

Appliance Standards Awareness Project
National Consumer Law Center
Natural Resources Defense Council
Northwest Energy Efficiency Alliance

April 29, 2013

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program
1000 Independence Avenue, SW
Mailstop EE-2J
Washington, DC 20585

RE: Docket Number EERE–2012–BT–STD–0045/ RIN 1904–AC87: Framework Document for Ceiling Fans and Ceiling Fan Light Kits

Dear Ms. Edwards:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), National Consumer Law Center (NCLC), Natural Resources Defense Council (NRDC), and Northwest Energy Efficiency Alliance (NEEA) on the framework document for ceiling fans and ceiling fan light kits. 78 Fed. Reg. 16443 (March 15, 2013). We appreciate the opportunity to provide input to the Department.

We are pleased that DOE is initiating this rulemaking to consider amended standards for ceiling fans and ceiling fan light kits. Given the high annual sales volume and the wide range of airflow efficiency levels of currently available products, we believe that performance standards for ceiling fans could achieve significant national energy savings. We also believe that there is an opportunity to achieve significant national energy savings from amended standards for ceiling fan light kits. Below we provide our comments on both ceiling fans and ceiling fan light kits.

Ceiling Fans

Ceiling fan use and energy savings

At the DOE public meeting on March 22, multiple manufacturers stated that ceiling fans are inherently energy-saving products—that they can reduce both cooling and heating energy consumption.¹ Ceiling fans clearly have the *potential* to yield energy savings during the cooling season if the use of ceiling fans results in consumers raising their thermostat and/or using air conditioning for fewer hours. However, we are unaware of any studies demonstrating *actual* energy savings in the field due to the use of ceiling fans. A study conducted by the Florida Solar Energy Center (FSEC) of 400 Florida homes found that homeowner-reported thermostat settings were the same for homeowners with and without ceiling fans, and measured thermostat settings were not statistically different for a sample of homes in which the indoor air temperature was

¹ Public Meeting Transcript. pp. 19-22.

measured. The FSEC study concluded that there was no indication that ceiling fans were being used in a manner that saves energy.² In addition, an environmental chamber study conducted by *Consumer Reports* demonstrated that the claimed de-stratification benefits of ceiling fans during the heating season are largely unsubstantiated.³

Efficiency levels of available ceiling fans

There is a wide range of airflow efficiency levels (CFM/W) among currently available ceiling fans. The table below shows the average, minimum, and maximum efficiency levels of ENERGY STAR qualified ceiling fans at each of three speeds (low, medium, and high). The last column of the table shows the ratio of the maximum efficiency level to the minimum efficiency level of ENERGY STAR qualified products. At high speed, the most-efficient ceiling fan is 7 times more efficient than the least-efficient ENERGY STAR qualified model, while at low and medium speeds, the most-efficient model is more than 9 times more efficient than the least-efficient ENERGY STAR qualified model.

