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Rheem Comments - 24-BSTD-01 Rheem Comments on 2025 Energy Code Rulemaking 45 Day Express Terms

Additional submitted attachment is included below.

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May 13, 2024

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
Docket office, Ms-4
Docket No. 24-BSTD-01
Submitted via e-Comment to 24-BSTD-01

Re: Rheem comments in response to proposed changes for the 2025 Building Energy Efficiency Standards, Express Terms, 45-Day Language

Dear Commissioners and CEC Staff,

Rheem Manufacturing Company (Rheem) appreciates the opportunity to comment on the 2025 Building Energy Efficiency Standards, Express Terms, 45-Day Language.

Rheem is an industry leader in total heating, cooling, refrigeration and water heating solutions and one of the few global brands with product offerings covering residential and commercial heating, cooling, conventional and hybrid storage water heaters (HPWH), tankless water heaters, solar water heating systems, pool and spa heaters, commercial boilers, residential hydronic and geothermal systems, commercial refrigeration products, indoor air quality accessories, and replacement parts for all categories. Rheem is headquartered in Atlanta, Georgia and with a manufacturing facility in Oxnard, California. Rheem also has U.S. based manufacturing facilities in Alabama, Arkansas, Connecticut, and North Carolina and distribution facilities throughout the US, Canada and around the world. Rheem is committed to a clean energy future and continues to bring to market products that advance the goals of emissions reduction at an affordable price to the homeowner, working cooperatively with environmental agencies and regulators.

General Comments

Rheem is a strong proponent of building decarbonization and truly values the efforts of the California Energy Commission (CEC) to drive improved energy performance through building energy efficiency standards. Rheem supports CEC's market-based approach to transition low-rise residential buildings to electric heat pump technologies over a reasonable timeframe which includes consideration of the work needed to increase the electric equipment readiness, labor force training, impacts to homeowners and business owners, and market adoption of heat pumps when setting requirements for new and existing buildings.

In our review of the 2025 Building Energy Efficiency Standards, Express Terms, 45-Day Language, we appreciate the efforts towards simplification and clarification as they will help aid overall understanding and adoption. Rheem supports the CEC's activity to encourage heat pump space and water heaters in

residential and nonresidential buildings. However, we urge CEC to preserve the flexibility for equipment to use any energy source as primary or back-up when it is economically beneficial to do so.

Comments on Formulas, Abbreviations, and Referenced Materials Needing Additional Clarification

Throughout the 45-day express terms language, there are several places where values, tables, sections, and formulas are referenced that require further clarification for us to understand and evaluate. They are:

- Section 140.4(e)2F and Section 170.2(c)4Civ and tables 140.4-H and 170.2-H – these note "Direct Expansion (DX) units greater than 65,000 Btu/hr that control the capacity of the mechanical cooling directly based on occupied space temperature shall have a minimum of two stages of mechanical cooling capacity." In the second sub-bullet but in the table directly below that language, it shows the minimum number of mechanical cooling stages for DX units greater than or equal to 65,000 Btu/h and less than 240,000 Btu/h is 3 stages. Rheem requests a clarification to understand if both of those conditions need to be satisfied (in which case all DX units greater than or equal to 65,000 Btu/h would be required to have a minimum of 3 stages of cooling) or can equipment satisfy only one of those conditions?
- Sections 150.0(h)9 and 160.3(b)8 both refer to "Variable or multi-speed systems shall comply with the following requirements" but within the energy code language, multi-speed systems is not defined. Rheem requests a clarification that defines multi-speed systems that aligns with the AHRI 210/240 test procedure definition that clearly identifies single-speed, two-speed, and multi-speed separately.
- Section 150.0(i)2: Refers to Section 150.0(i)A, which does not exist. Should this instead be 150.0(h)7A?
- Table 150.1-A and Table 170.2-K do not specify what CEER to use in the standard design.
- Section 150.1(c)14 and Section 170.2(f) refer to EER2 as part of an equation but offer no explanation for what EER2 is the proper input for the equation. Additionally, Section 170.2(f) pertains to multi-family residential buildings which likely means the presence of multiple units that can have different EER2 values.

All Occupancies—Mandatory Requirements

SECTION 100.1 – DEFINITIONS AND RULES OF CONSTRUCTION

Rheem notes that a definition for air to water heat pumps (AWHP) was proposed which includes "Its primary purpose is to generate heated or cooled water to meet space conditioning and domestic hot water load." Rheem requests clarification on how the AWHP definition interacts with the term "hydronic heat pump (WLHP)" that is used in several sections but not explicitly defined.

