

Appliance Standards Awareness Project  
Alliance to Save Energy  
National Consumer Law Center  
Natural Resources Defense Council

January 23, 2014

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-2010-BT-STD-0011 / RIN 1904-AC22: Notice of Proposed Rulemaking for Furnace Fans**

Dear Ms. Edwards:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), Alliance to Save Energy (ASE), National Consumer Law Center (NCLC), and Natural Resources Defense Council (NRDC) on the notice of proposed rulemaking (NOPR) for furnace fans. 78 Fed. Reg. 64068 (October 25, 2013). We appreciate the opportunity to provide input to the Department.

DOE has proposed strong efficiency standards for furnace fans that will achieve large energy savings for the nation and electricity bill savings for consumers. Manufacturers have raised concerns that the proposed standards do not reflect the performance of the assumed design options. We encourage DOE to confirm the fan energy rating (FER) equations and to adopt standards based on constant-torque brushless permanent magnet (BPM) motors and multi-stage/modulating controls for the major product classes. Constant-torque BPM motors are already widely employed in furnace fans and are essentially “drop-in” replacements for PSC motors. We therefore encourage DOE to adopt a 3-year compliance date rather than the 5 years proposed in the NOPR.

**We strongly support standards based on performance equivalent to furnace fans with constant-torque BPM motors and multi-stage/modulating controls for the major product classes.**<sup>1</sup> DOE found that constant-torque BPM motors with multi-stage/modulating controls reduce furnace fan electricity consumption by more than 50%.<sup>2</sup> DOE estimates that the standards proposed in the NOPR would save 4.58 quads of energy from purchases over 30 years and would yield net present value savings for consumers of \$8.5-\$26.2 billion. Average LCC savings for consumers for furnace fans in non-weatherized non-condensing and condensing furnaces are

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<sup>1</sup> The NOPR proposes standards based on constant-torque BPM motors and multi-stage/modulating controls for non-weatherized non-condensing, non-weatherized condensing, and weatherized non-condensing gas furnaces, electric furnaces/modular blowers, and manufactured home electric furnaces/modular blowers.

<sup>2</sup> Technical Support Document. Tables 7.8.1, 7.8.2, 7.8.3, 7.8.4.

\$474 and \$371, respectively.<sup>3</sup> In addition to achieving large energy savings and electricity bill savings for consumers, constant-torque BPM motors with multi-stage/modulating controls can improve comfort by doing a better job of providing sufficient airflow in the field and reducing cycling in heating mode.

**We encourage DOE to confirm that the FER equations reflect the performance of the assumed design options.** At the DOE public meeting on December 3, manufacturers stated that the FER equations for the efficiency levels analyzed do not reflect the assumed design options. Several manufacturers also stated that they have products that employ the design options on which the proposed standards are based and yet their products would not meet the proposed standards. We encourage DOE to conduct additional testing and/or analyze manufacturer data to confirm that the efficiency levels reflect the performance of the assumed design options. However, it is important to note that even among furnace fans of the same airflow capacity with the same motors and controls, we would expect a range of efficiency levels due to differences in housing and airflow path design. Therefore, appropriate standard levels based on performance equivalent to furnace fans with constant-torque BPM motors and multi-stage/modulating controls may eliminate some furnace fans that employ the assumed design options but which have poor housing design and/or airflow path design.

**We support the inclusion of modular blowers in the scope of coverage.** At the DOE public meeting on December 3, manufacturers suggested that modular blowers should be excluded from this rulemaking. We understand that the strip heat used with electric furnaces is often installed in the field, which means that an “electric furnace” is often sold by the manufacturer as a “modular blower.” DOE found that non-weatherized and manufactured home electric furnace/modular blower furnace fans represent 10% of all furnace fan sales.<sup>4</sup> Excluding modular blowers from the scope of coverage would not only reduce energy savings from this rulemaking, but would also create a loophole—manufacturers would have an incentive to sell electric furnaces as modular blowers (without strip heat installed) such that they would no longer have to comply with the furnace fan standards. DOE’s proposal to exclude blower-coil central air conditioners and heat pumps could create a similar loophole, which we describe below.

**We encourage DOE in the future to adopt standards and/or test procedure changes to drive improved efficiency of furnace fans that are part of single-package and blower-coil central air conditioners and heat pumps.** We are disappointed that DOE has excluded furnace fans that are part of single-package and blower-coil central air conditioners and heat pumps from the scope of coverage in the NOPR. As we explained in our comments on the preliminary technical support document, since the test procedures for SEER and HSPF do not incorporate realistic external static pressure values, these metrics neither adequately capture fan energy consumption nor ensure adequate airflow in the field.<sup>5</sup> In addition, SEER and HSPF do not account for fan operation in constant circulation mode, which means that these metrics are not capturing furnace fan energy use in all modes of operation. Further, we understand that it is not uncommon for heat pump indoor units to be installed and operated as electric furnaces (without an outdoor unit). There is no SEER or HSPF rating that applies to these heat pump indoor units when they are

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<sup>3</sup> 78 Fed. Reg. 64070.

<sup>4</sup> Technical Support Document, p. 3-3.

<sup>5</sup> Comment ID: EERE-2010-BT-STD-0011-0055.

installed without an outdoor unit. If a heat pump indoor unit with a PSC motor is less expensive than an electric furnace/modular blower with a constant-torque BPM motor, there will be greater incentive to install heat pump indoor units intended to operate as electric furnaces.