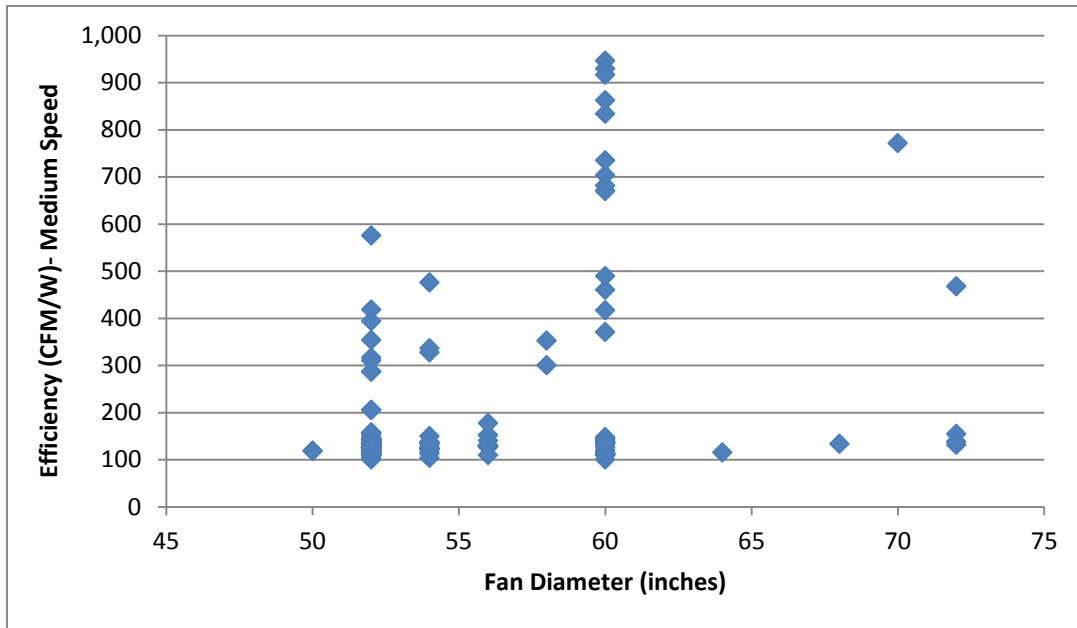
Speed	Airflow Efficiency (CFM/W)			Ratio of Max to Min
	Average	Min	Max	
Low	253	155	1,455	9.4
Medium	162	100	946	9.5
High	107	75	549	7.3

Source: Analysis of ENERGY STAR Qualified Product List as of April 5, 2013.

The graph below shows the airflow efficiency at medium speed of ENERGY STAR qualified ceiling fans. For 52” ceiling fans, which represent 70% of all ENERGY STAR qualified models, airflow efficiency at medium speed ranges from 100-575 CFM/W. For 60” fans, the most-efficient model (946 CFM/W) at medium speed is more than 9 times more efficient than the least-efficient model (100 CFM/W).

² James, P.W., J.K. Sonne, R.K. Vieira, D.S. Parker, and M.T. Anello. 1996. Are Energy Savings Due to Ceiling Fans Just Hot Air? Presented at the 1996 ACEEE Summer Study on Energy Efficiency in Buildings. http://www.aceee.org/sites/default/files/publications/proceedings/SS96_Panel8_Paper10.pdf.

³ Parker, D.S., M.P. Callahan, J.K. Sonne, G.H. Su, and B.D. Hibbs. 2000. Development of a High Efficiency Ceiling Fan. Proceedings of the Twelfth Symposium on Improving Building Systems in Hot and Humid Climates, San Antonio, TX, May 15-17, 2000. <http://repository.tamu.edu/bitstream/handle/1969.1/6803/ESL-HH-00-05-33.pdf?sequence=4>.



Source: Analysis of ENERGY STAR Qualified Product List as of April 5, 2013.

Highly decorative ceiling fans

In the framework document, DOE proposes to establish a separate product class for “highly decorative ceiling fans.”⁴ We are not opposed to a separate product class for “highly decorative” fans. However, we urge DOE to try to ensure that a separate product class does not create a loophole. We also urge DOE to adopt (or to coordinate with FTC on adopting) a labeling requirement for “highly decorative” ceiling fans that would make consumers aware that these fans are not primarily designed for air movement performance. In addition, we encourage DOE to consider a potential design requirement for “highly decorative” ceiling fans. We recognize that airflow efficiency may not be a good metric for ceiling fans that are not primarily designed to circulate air. However, there may be low-cost options for reducing energy consumption in these products; for example, a motor efficiency requirement that would eliminate the least-efficient motors, or a requirement to include a motion sensor.

In case there is any confusion, we also urge DOE to clarify that any ceiling fan light kits that are integral or attachable to a “highly decorative” ceiling fan would be covered by the standards for ceiling fan light kits. Ceiling fan light kits are defined in EPCA as “equipment designed to provide light from a ceiling fan,” 42 U.S.C. § 6291(50), and highly decorative ceiling fans, even if they are exempted from the efficiency standards DOE is considering, would still meet the statutory definition of a ceiling fan.

