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CASE Team Additional Comments to 45-Day Express Terms

Additional submitted attachment is included below.

Statewide CASE Team Comments on Title 24, Part 6 45-Day Express Terms

Docket Number 24-BSTD-01

July 15, 2024

Response to AHRI Comments on Multifamily Domestic Hot Water Requirements

AHRI submitted comments to the rulemaking docket on May 13, 2024 (TN #[256352](#)) regarding proposed electric ready requirements and requirements heat pump water heaters. Their comments cover multiple code change proposals that the Statewide CASE Team recommended in the [Multifamily Domestic Hot Water CASE Report](#), including proposals for electric readiness and central heat pump water heating. The bullets below summarize AHRI comments and suggested edits and include the Statewide CASE Team's response to each. AHRI's comments (TN #256352) offer additional detail on their recommendations.

Section 160.9 Mandatory Requirements for Electric Ready Buildings

- AHRI Comment:** AHRI is concerned with certain provisions proposed in Section 160.9(e). AHRI opposes new Sections 160.9(e)3 and 4 because they present several issues. The new section proposes to reserve an additional space of 39" x 39" for a future HPWH which is quite significant for smaller dwelling units. If a homeowner goes through the performance path to select a gas or electric instantaneous water heater for a small dwelling unit, to also be mandated to reserve additional floor space is excessive for the homeowner. Section 160.9(e)4.C requires two 8" capped ducts, venting to the building exterior. Though the ducts are capped, these requirements would seem to compromise the envelope by creating an unnecessary thermal bridge. Also, future generations of HPWHs may need different infrastructure. AHRI suggests the CEC revisit these provisions.

Statewide CASE Team Response: To address the first concern that the designated area for the future HPWH is too large, The Statewide CASE Team performed plans analysis that shows that instantaneous gas water heaters are often installed in a smaller space than what we prescribed and that these spaces are too small for HPWH. The Statewide CASE Team analyzed HPWH products on the market, worked with a plumbing designer to understand what space is needed for service, and asked for input on the space requirement in the stakeholder meetings we hosted. Although the comment says that the specified space is excessive, it is necessary to ensure that a HPWH can be installed in the future as our plans review demonstrated that instantaneous water heaters are often installed in spaces that are too small for HPWH. If adequate space is not reserved, it would require extensive renovations with significant impact on occupants if they choose to adopt HPWH in the future.

The Statewide CASE Team agreed with the concern and has suggested to CEC to include requirement to seal building penetration in the 15-Day Language. If the design and construction team is concerned about thermal performance of ducts they have two other options to meet the requirements.

2. **AHRI Comment:** AHRI has significant concerns with the central heat pump water heater ready requirements in Section 160.9(f). Again, the CEC is mandating expensive additional requirements further penalizing gas or propane water heating systems. These requirements are extensive and should be stricken. Regarding the technical analysis, it is unclear what life cycle the CEC used for Central Water Heaters. The CEC should note that Central HPWH are new equipment and technologies are changing rapidly.

Statewide CASE Team Response: The requirements of Section 160.9(f) give building owners more options for retrofit decisions that may happen in the lifetime of the building. The Statewide CASE Team is aware of the rapidly changing market which is why the code language allows the designer to meet the requirements by performing their own analysis of what infrastructure will be needed for a future retrofit to HPWH. Regarding the question about life cycle for central water heaters, the cost analysis is based on the incremental cost of the electric-ready infrastructure and does not include the water heater.

