Appliance Standards Awareness Project
American Council for an Energy-Efficient Economy
Consumer Federation of America
National Consumer Law Center

March 22, 2022

Dr. Stephanie Johnson
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies, EE-2J
1000 Independence Avenue SW, Washington, DC 20585

RE: Docket Number EERE-2020-BT-STD-0039: Notice of Webinar and Availability of Preliminary Technical Support Document for Miscellaneous Refrigeration Products

Dear Dr. Johnson:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), the American Council for an Energy-Efficient Economy (ACEEE), the Consumer Federation of America (CFA), and the National Consumer Law Center (NCLC) on behalf of its low-income clients on the notice of webinar and availability of preliminary technical support document (TSD) for miscellaneous refrigeration products (MREFs). 87 FR 7396 (February, 9 2022). We appreciate the opportunity to provide input to the Department.

We encourage DOE to capture the improved full-load efficiency of variable-speed compressors. We are concerned that DOE is underestimating the potential savings from upgrading from a single-speed compressor to a variable speed compressor (VSC) by not accounting for the higher energy efficiency ratio (EER) values of variable-speed compressors. DOE states in the preliminary TSD that the EER values for variable-speed compressors are typically consistent with the EER values of the highest efficiency single-speed compressors.[1] However, this statement does not seem to be supported by the compressor efficiency data presented in the preliminary TSD and shown in Figure 1 below. In particular, DOE notes that compressors typically present in MREFs have capacities of 300 to 400 Btu per hour[2], but at a capacity of 300 Btu per hour, for example, even the least-efficient VSC has a higher EER than the most-efficient single-speed compressor. Furthermore, the EER of the most-efficient VSC at 300 Btu per hour appears to be about 30% higher than the most-efficient single-speed compressor. We therefore urge DOE to ensure that its analysis is capturing the improved full-load efficiency of VSCs relative to single-speed compressors.

[1] https://www.regulations.gov/document/EERE-2020-BT-STD-0039-0009. p. 5-21.
[2] https://www.regulations.gov/document/EERE-2020-BT-STD-0039-0009. p. 3-32.

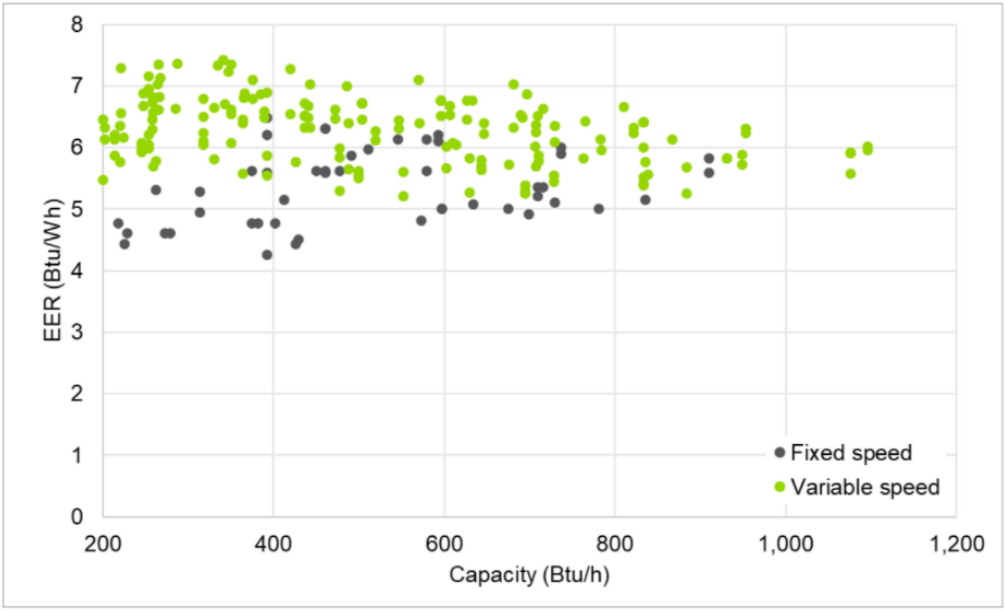

Figure 1. Efficiency Curve for R-600a Compressors (at LBP) [source: preliminary TSD Figure 5.5.1]