SECTION 110.2 – MANDATORY REQUIREMENTS FOR SPACE-CONDITIONING EQUIPMENT

CEC has proposed modifications to minimum efficiency requirements for mechanical equipment in this section, removal of product tables where all products are subject to federal minimum requirements such as Table 110.2-E Package Terminal Air Conditioners and Table 110.2-J Gas- and Oil-Fired Boilers, Minimum Efficiency Requirements. We understand that since changes to

federal minimum efficiency requirements may change asynchronously from the California Energy Code cycle, those tables may be difficult to keep maintained. However, Rheem does not support the complete removal of the tables proposed for deletion in section 110.2 as we believe there is value in system designers being able to clearly and quickly identify equipment that meets Title 24 requirements. To that end, we fully support CEC's plan to release a compendium to Title 24 with federal standards to be maintained by CEC staff.

Additionally, in 110.2(b), it is noted that controls for non-residential and multi-family building heat pumps with supplementary electric resistance heaters shall have controls in which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplemental heating. Rheem's concern with this language is that in some cases, the space may be left without compressor heating or electric resistance heating (such a condition arises when compressor cut-in and supplementary heating cut-in temperatures are 35 and 32 °F respectively, and the compressor and supplementary heating cut-out temperatures are 30 and 28 °F respectively. This setting complies with the proposed language. Similarly, such a condition arises when compressor cut-in and supplementary heating cut-in temperatures are 35 and 28 °F and compressor cut-out and supplementary heating cut-out temperatures are 30 and 28 °F respectively. This setting also complies with the proposed language). As the desired performance is that there should be overlap between the compressor cut-in temperature and supplemental electric resistance cut-out temperature as well as between the compressor cut-out temperature and the supplemental electric resistance cut-in temperature with hysteresis to avoid sudden switching between the modes, we request clarifying language be added so building design can satisfy both the desired performance and CEC building code language.

SECTION 110.3 – MANDATORY REQUIREMENTS FOR SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT

Rheem appreciates the Commission's efforts to ensure heat pump water heaters are appropriately installed with regards to backup heat and ventilation. For the ventilation requirements, Rheem recommends that manufacturer's installation instructions be the primary method used. When manufacturer's installation instructions are not available, or insufficient, the ventilation requirements in 110.3(c)(7)(B)(1-3) should be used. Currently, manufacturer's instructions on room size and ventilation are more restrictive than proposed by the Commission (i.e., the proposal allows 400-450 ft^3 while 700 ft^3 is recommended by most manufacturers). The proposal generally aligns with the NEEA study[1] titled, "Heat Pump Water Heaters in Small Spaces Lab Testing: "The Amazing Shrinking Room"." This study helps to approximate the drop in efficiency associated with installation in small enclosures and does not need to be used in the mandatory requirements for new construction or additions as the appropriate space can be

[1] Heat Pump Water Heaters in Small Spaces Lab Testing: "The Amazing Shrinking Room": https://neea.org/resources/heat-pump-water-heaters-in-small-spaces-lab-testing-the-amazing-shrinking-room.

allocated during design of the building. These provisions are more appropriate for replacement (covered as alterations in Title 24) applications. As the proposal allows for installations in smaller enclosures than manufacturer recommendations, the architect will lean towards this design and the installed equipment will not perform as well as it is rated. If the current language is maintained, then a derate may need to be applied in the performance calculations.

SECTION 110.4 – MANDATORY REQUIREMENTS FOR POOL AND SPA SYSTEMS AND EQUIPMENT

Consistent with comments separately submitted by PHTA, Rheem recommends removing "The control for the heat pump pool heater shall meet the requirements specified in section 110.2(b)." from section 110.4(c)(2). This mandatory requirement would effectively ban supplementary (backup) heating during the typical pool season as supplementary heating would not be allowed at outdoor temperatures above 35°F. If the CEC desires clarification of supplementary heating sizing and operation, then this should be explicit and directly apply to pool heating's unique application.

Rheem appreciates the Commission's addition of exemptions to section 110.4(c), particularly Exception 2 which allows a consumer to replace an existing pool heater with a pool heater of the same fuel type. This change is consistent with other provisions within Title 24 where replacement applications are directly addressed (*e.g.,* section 150.2(b)(H)(iii)(a))

<u>Nonresidential Occupancies—Mandatory Requirements</u>

SECTION 140.4 – PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

Rheem strongly disagrees with the overly prescriptive requirements proposed for certain applications using multi-zone systems, significantly limiting appropriate system choices by local system designers looking to make energy efficiency improvements in their projects. These are business-level decisions that need to be made based on a series of complex conditions: building location, building type, climate, building orientation, availability of different fuel types, etc. The proposed changes for offices and schools in Section 140.4 – Prescriptive Requirements for Space Conditioning Systems limit consumer choice to an extreme degree.