While we recognize that it may be too late in the current rulemaking to include furnace fans that are part of single-package and blower-coil central air conditioners and heat pumps in the scope of coverage, we encourage DOE to address furnace fan efficiency in these products in the future through one of two options. The first option would be to amend the test procedures for central air conditioners and heat pumps to incorporate more realistic external static pressure values. A test procedure with more realistic external static pressure values would both better capture fan energy consumption and better ensure adequate airflow in the field. The second option would be to include furnace fans that are part of single-package and blower-coil central air conditioners and heat pumps in a future rulemaking for furnace fans. If DOE pursued this option, it would be less critical to change the external static pressure values in the central air conditioner and heat pump test procedures since fan efficiency would be addressed through standards for furnace fans.

**We encourage DOE to require that manufacturers report power consumption in each operating mode ( $E_{Max}$ ,  $E_{Heat}$ , and  $E_{Circ}$ ) and HCR in addition to FER and  $Q_{Max}$ .** As the California IOUs explain in their comments in response to the NOPR, data on furnace fan power consumption in different operating modes will help utilities and other energy efficiency program implementers to develop targeted incentive programs for high-efficiency furnace fans. We do not believe that reporting these additional values would represent a significant burden since these data will already be generated as part of the test procedures.

**We believe that DOE has thoroughly analyzed motor lifetime and repair costs.** We are not aware of any data indicating that constant-torque BPM motors have a shorter lifetime than PSC motors. In the analysis for the NOPR, DOE included additional labor hours to repair constant-torque and constant-airflow BPM motors and higher equipment costs for BPM motors. DOE also assumed that repair to electronics would occur more often for constant-torque BPM motors and especially for constant-airflow BPM motors compared to PSC motors with controls.<sup>6</sup>

**We encourage DOE to update the analysis to reflect recent survey data on use of constant circulation mode.** In the NOPR, DOE assumed that 11% of households nationally use constant circulation mode.<sup>7</sup> DOE also conducted a sensitivity analysis based on half as much use of constant circulation mode.<sup>8</sup> At the DOE public meeting on December 3, DOE cited a recent national survey that found that 19% of households frequently use constant circulation.<sup>9</sup> These recent survey data suggest that DOE's assumptions in the NOPR for hours spent in constant circulation mode are too conservative. We encourage DOE to update the analysis to reflect the recent survey data. We also encourage DOE to drop the sensitivity analysis conducted for the NOPR since the recent survey data suggest that actual use of constant circulation mode is higher (not lower) than that assumed in the NOPR. However, we note that even under the sensitivity

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<sup>6</sup> Technical Support Document. p. 8-D-4.

<sup>7</sup> NOPR Public Meeting Presentation. p. 58.

<sup>8</sup> 78 Fed. Reg. 64094.

<sup>9</sup> NOPR Public Meeting Presentation. p. 58.

scenario assuming half as much use of constant circulation mode (Scenario 3), the proposed standards still yield large life-cycle cost savings for consumers.<sup>10</sup>

**We believe that DOE has appropriately characterized manufacturer conversion costs.** At the DOE public meeting on December 3, manufacturers suggested that DOE's estimates of product conversion costs were too low. The Technical Support Document notes that DOE considered feedback from multiple manufacturers to determine product conversion costs at each efficiency level.<sup>11</sup> We would expect product conversion costs at the proposed efficiency levels to be relatively low for two reasons. First, we understand that constant-torque BPM motors are essentially "drop-in" replacements for PSC motors. In fact, multiple manufacturers offer constant-torque BPM motors that can replace PSC motors in the field.<sup>12</sup> Second, DOE estimates that in the base case, 25% and 41% of furnace fans for non-weatherized non-condensing and non-weatherized condensing gas furnaces, respectively, will already employ either constant-torque or constant-airflow BPM motors.<sup>13</sup>

**We encourage DOE to adopt a compliance date of 3 years after publication of the final rule.** In the NOPR, DOE proposed a 5-year compliance date.<sup>14</sup> The proposed standards in the NOPR are based on constant-torque BPM motors and multi-stage/modulating controls, which are technologies that are already widely employed in current furnace fans. DOE estimates that for all furnace types, constant-torque BPM motors have a 10% market share, and constant-airflow BPM motors represent 34% of the market.<sup>15</sup> As noted above, we understand that constant-torque BPM motors are essentially "drop-in" replacements for PSC motors. Therefore, we would not expect that the proposed standards would require significant product re-design. In addition, DOE concluded that the proposed standards would not require any capital conversion costs since no new tooling or equipment would be necessary.<sup>16</sup> We encourage DOE to adopt a 3-year compliance date, which is typical for DOE rulemakings. Three years appears to be feasible for manufacturers and would yield greater national energy savings.

Thank you for considering these comments.

Sincerely,



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Appliance Standards Awareness Project



Rodney Sobin  
Director of Research and Regulatory Affairs  
Alliance to Save Energy

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<sup>10</sup> Technical Support Document. Table 8-H.3.4.

<sup>11</sup> *Ibid.* p. 12-17.

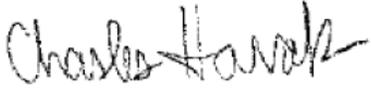
<sup>12</sup> See, for example: [http://www.usmotors.com/Our-Products/Catalogs-And-Literature/Literature/~media/USMotors/Documents/Literature/Products/Training\\_RescueEcoTech.ashx](http://www.usmotors.com/Our-Products/Catalogs-And-Literature/Literature/~media/USMotors/Documents/Literature/Products/Training_RescueEcoTech.ashx).

<sup>13</sup> Technical Support Document. Tables 8.4.1, 8.4.3.

<sup>14</sup> 78 Fed. Reg. 64103.

<sup>15</sup> *Ibid.* p. 3-28.

<sup>16</sup> *Ibid.* p. 12-16.



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