

Appliance Standards Awareness Project  
American Council for an Energy-Efficient Economy  
Consumer Federation of America  
National Consumer Law Center, on behalf of its low-income clients  
Natural Resources Defense Council  
Northwest Energy Efficiency Alliance

May 16, 2022

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

**RE: Docket Number EERE–2019–BT–TP–0037/RIN 1904–AE83: Notice of Proposed Rulemaking for Test Procedure for Consumer Boilers**

Dear Ms. Hegarty:

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), National Consumer Law Center, on behalf of its low-income clients (NCLC), Natural Resources Defense Council (NRDC), and Northwest Energy Efficiency Alliance (NEEA) on the notice of proposed rulemaking (NOPR) for test procedure for consumer boilers. 87 Fed. Reg. 14622 (March 15, 2022). We appreciate the opportunity to provide input to the Department.

**We encourage DOE to establish test procedures for air-to-water and water-to-water heat pumps.** In the NOPR, DOE tentatively concluded that air-to-water and water-to-water heat pumps meet the definitional criteria to be classified as a consumer boiler.<sup>1</sup> However, although these products meet the definition of consumer boilers and are commercially available in the U.S.,<sup>2</sup> DOE has tentatively determined that they are not subject to the current DOE standards for consumer boilers due to the lack of a federal test procedure. We encourage DOE to expeditiously develop test procedures and define performance metrics for these products so that consumers have access to efficiency ratings based on a standardized test procedure and the Department can evaluate potential energy conservation standards in the future. While hydronic systems are the main heating means in only 8% of U.S. homes overall, they are the

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<sup>1</sup> 87 Fed. Reg. 14625.

<sup>2</sup> Available from various manufacturers. See for example, <https://www.nordicghp.com/product/nordic-products/air-source-heat-pump/air-to-water/> and <https://www.aermec.us/products-2/air-to-water-units/ank/?hsCtaTracking=0259f429-7ede-4e1d-8281-5bd68c3822d5%7C435b5df9-9045-48b0-9e99-c6436b02a785>.

main heating means for 28% of households in the Northeast.<sup>3</sup> State policies, market and technology maturation, and emissions reduction imperatives are likely to continue motivating a shift towards high efficiency electricity-based heating.

While AHRI 550/590 is appropriate for evaluating the performance of consumer air-to-water heat pumps, it is only applicable for water-to-water heat pumps with a capacity greater or equal to 135,000 Btu/h; ASHRAE/ANSI/AHRI/ISO Standard 13256-2 is therefore more appropriate for consumer water-to-water heat pumps. The process of establishing a seasonal performance rating analogous to the Annual Fuel Utilization Efficiency (AFUE) could be expedited by referring to established international standards, such as EN 14511 and EN 14825, for conditions and calculation methods to determine seasonal performance ratings.

**We urge DOE to further investigate appropriate return water temperatures (RWTs) that may more accurately capture relative boiler efficiencies.** In the current test procedure, the required nominal RWT is 120°F ± 2°F for condensing boilers and 120°F to 124°F for non-condensing boilers. In response to the May 2020 request for information (RFI), DOE received comments that recommended that the Department require condensing boilers to be tested at two separate RWTs. DOE responded in the NOPR and tentatively determined that the single RWT specified in the current test procedure is reasonably representative given the wide range of potential operating conditions.<sup>4</sup> However, as seen in Figure 1 below from the April 2022 preliminary technical support document (PTSD), the relative efficiencies of condensing boiler models can vary significantly at different RWTs. Thus, we believe that the single temperature specification of 120°F may not be a good predictor of efficiency at other RWTs and testing at multiple RWTs may help in differentiating among different condensing boiler models. Therefore, we encourage DOE to consider requiring condensing boilers to be tested at multiple RWTs, which would provide consumers with a more accurate relative ranking of boiler efficiencies. Additionally, we encourage DOE to consider testing non-condensing boilers at a higher temperature. For example, DOE could consider requiring testing non-condensing boilers at 158°F and condensing boilers at 108°F and 158°F to reflect “low” and “high” RWT applications as outlined in the April 2022 PTSD.<sup>5</sup>