3. **AHRI Comment:** Central HPWH systems are typically more complex than individual systems and require more effort to specify, layout, and install. For example, see Ecosizer (ecotope.com), a free tool for sizing central water heating systems based on commercial heat pump water heaters in multifamily and commercial buildings. The Ecosizer shows the tradeoff between storage volume

and heating capacity. A designer could choose to have a larger compressor kBTU/hr to tradeoff a smaller storage tank size; and vice-versa the designer could choose a smaller compressor kBTU/hr to tradeoff a larger storage tank size. These differences illustrate choices which will be made in the future; trying to determine the proper floor space for a future HPWH and storage tank(s) is a guess. Ecosizer also demonstrates a return to primary installation, and this is also noted in EnergyTrust of Oregon Central Heat Pump Water Heater Design Guide; a parallel temperature maintenance tank is not required in those scenarios. There could be concerns that requiring Central Heat Pump Water Heater Ready will be obsoleted, similar to the Title 24-2019 Section 150.0(n) Water Heating System which required systems using gas or propane water heater to serve individual dwelling units to include a Category III or IV vent, or a Type B vent with straight pipe between the outside termination and the space where the water heater is installed; and a gas supply line with a capacity of at least 200,000 Btu/hr. Such measures did not have direct impacts to building energy conservation, and one could argue that if these assets are 'lost,' 'stranded,' or unused, the manufacturing, shipping, handling of additional building materials which were not needed, contributed Greenhouse Gas which could have been avoided.

Statewide CASE Team Response: The comment expresses concern that HPWH technology is complex and that the market is evolving rapidly which could lead today's electric ready requirements to become obsolete. The Statewide CASE Team appreciates this concern and understands the complexity of central HPWH sizing and the various tradeoffs that have to be made. This is why the proposed code language allows the responsible designer to meet the requirements based on their analysis of what size HPWH (and infrastructure) will be required. The plumbing designer already has a deep understanding of the hot water demands expected at the building and can size the HPWH ready infrastructure appropriately. The designer has the option to use the prescribed approach in Joint Appendix 15 in the 2025 Building Energy Efficiency Standards, Title 24, Part 6 if they choose not to size the infrastructure themselves.

While it's true that the market could change, there are HPWHs being installed today that will need to be replaced as they age. It's reasonable to expect that the market will provide solutions for buildings installed with HPWHs today, and those same products will serve the market of buildings that have been built electric ready. Finally, our analysis showed that the requirements will not typically result in additional installed components. Therefore, the Statewide CASE Team does not agree that there is a risk of stranded assets.

4. **AHRI Comment:** Also, the Central Heat Pump Water Heater Ready space requirements in Section 160.9(e)3 conflict with Individual heat pump water heater ready requirements and the requirements in Joint Appendix JA15. Section 160.9(e)3 requires that “the construction drawings shall designate a space at least 39 inches by 39 inches and 96 inches tall for the future location of heat pump water heater,” or 84.5 ft³. JA15.2.1(a), states that “If the gas water heating system has an input capacity less than 200,000 Btu per hour, the minimum space reserved for the heat pump shall be 2.0 square feet per 10,000 Btu per hour input of the gas or propane water heating system, and the minimum linear dimension of the space reserved shall be 48 linear inches.” For example, a 200,000 Btu per hour water heater would require 2 ft² x 20 x 4ft or 80 ft³ using JA15 calculations. A 12 kW HPWH, which is approximately 40,946 Btu/hr, would require 2 ft² x 4 x 4ft or 32 ft³.

Statewide CASE Team Response: The electric ready requirements for central HPWH apply to systems serving multiple dwelling units and are not in conflict with the individual electric ready requirements which apply to systems serving one dwelling unit. As written, a water heating system can only be central or individual, not both. Individual systems tend to be installed in space constrained areas in the dwelling unit and the size requirement for individual electric readiness is based on these real-world considerations. Central systems are not installed in dwelling units and are more often installed in dedicated mechanical rooms with sufficient access and walkways. It is not expected that the space requirements for central and individual systems would match. Finally, to address the specific example/concern in the comment, the calculation performed by AHRI is missing the calculation for tank space which would address any concern as to why the space requirement seems too small for a HPWH system.

5. **AHRI Comment:** AHRI recommends striking Section 160.9(e)3, as proposed, 58 and replacing with “Central water heating systems using gas or propane to serve multiple dwelling units may consider providing space requirements and electrical requirements to serve a future heat pump water heater system as calculated and documented by the responsible person associated with the project.”

Statewide CASE Team Response: The Statewide CASE Team has demonstrated that the concerns AHRI raises are addressed by the currently proposed code language. The Statewide CASE Team recommends against the code language proposed by AHRI since it would essentially be unenforceable.

