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AO Smith Comments to CEC Workshop on California's Heat Pump and Decarbonization Goals

Additional submitted attachment is included below.

April 19, 2022

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street
Sacramento, California 95814

RE: A. O. SMITH CORPORATION COMMENTS TO THE CALIFORNIA ENERGY COMMISSION WORKSHOP ON CALIFORNIA'S HEAT PUMP AND DECARBONIZATION GOALS (DOCKET #: 22-DECARB-01)

Dear Commissioner McAllister, Dr. Nicholas Janusch and California Energy Commission Staff:

A. O. Smith appreciates the opportunity to submit comments to the California Energy Commission (CEC / Commission) Staff Workshop on Heat Pump Goals, Supply Chain, and Programs held on April 5, 2022. The workshop examined statewide goals of installing six million heat pumps by 2030; challenges to market transformation and an equitable transition to building decarbonization; and explored heat pump water heater (HPWH) incentive programs currently in place. A. O. Smith participated in the workshop as a presenter on Panel 1: Manufacturer Perspective on Heat Pump Supply Chain.

I. About A. O. Smith and Heat Pump Water Heaters

A. O. Smith is a global leader applying innovative technology and energy-efficient solutions to products manufactured and marketed worldwide. Our company is one of the world's leading manufacturers of residential and commercial water heating equipment and boilers, as well as a manufacturer of water treatment and air purification products. Along with its wholly owned subsidiaries, A. O. Smith is the largest manufacturer and seller of residential and commercial water heating equipment, high efficiency residential and commercial boilers, and pool heaters in North America.

HPHWs will play a vital role in two key California policy priorities – reducing the carbon footprint of our buildings as the state transitions water heaters from primarily gas-fired to electricity and helping to manage the integration of increasing amounts of renewable energy as HPWHs.

HPWHs and grid-interactive electric storage water heaters offer the ability to provide thermal storage serving as a battery for assisting the integration of renewable energy into local distribution grids in both residential and commercial applications. Flexible demand [or smart] water heaters, which include grid-enabled electric resistance storage water heaters and HPWHs, have additional controls that allow the utility or third-party aggregator to control their energy use (e.g., load shifting) during the course of the day. Within a given local territory, a fleet of water heaters can be controlled to be a flexible energy storage system that can adjust the load on the grid. Given that every home in the state has a water heater, smart water heaters can play a key role in load management and carbon reduction within the built environment.

II. General Overview of A. O. Smith Comments

The 2021 IEPR Report, Volume 1[1] recognizes that the transition away from utilizing natural gas for space and water heating to electricity exclusively presents significant challenges from physical infrastructure and electricity grid modernization to funding and consumer awareness and acceptance. The path to achieving carbon neutrality will require a number of changes in California.

In order to reach carbon neutrality across the entire building stock in California, a massive investment will be required from both the public and private sectors given California's current building and electric grid infrastructure. A. O. Smith recommends a pragmatic approach to reach electrification goals, and we look forward to working with the CEC and other state agencies in this regard. Having a clear and reliable policy structure will be necessary to provide manufacturers with the business certainty needed to make the investments required to increase manufacturing capacity at the scale needed to meet the state's goals. In addition to having consistent programs that provide incentives and consumer awareness and education on HPWHs, A. O. Smith urges continued agency coordination to align federal, state and local policies and rules to help achieve California's climate goals.

III. Building Electrification Requires Significant Investments

In California, about 75 percent of homes (or 9.75 million) were built before 1990. Older homes are less likely to have adequately sized electric panels to accommodate all electric appliances.[2] In addition to the cost of the electric appliance, an older home may also require an electric panel upgrade.

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[1] California Energy Commission, *Final 2021 Integrated Energy Policy Report Volume I Building Decarbonization*, February 2, 2022.

[2] California Energy Commission. *California Building Decarbonization Assessment - Final Commission Report*, August 13, 2021, pg 109.

