid heating systems and their ability to assist California in achieving its deep decarbonization goals as cost-effectively as possible. We focus on dual fuel heat pumps because their application as a hybrid heating system is relatively straightforward to describe without extensive technical literature. However, the costs and benefits are generally applicable to any hybrid heating system with integrated controls.

Dual fuel heat pumps utilize an air source heat pump until the outdoor ambient temperature drops too low for it to operate, at which time the backup furnace is engaged. This differs from an electric-only heat pump, which relies on an inefficient electric resistance heating element to provide backup heating. Dual fuel heat pumps can provide an enormous advantage in their ability to provide electric grid stability and rapid, cost-effective, decarbonization at scale.

Dual fuel heat pumps can be utilized as demand response assets

Air source heat pumps have significantly improved their performance over the past three decades, especially at colder outdoor temperatures, and JCI expects rapid deployment of heat pumps will be necessary to achieve building decarbonization needs. However, as outdoor ambient temperatures drop, a heat pump will operate less efficiently and lose heating capacity, while at the same time, the space heating load in the building increases. As a result, a heat pump's electricity consumption will increase exponentially as temperatures decrease. This is true even for cold climate heat pumps; they too will operate less efficiently as it gets colder outside, until reaching a point where they must rely on a backup heating source. Generally, a heat pump's electricity demand is larger for heating operation than for cooling, especially once backup electric heating is utilized. As buildings in California are fully electrified, the California Independent Service Operator must prepare for a new coincident winter peak load that will be significantly larger than that of today. This will become even more challenging as renewables continue to increase share of the electricity, which have variable generation profiles that will not necessarily align with peak heating periods.

Dual fuel heat pumps can be a part of the solution in California because of their potential for electric load shedding. Within a matter of seconds, a dual fuel heat pump can shift the vast majority of its energy consumption from electric to gas, providing immediate relief to a congested electric grid. The "changeover point" between the two fuel sources is controlled by a thermostat, which can be connected and enrolled in a utility demand response program. With little effort, and no impact to the occupant's comfort or well-being, dual fuel systems are ideal demand response assets.

Dual fuel heat pumps are cost-effective

For existing buildings that utilize a ducted furnace and air conditioner today, conversion to a dual fuel system will often be the most cost-effective solution for significant decarbonization of the space heating load. For buildings with split systems, replacement of the outdoor air conditioning unit with a heat pump and the installation of a compatible thermostat is all that is required. Likewise, a packaged air conditioner and furnace can be replaced with a packaged dual fuel system. This conversion will often be less costly than redesigning the system to an electric-only heat pump, which requires additional electrical service for the backup resistance heating element and may require expanded ductwork to accommodate changes in supply airflow.

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Dual fuel heat pumps also allow California ratepayers of all economic classes to take advantage of time of use electricity rates. Innovative rate designs can significantly discourage the use of natural gas for heating for the majority of system operation, while also protecting consumers from extreme spikes in energy costs during periods of high building heating loads and peak electricity demand. Such a strategy enables cost-effective displacement of fossil fuel combustion without having to sacrifice space heating when it is needed most.

Dual fuel heat pumps facilitate rapid uptake of space heating electrification

Given the ability to install dual fuel heat pumps without fear of increasing winter coincident peak electric loads, and the cost-effective flexibility they provide consumers, this heating solution enables the rapid electrification of space heating at a greater scale than an electric-only approach. With the right policies, rate structures, and incentives, a market transformation toward dual fuel space heating can facilitate a direct building emissions reduction of 40% by 2030. Perhaps more importantly, such a transformation will also help smoothen the cost curves associated with building retrofits and grid infrastructure improvements as California pursues its longer-term decarbonization targets.

JCI is fully committed to helping California achieve its climate goals and believes that there is no “one-size-fits-all” approach to building decarbonization: we must consider all pragmatic pathways to this shared goal. While many buildings are ideal candidates for full electrification right away, we fear that a narrow view that does not also consider hybrid heating solutions will result in a sub-optimal – and unnecessarily expensive – building decarbonization strategy. These costs will be borne by California consumers in the form of direct building retrofit expenses and/or utility rate increases and must be kept manageable. Doing so will maintain consumer appetite for low carbon solutions and ensure that the transition to decarbonized buildings is as just and equitable as possible. Building decarbonization pathways that leverage hybrid heating solutions as a transition technology is a “no regrets” strategy, and we urge the CEC to model its impact in its Staff Report.

Thank you again for the opportunity to comment on the Staff Draft Report Building Decarbonization Assessment. Should you wish to discuss these comments, please do not hesitate to contact us at the information below.

Respectfully,

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