Section 170.2 Prescriptive Approach for Multifamily Buildings

1. **AHRI comment on Section 170.2 (d).2 related to alternative pathway using NEEA Tier 2:** *“AHRI has several concerns related to proposed modifications to Section 170.2(d).2. This alternate compliance pathway provides a prescriptive path for products meeting the requirements of Version 8.0 Tier 2 (or higher) of the Northwest Energy Efficiency Alliance (NEEA) Advanced Water Heater Specification for commercial heat pump water heaters and the cites the associated qualified products list. First, the NEEA specification includes design requirements for products beyond performance, including sound/warranty. Does the CEC intend to limit consumer choice in this way? Second, unlike the AHRI Directory, the NEEA database is unaudited. What assurance do consumers have that products are meeting the specification? Third, this specification is in the process of being updated. Once a specification is updated, it is not typical for a previous version’s qualified product list to be maintained. Has the CEC received assurance from NEEA that this is not the case for version 8.0? If this qualified product list becomes unavailable, the Energy Code option will cease to be relevant. It will also block products qualifying to more recent versions.”*

Statewide CASE Team Response: Including NEEA Advanced Water Heating Specification (AWHS) offers an alternative prescriptive pathway, providing flexibility in equipment and design for central HPWH applications to comply with the Energy Code. While the primary intent of the Energy Code is to ensure energy performance and reliable operation, endorsed by manufacturers and rated per NEEA AWHS, factors such as sound and warranty are also critical for the market adoption of HPWH systems.

The Statewide CASE Team acknowledges the continuous efforts to enhance and maintain NEEA AWHS, especially as industry knowledge and development around central HPWH technology rapidly evolve. The Energy Code's reference to NEEA AWHS aims to leverage the latest industry developments, harmonize regulatory requirements, and encourage industry innovation.

Regarding the AWHS version, the Energy Code can only mandate the use of the published version. Manufacturers can continue to submit their products to the product list under AWHS 8.0.

2. **AHRI comment:** *“The requirements in Section 170.2(d).2 are geared towards split systems and inadvertently ban integrated systems from complying through this pathway. There are no compliance pathways outlined that would allow an integrated product to be installed via the performance pathway given that integrated products are not included in the NEEA specification. This forces the products to fit into the architecture of a split system,*

which would most closely be characterized as a multi-pass return to primary design. Given the requirement that a central water heater cannot be configured as a multi-pass or a return to primary system, it effectively bans integrated systems from complying. AHRI requests that CEC add a compliance pathway or add an exception to this section to allow for integrated systems to comply.”

Statewide CASE Team Response: The Statewide CASE Team does not agree with this recommendation. The proposed primary prescriptive requirement reflects lessons learned from lab testing, field data and cost effectiveness analysis. The proposed primary requirement is also consistent with the Standard Design implemented in the compliance software, which sets the baseline for performance path. The added alternative pathway that NEEA AWHs provides designers flexibility in selecting equipment and system configuration. Additional flexibility in equipment selection and system configuration is available via the performance compliance pathway.

- 3. **AHRI comment on applicability of 170.2 (d).2 to Section 140.5 (b):** “Lastly, Section 170.2(d).2 is also referenced by Section 140.5(b) for hotel/motel occupancies, however the case reports and supporting documentation only looked at the multifamily housing. If hotels and motels were not examined as a building-type, how is the CEC justifying these new requirements? AHRI expects that the proposed changes will have a substantial and different impact than what was considered by the case team and these additional occupancy types need to be evaluated for cost effectiveness.”*

Statewide CASE Team Response: The Statewide CASE Team was not directly involved in the proposed changes in Section 140.5 (b). However, 170.2 (d).2 prescriptive requirement offers multiple options to comply including 170.2 (d).2A using heat pump water heating systems and 170.2 (d).2 B using gas or propane system. Since the changes associated with heat pump water heater systems do not eliminate the compliance path of using gas or propane systems, cost effectiveness of the changes is not required.