

Appliance Standards Awareness Project  
American Council for an Energy-Efficient Economy

June 24, 2022

Ms. Catherine Rivest  
U.S. Department of Energy  
Office of Energy Efficiency and Renewable Energy  
Building Technologies Office, EE-5B  
1000 Independence Avenue SW, Washington, DC 20585

**RE: Docket Number EERE-2022-BT-STD-0015: Request for Information on the Test Procedures and Energy Conservation Standards for Commercial Package Air Conditioners and Heat Pumps**

Dear Ms. Rivest:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP) and the American Council for an Energy-Efficient Economy (ACEEE) on the request for information on the test procedures and energy conservation standards for commercial package air conditioners and heat pumps (CUACs/CUHPs). 87 FR 31743 (May 25, 2022). We appreciate the opportunity to provide input to the Department.

**We encourage DOE to include a 17 °F heating test and an optional 5 °F heating test for CUHPs.** We agree with DOE's statement in the RFI that incorporating a low temperature heating test for CUHPs may better represent the operating range of CUHPs. We therefore support incorporating a low temperature heating test (i.e., 17 °F). In addition, we believe that the performance of heat pumps in very cold ambient temperatures may become more important to purchasers, and we therefore encourage DOE to incorporate an optional 5 °F test. This optional test would be similar to the optional 5 °F heating test (H4) for residential heat pumps specified in Appendix M1.

**We urge DOE to follow the recommendations of the ASRAC term sheet for CUACs/CUHPs to more fully capture fan energy use in the test procedure.** The ASRAC working group recommended that fan energy use outside of mechanical cooling be captured in the test procedure.<sup>1</sup> DOE's analysis from the 2016 Direct Final Rule for standards for air-cooled CUACs/CUHPs illustrates the importance of capturing fan energy use appropriately.<sup>2</sup> As we identified in our comments on the May 2020 RFI, in some cases, DOE's analysis showed that more energy would be consumed at a higher efficiency level than at a lower one due to significant real-world fan energy consumption that is not fully captured in the current test procedure.<sup>3</sup> In particular, fan energy consumption in ventilation mode is not captured in the current test procedure. It is therefore critical that DOE amend the test procedure to more fully capture fan energy so

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<sup>1</sup> <https://www.regulations.gov/document/EERE-2013-BT-STD-0007-0093>. p. 2.

<sup>2</sup> <https://www.regulations.gov/document/EERE-2013-BT-STD-0007-0105>. p. 7-10.

<sup>3</sup> <https://www.regulations.gov/comment/EERE-2019-BT-STD-0042-0023>. p. 2-3.

that the efficiency metric both reflects the performance of a unit during a representative average use cycle and provides an adequate relative ranking of models.

In addition, the ASRAC term sheet recommended that DOE consider alternative ESP values that are more representative of field applications. In the RFI, DOE states that the indoor ESP values in the current test procedure are likely too low. However, the most recent industry test procedure, AHRI 340/360-2022, maintains the low ESP values. We therefore continue to encourage DOE to adopt more representative ESP values to better reflect fan energy consumption in the field.

DOE also notes in the RFI that the current test procedure does not account for economizer-only cooling operation of CUACs/CUHPs. In the analysis for the 2016 DFR, DOE presented AHRI data that showed that 60, 67, and 77% of small, large, and very large equipment, respectively, were equipped with economizers.<sup>4</sup> These numbers have likely increased since that time because the latest version of ASHRAE 90.1 (2019) requires all but one U.S. climate zone (1A) to have economizers installed on this equipment. This suggests that the hours of operation in economizer-only mode may be significant, and we therefore encourage DOE to consider incorporating economizer-only cooling operation in the test procedure.

**We encourage DOE to amend the IEER weighting factors and ensure that the calculation is adequately representing seasonal efficiency.** In the RFI, DOE notes that CUACs/CUHPs are the default HVAC equipment for building types other than those considered when the weighting factors for the IEER metric were initially determined. We therefore encourage DOE to develop updated IEER weighting factors by considering the other representative buildings.

We also are concerned that the current IEER metric may not reflect the total cooling provided divided by the total energy consumed. We understand that the weighting factors consider operating hours, but do not account for the fact that an hour of operation at a higher outdoor temperature is providing more cooling and consuming more energy than an hour of operation at a lower outdoor temperature. In this way, IEER may be underweighting performance at the higher outdoor temperature conditions and overweighting performance at the lower outdoor temperature conditions. In revisiting the IEER metric, we encourage DOE to ensure that the calculation is adequately representing seasonal efficiency.

We also note that once the weighting factors are updated, an existing IEER rating will not be comparable to a newly calculated IEER rating. Given the potential for confusion in the marketplace during the transition to updated future standards (as well as in the secondary marketplace), we believe that it may make sense to change the name (or assign a subscript to the metric).

**We encourage DOE to consider including a controls verification procedure (CVP) in an updated test procedure.** Across multiple AC and HP equipment categories, DOE has recognized that a unit under test may perform differently under fixed controls than it would in the field operating under native controls.

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<sup>4</sup> <https://www.regulations.gov/document/EERE-2013-BT-STD-0007-0105>. p. 3-16.

For example, to help ensure that performance metrics for variable refrigerant flow (VRF) ACs and HPs better reflect performance achievable under the unit’s control system, DOE introduced a CVP to the VRF test procedure in the December 2021 NOPR. DOE is also requiring testing of variable speed units under native controls in the residential cold climate heat pump challenge September 2021 specifications.<sup>5</sup> We believe that it would be beneficial to require testing under native controls for CUACs/CUHPs as part of a CVP. A CVP will allow the unit to perform with unlocked controls, instead of fixed controls set by a manufacturer for testing mode only, which will better represent the performance of this equipment in the field.

**We support DOE considering low-GWP refrigerants as a design option in the engineering analysis to evaluate amended energy conservation standards.** The predominant refrigerant used in CUACs/CUHPs, R-410a, is one of many high-GWP refrigerants that is currently being phased down at the federal level (or prohibited entirely at the state level). In the RFI, DOE explains that “given the timelines of both enacted and potential state and federal regulatory changes regarding the phasedown of high-GWP refrigerants...low-GWP refrigerants may be used in ACUACs/ACUHPs in the U.S. by the time potential amended standards could take effect.”<sup>6</sup> We therefore believe that it is appropriate for DOE to consider low-GWP refrigerants as a design option.

Thank you for considering these comments.

Sincerely,



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Appliance Standards Awareness Project



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American Council for an Energy-Efficient Economy

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<sup>5</sup> <https://www.regulations.gov/document/EERE-2021-BT-TP-0019-0002> and <https://www.energy.gov/sites/default/files/2021-10/bto-cchp-tech-challenge-spec-102521.pdf>

<sup>6</sup> <https://www.regulations.gov/document/EERE-2022-BT-STD-0015-0001>. p. 31753.