The CEC estimates that a panel upgrade can cost between $2,500 - $4,000[3] and would likely be borne by the home or property owner. In a scenario where every house built before 1990 requires an electric panel upgrade, an investment between $25 - $40 billion dollars would be required. Another study on building electrification by the not-for-profit organization, Pecan Street, found that it would cost approximately $100 billion to upgrade electric panels in the residential sector across the country. Regardless of the exact amount, it's important to note that just one component of electrification, updating the main electrical panel of a home, will require a tremendous financial investment. The figures shared here do not even account for the cost of upgrading electric appliances that in many cases are more expensive than their gas counterparts. According to the Building Decarbonization Coalition, the cost to electrify low-to-moderate income (LMI) households alone in California would require investments of $72 - $150 billion over the next several decades.[4]

Therefore, it is critical that CEC consider the economic impacts of retrofitting millions of households and commercial buildings and the need for sustained programs and incentives for property owners and businesses. Consistent and long-term funding for greenhouse gas (GHG) reduction programs and incentives is essential in aiding consumers in making different purchasing decisions and accepting new technologies.

IV. Application of HPWHs for the Current Built Environment

In addition to a panel upgrade, space constraints within existing homes can make it difficult to install a HPWH. Most gas water heaters are placed inside a small closet, whereas a HPHW requires more space for the appliance to function efficiently and as intended. Given that some existing homes and buildings may lend themselves to a cheaper, faster and overall easier transition to electrification, A. O. Smith recommends a system of prioritization to help target homes and buildings that are more "retrofit-ready" for replacements while continuing to develop plans for homes and buildings that are harder to electrify. In the State of New York, for example, some local jurisdictions are pursuing a step-wise approach for building electrification by completing energy audits of buildings (residential and commercial) as a first step to identify, tier and prioritize which buildings can transition to all-electric end-uses ahead of others. A similar prioritization program study has been completed for the City of Denver by the Colorado Energy Office. Notably, one of the observations in that study noted that "[e]lectrification without energy efficiency upgrades could cause substantial damage to the distribution transformers if a neighborhood is not designed to handle the larger loads."[5]

Retrofits of existing commercial buildings have similar issues as retrofits of a residence: type and size of equipment, age of the building and space constraints. However, the primary challenge in commercial applications is being able to match the customers hot water needs (i.e., load) in converting

[3] Building Decarbonization Coalition. *Towards an Accessible Financing Solution*. June 2020, pg 14.
[4] CEC *California Building Decarbonization Assessment - Final Commission Report*, August 13, 2021, pg 84.
[5] Earle, Lieko, Jeff Maguire, Prateek Munankarmi, and Dave Roberts. 2022. *Colorado Residential Retrofit Energy District (CoRRED) Phase I: Final Modeling Results.* Golden, CO: National Renewable Energy Laboratory.

from a gas-fired product to a HPWH. Moreover, in certain applications, the economics of the conversion will not be favorable, including the potential to increase the annual operating costs to a business owner or property owner. According to a report on the CEC's assessment of building decarbonization, small business owners and property owners of small and medium size commercial buildings could incur retrofit costs of up to $40,000.[6] Therefore, ensuring the correct application of the equipment will be critical. A. O. Smith recommends a step-wise approach to reaching electrification goals by allowing high efficiency gas condensing equipment to be used in limited cases where there is no viable electric alternative. Using hybrid heat pumps with options for gas/electric back-up may also be necessary for certain space constrained and larger thermal load applications, such as health care facilities, in certain areas of the state.

V. Providing Manufacturers with Business Certainty

The CEC assumes a turnover rate of 7 percent in water heaters in existing single-family homes and multi-family units, which equates to 861,000 water heaters being replaced annually.[7] To capture even 10 percent of this market means installing 86,000 units per year. The number of HPWH units sold annually across the entire country in 2020 was approximately 100,000.[8] To convert the entire annual California market of water heaters to HPWHs would require a ten-fold increase in HPWH manufacturing capacity. These figures are meant to illustrate that meeting California's demand for HPWHs at even a modest pace would require significant ramp up of manufacturing and have vast impacts on the supply chain. This sort of increase takes time to orchestrate as new manufacturing capacity and production lines must be created. As stated earlier, having a clear and reliable policy scheme will be necessary to provide manufacturers with the business certainty needed to make the massive investments required to increase manufacturing capacity at this unprecedented scale.

