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

December 23, 2021

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-2021-BT-STD-0029: Request for Information for Energy Conservation Standards for Consumer Furnace Fans

Dear Ms. Rivest:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), Consumer Federation of America (CFA), Natural Resources Defense Council (NRDC), and the National Consumer Law Center (NCLC) on behalf of its low-income clients on the request for information (RFI) for consumer furnace fan standards. 86 Fed. Reg. 66465 (November 23, 2021). We appreciate the opportunity to provide input to the Department.

We believe that significant energy savings can be achieved from the adoption of more stringent standards for furnace fans. In the RFI, DOE notes that certain models in a variety of product classes have certified values for fan energy rating (FER) that are at least 100 W/1000 CFM below the current standard. For example, several models in the non-weatherized non-condensing oil furnace product class have FERs more than 300 W/1000 CFM below the current standard, which corresponds to energy usage that is approximately 30% of the minimum standard. Figure 1 plots model FER (blue dots) for both condensing (left) and non-condensing (right) non-weatherized gas furnace fans versus maximum calculated airflow (CFM); the minimum standards (black lines) and maximum technologically feasible ("max-tech") levels (red lines) from the analysis for the July 2014 Final Rule are included for reference.[1] These two classes represent over two-thirds of estimated shipments of covered furnace fans.[2] Importantly, 16 total models of non-condensing and condensing non-weatherized gas furnace fans use less energy than the previous rulemaking's max-tech levels.[3] The RFI mentions that DOE previously estimated that the max-tech levels from the July 2014 Final Rule would have provided an additional 1.65 quads of full-fuel-cycle energy savings relative to the adopted standard levels.[4] Thus, we believe there is significant opportunity for energy savings through this standards rulemaking.

[1]EERE-2010-BT-STD-0011-0111, p. 5-16. https://www.regulations.gov/document/EERE-2010-BT-STD-0011-0111
[2]EERE-2010-BT-STD-0011-0111, p. 9-4. https://www.regulations.gov/document/EERE-2010-BT-STD-0011-0111
[3]Compliance Certification Database, https://www.regulations.doe.gov/certification-data/CCMS-4-Furnace_Fans.html#q=Product_Group_s%3A%22Furnace%20Fans%22
[4]DOE adopted Trial Standard Level 4, which included a mix of Efficiency Levels (ELs) 1 and 4.

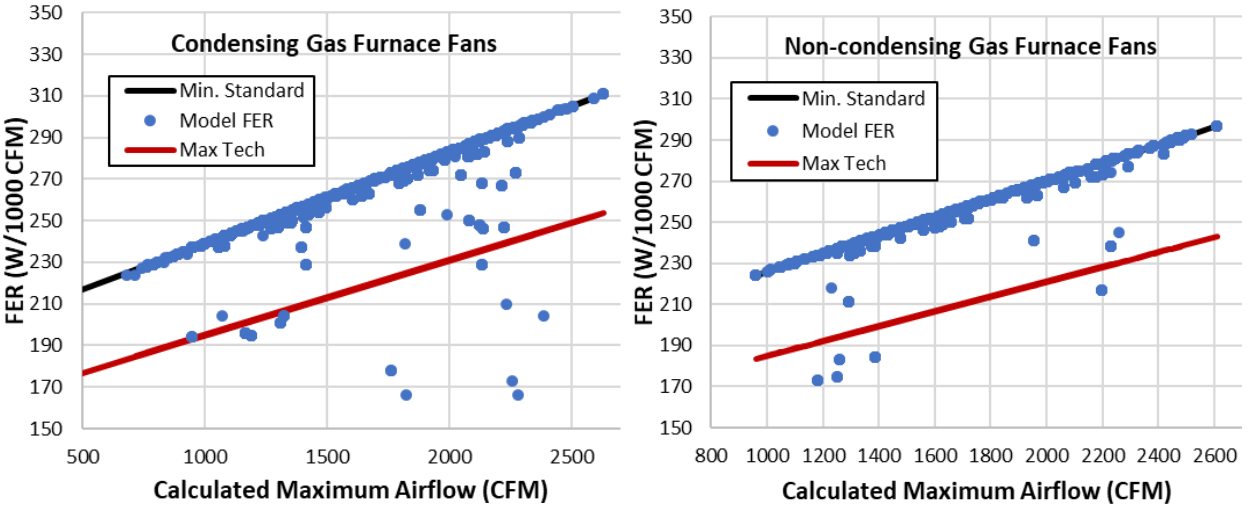

Figure 1: Furnace fan FER (W/1000 CFM) vs. calculated maximum airflow for condensing (left) and non-condensing (right) non-weatherized gas furnace fans. Black and red lines represent the current minimum standard and the max-tech level from the previous rulemaking analysis, respectively.