Section 140.4(a)3B, Multizone space-conditioning system types for schools provides only one option for buildings categorized as large schools or large offices – AWHP + FPFC. For medium-sized offices, the only option is VRF + DOAS. This is overly prescriptive and problematic for these reasons:

- These systems are not typical or widespread in these applications today and will require higher up-front equipment and labor costs to the school districts and nonresidential building owners
- Due to the atypical nature of these system types today in California, finding the right technical expertise among engineers and contractors to design, install, and maintain these types of mechanical systems will become increasingly difficult, further driving up costs for building owners throughout the life of the equipment

- Identifying only one prescriptive path to compliance for each of these building types and sizes significantly limits the designer's options when selecting from the variety of system types available on the market today and which energy efficiency measures to pursue when designing a new project.

Rheem emphasizes that maintaining some degree of system flexibility for the specifier is critical to meet the needs of every project that will come with a unique set of design considerations and encourages CEC to add commercial packaged air conditioners, commercial packaged heat pumps to the prescriptive path to compliance for multizone space-conditioning system types. Furthermore, due to the limited expertise in the field today with the systems identified in the prescriptive path for multizone space conditioning systems, it would be prudent to provide time for industry professionals to gain more familiarity with complex, applied systems like VRF + DOAS and AWHP + FPFC to ensure these types of systems are designed and installed properly to actually achieve the energy efficient gains they may offer.

SECTION 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING NONRESIDENTIAL, AND HOTEL/MOTEL BUILDINGS

Section 141.0(b)2C introduces new language that prescribes heat pumps for new or replacement single-zone packaged rooftop systems <65,000 Btu/h. This requirement places significant undue burden on business owners, especially in replacement scenarios that may become necessary due to equipment mechanical failures. We encourage the CEC to consider allowing replacement with the same equipment type in existing buildings to encourage business owners to continue to invest in overall energy efficiency measures as their business plans allow, as opposed to being forced into the prescriptive heat pump requirement in an emergency replacement situation. Furthermore, in emergency replacement scenarios, identifying a heat pump to fit exactly where the previous equipment of a different type was located will require more design and contractor labor time, further negatively impacting California business owners financially while increasing the amount of time their business must go without air conditioning, leading to lost profitability and in some cases, closures.

<u>Single-Family Residential Buildings</u>

SECTION 150.0 —- MANDATORY FEATURES AND DEVICES

Rheem notes that the spirit of Section 150.0(h)7 for single family residential buildings is similar to that of section 110.2(b), in its desire to limit and use of supplementary heat and help design supplementary heat parameters. Within Section 150.0(h)7, however, we believe an exclusion should be added, like the exception 1B to Section 110.2(b) that allows homeowners who do maximize their energy savings with aggressive setback temperatures to experience the desired heating performance during transient periods. To that point, the following exception language should be added as Exception 4 to 150.0(h)7: "transient periods such as start-ups and following room thermostat setpoint advance, if the controls provided preferential rate control, intelligent recovery, staging, ramping or another control mechanism designed to preclude the unnecessary operation of supplementary heating."

Section 150.0(h)9 and 160.3(b)8 – Capacity variation with third-party thermostats both contain language that implies variable or multi-speed systems need to be compatible with all 3rd party thermostats, which is quite broad in scope. Manufacturers develop equipment with controllers that are designed to perform optimally when matched together. The requirement to be compatible with all 3rd party thermostats may result in equipment matched with thermostats that do not take full advantage of the energy efficient features of the equipment design and other features in the building code language, resulting in the homeowner's loss of overall efficiency and system functionality.

In addition, the testing procedure in the CF2R the installer should use to certify on the Certificate of Installation that the control configuration has been tested is not available for review so we were not able to get further clarification on steps to compliance with this proposed measure. Rheem believes CEC should consider compatibility with third-party thermostats holistically and should avoid near-term requirements that preclude long-term demand response goals.

SECTION 150.1 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR SINGLE-FAMILY RESIDENTIAL BUILDINGS

Section 150.1(b) identifies the performance approach for single family residential buildings and includes references to Long-term System Cost (LSC) as an avenue to accomplish performance method compliance but during the 45-day express terms comment period, the CBECC-Res Compliance Software for 2025 was not available for exploration and assessment. In the future, we ask that related compliance software be made available for assessment during the comment period so it can be reviewed alongside the building energy code language.