Ceiling fans with decorative features

We understand that in addition to “highly decorative” ceiling fans, there are many ceiling fans that include air movement performance as a primary feature, but that also incorporate decorative features, and that these decorative features may impact efficiency. However, given the wide

⁴ Framework Document. p. 48.

range in airflow efficiency of currently available products and the huge gain in efficiency associated with switching from standard induction motors to brushless DC motors,⁵ we believe that significant energy savings can be achieved from establishing efficiency performance standards for ceiling fans, while maintaining the ability for manufacturers to provide decorative features.

Proposed reinterpretation of “ceiling fan” definition

In the framework document, DOE proposes to reinterpret the definition of “ceiling fan” to incorporate “hugger” fans.⁶ We support DOE’s proposed reinterpretation. As DOE notes in the framework document, hugger fans generally are indistinguishable from other types of ceiling fans—the only distinguishing feature is that they are safe to use in rooms that have low ceilings.⁷

Test procedure for ceiling fans with multiple fan heads

The framework document states that for ceiling fans with multiple fan heads, DOE is considering testing only one of the fan heads and treating the fan head like a single-head ceiling fan.⁸ At the DOE public meeting on March 22, one manufacturer stated that it is conceivable that the individual fan heads of a ceiling fan with multiple fan heads could have different motors.⁹ It also seems conceivable that different fan heads could have different blades. We encourage DOE to ensure that the results of the test for ceiling fans with multiple fan heads do not overstate the efficiency of the ceiling fan in cases where the efficiency of individual fan heads may not be the same. One potential approach would be for manufacturers to certify that the fan heads that are not tested do not have any characteristics that are different from those of the tested fan head that affect efficiency (similar to the language used for determining “basic models”). In a case where individual fan heads did have different characteristics that affect efficiency, multiple fan heads would need to be tested.

Testing at multiple fan speeds

We encourage DOE to develop a test procedure that includes measurements of airflow efficiency at multiple fan speeds. The graph below shows the ratio of airflow efficiency at low speed to airflow efficiency at high speed for ENERGY STAR qualified ceiling fans. For 52” and 60” ceiling fans, the ratio of low speed to high speed airflow efficiency ranges from 1.7-3.8. The wide variability in the ratio of low-speed to high-speed airflow efficiency suggests that airflow efficiency at a given speed is not necessarily a good predictor of airflow efficiency at other speeds.

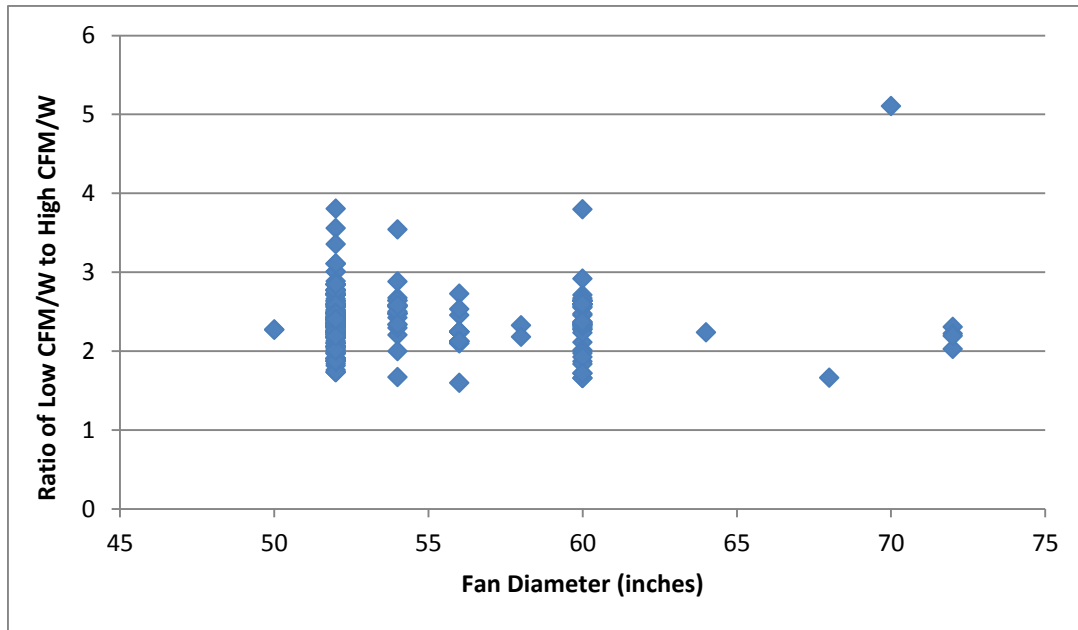
⁵ For example, Emerson states that their ‘EcoMotor’ uses up to 75% less energy than typical ceiling fan motors. <http://www.emersonfans.com/pages/choose-motor.aspx>.