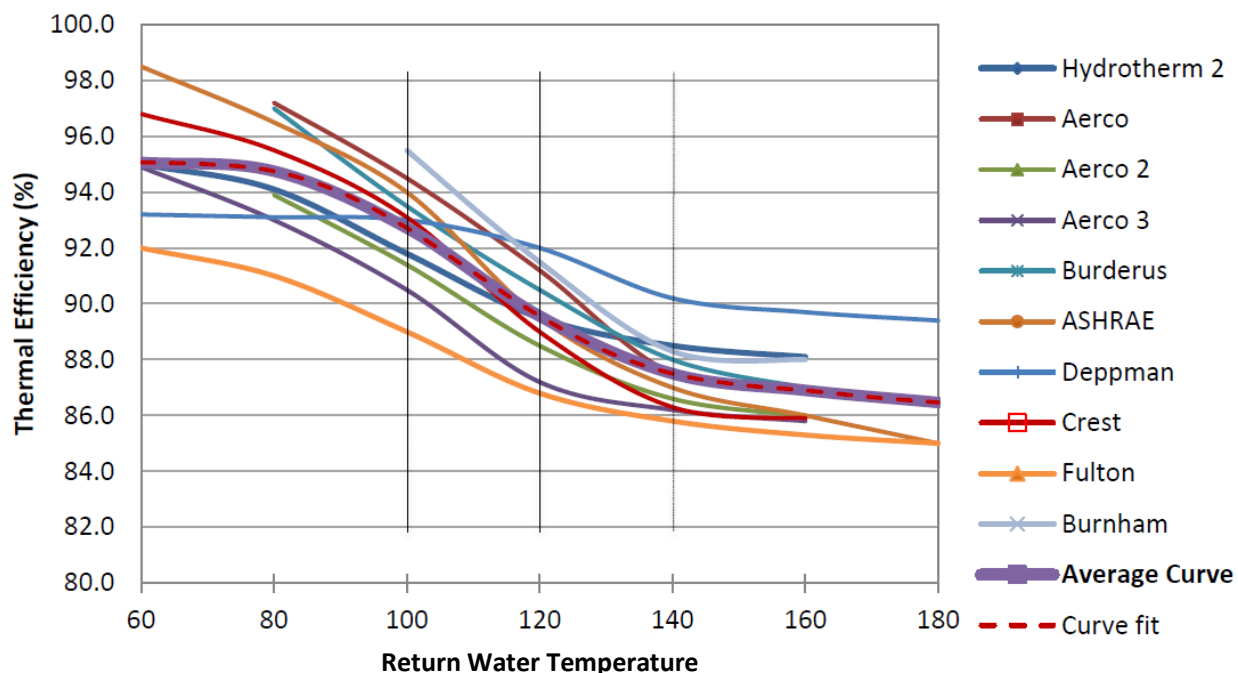
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<sup>3</sup> U.S. Energy Information Administration 2015 Residential Energy Consumption Survey (RECS). Note that RECS data does not differentiate hydronic heating between hot water and steam systems.

<sup>4</sup> 87 Fed. Reg. 14633.

<sup>5</sup> April 2022 Preliminary Technical Support Document for Consumer Boilers. <https://www.regulations.gov/document/EERE-2019-BT-STD-0036-0021>. p. 7-9.

**Figure 1. Boiler efficiency vs. return water temperature for condensing boilers<sup>6</sup>**



**We encourage DOE to reconsider the range of allowable ambient temperature, particularly for non-condensing boilers.** Currently, the test procedure specifies that the ambient temperature during testing must be between 65°F and 100°F for non-condensing boilers and between 65°F and 85°F for condensing boilers. We believe that the range of allowable ambient temperatures for non-condensing boilers is not representative of field conditions and is too broad to accurately measure energy use during a representative average use cycle. Additionally, we do not believe that separate ambient conditions are necessary for non-condensing and condensing boilers. In the NOPR, DOE did not propose any changes to the ambient test condition requirements, citing a lack of sufficient evidence that changes in ambient conditions within the current allowable bounds affect AFUE.<sup>7</sup> However, we understand that a variation in ambient temperature of 20°F can affect efficiency by over 0.5%.<sup>8</sup> Thus, we encourage DOE to require the range of allowable ambient temperature to be between 65°F and 85°F for both non-condensing and condensing boilers in order to ensure consistency in ratings across products.

**We encourage DOE to study the impact of combustion airflow settings on AFUE ratings.** In the RFI, DOE requested comment on whether more specific instructions are needed for setting the excess air ratio, flue O<sub>2</sub> percentage, and/or flue CO<sub>2</sub> percentage. In the NOPR, DOE tentatively concluded that it lacks sufficient evidence that combustion airflow settings would result in

<sup>6</sup> Ibid. p. 7B-11.

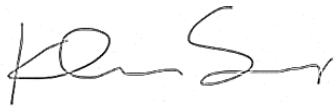
<sup>7</sup> 87 Fed. Reg. 14631-14632.

<sup>8</sup> <https://www.cedengineering.com/userfiles/Improving%20Energy%20Efficiency%20Boilers%20R1.pdf>.

more representative AFUE ratings than the current test procedure approach.<sup>9</sup> However, excess air, which can be determined by flue gas O<sub>2</sub> and CO<sub>2</sub> concentrations, affects combustion efficiency. For example, for commercial boilers, boiler efficiency can be increased by 1% for each 15% reduction in excess air.<sup>10</sup> Thus, establishing guidance for combustion airflow settings could provide a more accurate understanding of the relative ranking of products. We therefore encourage DOE to investigate the efficiency impacts of combustion airflow settings and consider establishing criteria around those settings in the test procedure.

Thank you for considering these comments.

Sincerely,



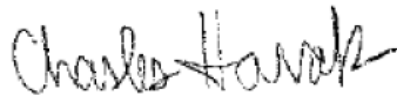
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<sup>9</sup> 87 Fed. Reg. 14633.

<sup>10</sup> <https://www.nrel.gov/docs/fy02osti/31496.pdf>.