We urge DOE to ensure that the energy savings associated with the improved part-load performance of variable speed compressors are being appropriately captured for compact coolers. We understand that DOE assumed similar EER values for the most-efficient single-speed compressor and the VSC used in the engineering analysis. As described above, the compressor efficiency data presented in the preliminary TSD suggest that the EERs of VSCs are generally higher than those of single-speed compressors, in particular at the compressor capacities typically used in MREFs. Nevertheless, even when upgrading from a single-speed compressor to a VSC with the same rated EER value, we would expect there to be significant energy savings associated with the improved part-load performance of VSCs. In the preliminary TSD for consumer refrigerators and freezers, DOE stated that it estimated a 9% improvement in compressor efficiency associated with converting from a single-speed compressor to a VSC with similar rated EER values[3], and we expect there to be similar savings for compact coolers. However, for the 5.1 cubic foot compact cooler representative unit, DOE appears to show energy savings of only about 2% when going from the most-efficient single-speed compressor at efficiency level (EL) 3 to a VSC and a triple pane glass pack at EL 4.[4] We are therefore concerned that DOE may be underestimating the energy savings associated with the design options incorporated at EL 4. We urge DOE to ensure that its analysis is appropriately capturing the savings from the incorporation of a VSC.

We urge DOE to evaluate an intermediate efficiency level between EL 1 and EL 2 for compact coolers. The EL 1 level for compact coolers is very cost-effective[5], and it also appears that EL 2 is cost-effective for the larger representative unit since DOE estimates a small incremental cost ($4) going from EL 1 to EL 2 (see Table 1 below). For the smaller 3.1 cubic foot representative unit, as shown in Table 1, there are multiple design options incorporated at EL 2, and we believe that a subset of those design options

[3] https://www.regulations.gov/document/EERE-2017-BT-STD-0003-0020. p. 5-24.
[4] Table ES.2.2 in the preliminary TSD shows that the percent energy use less than baseline is 49% and 50% for EL 3 and EL 4, respectively, for the larger compact cooler. The energy savings of EL 4 relative to EL 3 is therefore (51-50)/51, or about 2%.
[5] Table ES.2.10 in the preliminary TSD shows that at EL 1, the average life cycle cost savings are $40 and the payback period is 1.7 years.

incorporated at an EL 1.5 level could result in a higher cost-effective efficiency level. We therefore urge DOE to evaluate an intermediate efficiency level between EL 1 and EL 2 for compact coolers.

Table 1. Design options and incremental manufacturer production costs (MPC) for compact coolers[6]

Efficiency level transition	Design options added for 3.1 cu. ft. unit	Incremental MPC for 3.1 cu. ft. unit	Design options added for 5.1 cu. ft. unit	Incremental MPC for 5.1 cu. ft. unit
EL 0 to EL 1	high-efficiency single speed compressor, Argon glass pack	$6	high-efficiency single speed compressor, Argon glass pack, increased insulation thickness, BLDC condenser fan	$6
EL 1 to EL 2	Tube-and-fin condenser, tube-and-fin evaporator, most-efficient single speed compressor	$43	Tube-and-fin evaporator	$4

We urge DOE to incorporate a price learning curve. DOE states in the preliminary TSD that due to a lack of historical price data, the Department elected not to use a price 'learning' curve in this analysis, as it has in many standards rulemakings for other products. We are concerned that assuming constant prices will result in overestimating the cost to achieve higher efficiency levels in the assumed compliance year of 2029 and beyond. We believe that it would be reasonable to use price data from consumer refrigerators to inform the development of an appropriate learning rate for MREFs as many of the same design options are used in MREFs.[7] DOE used a learning rate of 40.3% in the consumer refrigerators preliminary TSD, and we believe a similar rate could be applied in the analysis for MREFs.[8]

We encourage DOE to evaluate potential standards for refrigerated produce growers. In the preliminary TSD, DOE indicated that the Department may consider a separate product class for produce growers when considering potential amended standards for miscellaneous refrigeration products. We understand that produce growers with a source of refrigeration (e.g., 'refrigerated produce growers') likely meet the definition of a cooler.[9] However, due to the unique components present in a produce grower that maintain an environment with temperature and humidity conditions that are conducive to growing plants, produce growers cannot be tested in the same manner as coolers whose primary function is to chill beverage products. DOE notes in the preliminary TSD that refrigerated produce growers may represent a growing market, and we encourage DOE to establish test procedures and standards for this product class.

Thank you for considering these comments.

[6] Incremental design options from Table 5.5.1 and incremental manufacturer production costs from Table E.S.2.4 in the preliminary TSD.

[7] About half of the design options incorporated in the MREF analysis were also incorporated in the consumer RFs analysis including improved compressor efficiency, VSCs, increased condenser surface area, increased insulation thickness, and vacuum insulated panels.

[8] https://www.regulations.gov/document/EERE-2017-BT-STD-0003-0020. p. 2-24.

[9] https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-430.

Sincerely,

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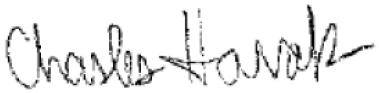

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National Consumer Law Center
(On behalf of its low-income clients)