Appliance Standards Awareness Project
Alliance to Save Energy
American Council for an Energy-Efficient Economy
Natural Resources Defense Council
Northwest Energy Efficiency Alliance
Northwest Power and Conservation Council

December 9, 2014

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program
Mailstop EE-5B
1000 Independence Avenue, SW
Washington, DC 20585

RE: Docket Number EERE–2012–BT–STD–0045/ RIN 1904–AC87: Preliminary Technical Support Document for Ceiling Fans

Dear Ms. Edwards:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), Alliance to Save Energy (ASE), American Council for an Energy-Efficient Economy (ACEEE), Natural Resources Defense Council (NRDC), Northwest Energy Efficiency Alliance (NEEA), and Northwest Power and Conservation Council (NPCC) on the preliminary technical support document (TSD) for ceiling fans. 79 Fed. Reg. 58290 (September 29, 2014). We appreciate the opportunity to provide input to the Department.

In the absence of data to the contrary, DOE should assume the same repair and warranty costs for all ceiling fan motors. For the preliminary analysis, DOE incorporated additional repair and warranty costs for ceiling fans with DC motors.[1] However, we are unaware of any data indicating any reliability issues associated with DC motors for ceiling fans. In addition, several manufacturers have indicated that there should not be any concerns related to the reliability of DC motors for ceiling fans:

- In comments in response to the request for information (RFI), ebm-papst stated that "ceiling fans are a very benign application for external rotor permanent magnet brushless DC motors" and that permanent magnet brushless DC motors have been successfully applied "in much more severe HVAC/R applications where fan motors are operated at more extreme temperatures, with higher power density, and for longer annual run times."[2]

[1] Preliminary TSD. pp. 5-12, 8-13.
[2] Comment ID: EERE-2012-BT-STD-0045-0060.

- In comments in response to the preliminary TSD, Big Ass Solutions stated that for well-designed motor controllers, mean time between failure (MTBF) numbers between AC and DC controllers will be similar.[3]
- At the DOE public meeting on November 19, Emerson stated that they have been using DC motors for seven years and have not seen a spike in failures.[4]
- Calsoft Labs, which produces electronic controls for DC motors for ceiling fans, states that DC motors "offer several advantages over conventional AC operated ceiling fans, including higher efficiency and reliability, reduced noise, longer lifetime (no brush and commutator erosion), elimination of ionizing sparks from the commutator, and overall reduction of electromagnetic interference (EMI)."[5]

As we noted in our comments on the framework document, the ENERGY STAR specification for ceiling fans requires that manufacturers provide a warranty of at least 30 years for the motor.[6] There are 76 ceiling fans from 16 manufacturers[7] that qualified for the 2014 ENERGY STAR Most Efficient specification, and we assume that all of these fans incorporate DC motors.[8]

Finally, as DOE noted at the public meeting on November 19, the projected compliance date for amended standards for ceiling fans is 2019.[9] While we are unaware of any reliability issues associated with DC motors, even if some manufacturers have encountered issues, we believe that these issues will no longer be a concern in 2019 as manufacturers continue to gain experience with DC motor technology.

In sum, we encourage DOE to revisit the assumptions related to the reliability of DC motors since we are not aware of any evidence suggesting that DC motors are less reliable than AC motors for ceiling fan applications. We also encourage DOE to talk with motor and control manufacturers in order to incorporate their expertise and experiences with DC motors in the analysis.

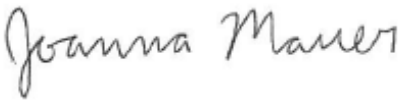
We support DOE's incorporation of price learning for DC motor electronic controls. For the preliminary analysis, DOE incorporated price learning in the cost of the electronic controls for DC motors.[10] We believe that this approach of applying price learning to a component that can be used to improve efficiency is an improvement over the price learning approach used in previous rulemakings where a learning rate was estimated for the product as a whole. In the case of ceiling fans, we believe that the price of DC motors and their associated controls will decline much faster than the total price of ceiling fans.

[3] Comment ID: EERE-2012-BT-STD-0045-0079.
[4] Public Meeting Transcript. p. 300.
[5] http://www.calsoftlabs.com/img/download_pdf/energy-efficient-ceiling-fan-solution.pdf.
[6] Comment ID: EERE-2012-BT-STD-0045-0014.
[7] The ENERGY STAR Most Efficient list for ceiling fans lists 16 ENERGY STAR Partners.
[8] https://data.energystar.gov/Active-Specifications/ENERGY-STAR-Most-Efficient-Ceiling-Fans/3zsg-8tys? Accessed December 2, 2014.
[9] Public Meeting Presentation Slides. p. 60.
[10] Preliminary TSD. pp. 8-9, 8-10.

We encourage DOE to continue to consider how best to structure the equations for potential efficiency levels. For the preliminary analysis, DOE evaluated efficiency levels (CFM/W) that are a function of fan diameter.[11] We are concerned that standards that are a function of diameter may not be well tied to the service the fan is delivering since two fans of the same diameter could provide significantly different airflows. In addition, if the required efficiency is a function of fan diameter, a manufacturer may be able to meet the standard simply by reducing the speed of the fan, which in turn would reduce airflow and the fan's utility.

Thank you for considering these comments.

Sincerely,



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[11] Preliminary TSD. p. 5-43.