⁶ Framework Document. p. 4.

⁷ *Ibid.*

⁸ *Ibid.* p. 21.

⁹ Public Meeting Transcript. p. 66.



Source: Analysis of ENERGY STAR Qualified Product List as of April 5, 2013.

A test procedure that includes measurements at multiple fan speeds would also be consistent with the current ENERGY STAR specification, which includes minimum airflow efficiency levels at low, medium, and high speeds.

Technology options

The framework document states that DOE is considering an integrated metric for ceiling fan efficiency which would incorporate standby mode power consumption.¹⁰ However, the list of technology options in the framework document does not contain any potential options for reducing standby power consumption.¹¹ We encourage DOE to investigate technology options that could reduce standby power consumption.

Lifetime of brushless DC motors

At the DOE public meeting on March 22, one manufacturer raised a concern regarding the lifetime of brushless DC motors.¹² The current ENERGY STAR specification requires that ceiling fans provide a warranty of at least 30 years for the motor.¹³ The website of Hansen Wholesale lists 172 ceiling fans with DC motors.¹⁴ Of these ceiling fans with DC motors, 94 ceiling fans from four different brands are listed as ENERGY STAR qualified.¹⁵ According to

¹⁰ Framework Document. p. 26.

¹¹ *Ibid.* p. 56.

¹² Public Meeting Transcript. p. 129.

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http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/ceilingfans/Version_3.0_Final_Specification.pdf?5dcf-9cdc.

¹⁴ <http://www.hansenwholesale.com/ceilingfans/fansearch.asp?MotorSize=DC> (accessed April 5, 2013).

¹⁵ <http://www.hansenwholesale.com/ceilingfans/energystar/fansearch.asp?MotorSize=DC> (accessed April 5, 2013).

Hansen Wholesale, DC motors can actually last longer than traditional induction motors since they operate at a cooler temperature.¹⁶

Ceiling Fan Light Kits

Efficiency metric for ceiling fan light kits

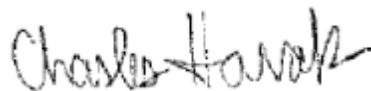
We support DOE's proposal to use luminous efficacy as the efficiency metric for all ceiling fan light kits. The current standards for ceiling fan light kits include performance standards (lm/W) for medium screw base and pin-based fluorescent light kits and a maximum wattage requirement for all other types of light kits. We understand that a significant loophole has developed under the current standards—that manufacturers have switched from using medium base sockets to intermediate base or candelabra base sockets on many ceiling fan light kits in order to avoid having to meet the lm/W performance standards. We agree with DOE that it makes sense to use a metric of lm/W for all ceiling fan light kits.

Thank you for considering these comments.

Sincerely,



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Appliance Standards Awareness Project



Charles Harak, Esq.
National Consumer Law Center
(On behalf of its low-income clients)



Meg Waltner
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¹⁶ <http://www.hansenwholesale.com/ceilingfans/bestfans.asp#interpret>.