In regards to domestic water heating systems described in section 150.1(c)(8)(B), Rheem recommends the Commission remove reference to the NEEA Advanced Water Heater Specification (AWHS). The AWHS tier is determined by a cold climate efficiency (CCE), prescriptive design, and warranty requirements. The U.S. DOE recently adopted certification and enforcement provisions for optional test conditions now allowing for representations of UEF at cold temperatures (E50), that also parallel the conditions required by the AWHS. Therefore, the Commission should set UEF and E50 requirements consistent with DOE's rule to avoid the risk of DOE enforcement action and confusion in making any efficiency claims using the CCE metric. Further, Rheem questions whether the Commission has the authority to set warranty requirements. Rheem notes that AWHS tier 3 or higher requires CTA-2045, therefore, if the Commission moved away from an AWHS reference then an AHRI 1430 reference could be made. AHRI 1430 is an industry standard which applies the CTA-2045 protocol to consumer water heaters. This recommendation also applies to sections 150.2(a)(D)(ii), 150.2(b)(H)(iii)(c), 170.2(d), and 180.2(b)(3)(C)(iii) which reference the AWHS.

Rheem appreciates the Commission's proposal to remove the word "instantaneous" from exception 1 to section 150.1(c)(8) as small electric storage water heaters are also used for point-of-use applications.

SECTION 150.2 – ENERGY EFFICIENCY STANDARDS FOR ADDITIONS AND ALTERATIONS TO EXISTING SINGLE-FAMILY RESIDENTIAL BUILDINGS

Rheem appreciates and supports the CEC's decision to move the prescriptive requirement for heat pumps when replacing an air conditioner in existing single-family homes to Part 11 as a voluntary measure to alleviate the cost to residents and homeowners while providing more time for industry professionals to gain more familiarity with heat pumps. We are ready to support the CEC's efforts in making industry professionals more familiar with heat pump technology and have adopted aggressive training goals to close the knowledge gap that exists in the industry today.

Multi-Family Buildings

SECTION 160.3 – MANDATORY REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS IN MULTIFAMILY BUILDINGS

Please refer to above comments for Section 150.0.

SECTION 160.9 – MANDATORY REQUIREMENTS FOR ELECTRIC READY BUILDINGS

Rheem appreciates and supports the Commission's proposal for heat pump water heater provisions in section 160.9(e-f).

Joint Appendix JA14

Rheem notes that central heat pump water heaters can be split-system (heat pump and a separate storage tank) or integrated (heat pump and storage tank connected). Split-system heat pump water heaters can be single-pass and multi-pass. JA14 references the DOE test procedure at Appendix E to Subpart G of 10 CFR Part 431, however, the DOE test procedure prescribes a set inlet and outlet temperature which can be achieved by varying the flow rate. JA14 requires input power, output capacity, and COP be reported at various ambient, inlet, and outlet temperatures. For single-pass and multi-pass water heaters with a single possible flow rate, these values can be provided. However, for integrated and multi-pass heat pump water heaters that can operate at multiple flow rates there is not enough information on how to set the flow rate to achieve a specific outlet temperature. Rheem recommends that the provisions in JA14 be reviewed and amended to allow for integrated and multi-pass heat pump water heaters with multiple possible flow rates to be certified.

Joint Appendix JA15

Rheem is concerned about the heat pump space requirements within the central heat pump water heater ready requirements. Below 200,000 Btu/h typically represents residential applications for instantaneous water heating and commercial applications for storage water heating. Many commercial applications in this range could be accomplished with an integrated heat pump water heater which typically has a height above the 48 inches required at JA14.2.1(a). For greater than or equal to 200,000

Btu/h applications, Rheem is concerned that the minimum floorspace is far too large. Rheem applied the 3.6 ft^2/10,000 Btu/h of input our existing central heat pump water heating system and found that the floorspace required by JA14 would be between 33% and 89% greater[2] than necessary. The method applied is a direct output capacity replacement and doesn't account for reduced capacity due to the addition of storage tanks. Therefore, Rheem expects the actual space to install a central heat pump water heater to reduce further.

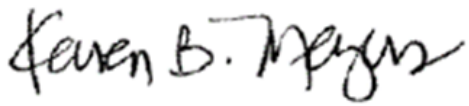
24-BSTD-01 draft 2025 Proposed Nonresidential HVAC Performance System Map

Rheem appreciates the additional clarification effort provided in this draft document posted on April 25, 2025 as the variety of building types, work type, and single zone vs. multi zone requirements are quite numerous. We have concerns as this document references sections such as 140.4(b)2C and Table 2 in the text that do not exist in the 2025 Building Energy Efficiency Standards, Express Terms, 45-Day Language.

Conclusion

We thank the CEC for their continued hard work on the 2025 code, and we remain willing to support CEC on the remaining steps of the rulemaking.

Thank you for your consideration.



Karen B. Meyers
Vice President of Government Affairs
Rheem Manufacturing Company

CC: Joe Boros, Nancy Grimm, Harshad Inamdar, James Phillips, Allison Skidd

[2] Rheem converted gas input power to output capacity at a 96% thermal efficiency, which will be the minimum required by DOE on October 6, 2026. This output capacity was divided by the output capacity of our central heat pump water heaters at 40°F ambient and outlet temperature of 140°F.