We encourage DOE to further analyze technology options considered in the last rulemaking. DOE's prior analysis suggested that a constant-torque DC brushless permanent magnet (BPM) motor and multi-staging were needed to reach Efficiency Level (EL) 4, the adopted standard level for the majority of product classes, and that high-efficiency constant-airflow BPM motors, multi-staging, and backward-inclined impellers were needed to reach the max-tech level.[5] However, the most efficient furnace fan for non-condensing, non-weatherized gas furnaces shown in Figure 1, with an FER of 173 compared to a minimum standard FER of 234, is a single-stage furnace.[6] We understand based on conversations with manufacturers that single-stage furnaces are indeed still common in the marketplace. Further, DOE noted in the RFI that certain technology options, in particular constant-airflow BPM motors, are incorporated in models at both baseline and max-tech ELs;[7] this suggests FER reductions of approximately 20% are achievable with similar motor technology. These insights suggest significant efficiency improvements beyond the scope of multi-stage, constant-airflow BPM furnace fans are being implemented in current products. Examination of the high-efficiency models in Figure 1 did not yield any defining furnace characteristics; both high-efficiency and baseline models from the same manufacturers could be found at the same heating output, cabinet size, flow direction, temperature rise, etc.

Further, DOE's prior analysis suggested backward-inclined impellers would yield a 10% reduction in FER based on a 15-30% reduction in input power at peak speeds.[8] These impellers are inexpensive, with estimated component costs of less than $20 based on DOE's previous analysis.[9] We understand that residential furnace fans using backward-inclined impellers are on the market but that they are uncommon. We encourage DOE to consider evaluating an EL that reflects incorporating backward-inclined impellers with current baseline-level technologies (e.g., single-stage, constant-torque BPM).

[5]EERE-2010-BT-STD-0011-0111, p. 5-13, 14. https://www.regulations.gov/document/EERE-2010-BT-STD-0011-0111
[6]Coleman TL8E, https://files.hvacnavigator.com/p/5523524-ctg-c-0920.pdf
[7]86 Fed. Reg. 66469.
[8]EERE-2010-BT-STD-0011-0111, p. 3-35, 36. https://www.regulations.gov/document/EERE-2010-BT-STD-0011-0111
[9]EERE-2010-BT-STD-0011-0111, p. 5-29. https://www.regulations.gov/document/EERE-2010-BT-STD-0011-0111

Overall, DOE should continue looking at high-efficiency BPMs, multi-staging, and backward-inclined impellers along with additional technology options that may drive improved efficiency.

We encourage DOE to analyze airflow-related technology options that were screened out in the last rulemaking. In the July 2014 Final Rule, DOE screened out fan housing and airflow path design modifications since these may increase envelope sizes, which could adversely impact practicability and product utility.[10] However, our understanding, based on manufacturer conversations and a review of recent innovation (e.g., patent filings), is that a significant portion of the energy efficiency gains observed in Figure 1 may come from improved housings, blower wheels, and airflow design. These technological innovations focus on increasing airflow (the denominator of FER) by reducing airflow restrictions. Thus, we encourage DOE to investigate additional technologies, included those related to reducing airflow restrictions, in their upcoming analysis.

We support DOE implementing a FER correction factor for "heating only" furnace fans. A test procedure waiver was recently granted for basic models which could not be tested at the external static pressure (ESP) range required in Appendix AA.[11] The RFI states that DOE is considering whether separate product classes are warranted for these "heating only" furnace fans. We are concerned that furnace fans operating under the current test procedure waiver can more easily meet the existing standards since they are tested at a lower ESP. In lieu of separate product classes, we support using an FER correction factor to equate low ESP FER measurements to the requirements of Appendix AA[12] as discussed previously in comments from the CA IOUs.[13] We believe a correction factor would help ensure that "heating only" furnace fans will have to meet equally stringent standards as other furnace fans.

Thank you for considering these comments.

Sincerely,

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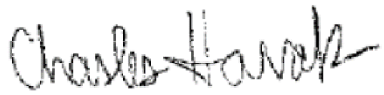
[10] 79 Fed. Reg. 38130, 38153.
[11] 86 Fed. Reg. 13530, 13531.
[12] 79 Fed. Reg. 523.
[13] EERE-2020-BT-TP-0041-0004, https://www.regulations.gov/comment/EERE-2020-BT-TP-0041-0004



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(On behalf of its low-income clients)