VI. Supply Chain and Logistical Barriers

As presented at the workshop, many manufacturers continue to experience challenges due to global supply chain disruptions that began in 2020 and into 2021. In response, Governor Newsom issued Executive Order N-19-21[9] which directs state agencies to continue coordinating with the Biden-Harris Administration Supply Chain Disruptions Task Force to address state, national and global supply chain challenges. While there is capacity available to meet current demand, A. O. Smith recommends that the CEC provide clarity on what percentage of HPWHs it has modeled as part of its goal of installing 6 million heat pumps in California by 2030. This type of clarity will provide both heating, ventilation, and air

[6] CEC *2021 Integrated Energy Policy Report Volume I: Energy Efficiency and Building, Industrial, and Agricultural Decarbonization*, pg 102.
[7] CEC *2021 Integrated Energy Policy Report Volume I: Energy Efficiency and Building, Industrial, and Agricultural Decarbonization*, pg 22.
[8] ENERGY STAR® Unit Shipment and Market Penetration Report Calendar Year 2020 Summary, pg 6.
[9] https://www.gov.ca.gov/wp-content/uploads/2021/10/10.20.21-N-19-21-Supply-Chain-Resilience.pdf

conditioning (HVAC) and HPWH manufacturers better insight into the investments that will need to be made to address the needs of the California market.

VII. Transitioning to Low Global Warming Potential Refrigerants in HPWHs

HPWH's use hydrofluorocarbon (HFC) refrigerants, which are also used in refrigerators and air conditioners. Compounding the potential supply issues that may stem from the 6 million installed heat pump goal by 2030, is the state's policy to transition to low-GWP refrigerants. A. O. Smith agrees that we must do all we can to lower the GHG emissions profile of HPWHs. The marketplace for broad-based and cost-effective low-GWP refrigerants for water heating continues to evolve - driven primarily by international agreements, such as the Montreal Protocol, the recently enacted American Innovation and Manufacturing (AIM) Act of 2020 at the federal level, California's action directed by Senate Bill (SB) 1383, and the regulations promulgated by CARB, as well as larger users of refrigerants such as the space cooling and automobile industry. We recommend that CEC, in conjunction with CARB and other agencies, examine refrigerant regulations to reduce the allowable GWP of refrigerants over time, in consultation with HPWH manufacturers and other market actors. Given the implications of the AIM Act on the refrigerant supply chain, A. O. Smith respectfully asks for adequate time to plan, source, build and test any new products designed to meet or exceed California's HFC regulatory requirements.

VIII. Streamlined Process for Electrifying Existing Buildings

Californians need a streamlined, easy-to-use program to assist homeowners and property owners in embracing electrification. Programs developed to incent customers to switch from gas water heaters to electric ones must be easy to use. Inspections of installations are critical to ensure that work was performed to required specifications and that appliances are working efficiently. Nevertheless, in-person inspections can further delay projects. A. O. Smith is encouraged that certain local jurisdictions have implemented an online permitting and inspection program for HVAC with heat pump technology which includes training for inspectors on heat pump technology installations so that they have the knowledge of what to look for in a quality heat pump installation. An online permitting process and remote inspections through virtual verification through pre and post pictures of installations should be considered as part of the CEC's strategy for building electrification.

IX. Addressing the Shortage of Experienced HPWH Installers

Currently, there is a shortage in California of plumbing contractors that have HPWH installation experience because the majority of water heating systems in California are gas-fired. The current pool of trained contractors and installers is limited which keeps the HPWH market from growing a consistent and stable workforce. As such, A. O. Smith recommends that local and state agencies work together to

explore barriers to the market, including licensing requirements which can help to address the HPWH contractor shortage that many manufacturers see taking place currently.

X. Conclusion

We appreciate the opportunity to present at the CEC's workshop and to provide comments on this important topic. We look forward to continuing the dialogue and working with the Commision to design a program that helps achieve our GHG reduction goals as effectively as possible.

Please do not hesitate to contact me if you have questions.

Respectfully submitted,

Joshua C. Greene, Esq.
Corporate Vice President – Government and Industry Affairs
A. O. Smith Corporation
jcgreene@aosmith.com