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

October 13, 2023

Ms. Julia Hegarty
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–2019–BT–STD–0036/RIN 1904–AE82: Notice of Proposed Rulemaking for Energy Conservation Standards 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 energy conservation standards for consumer boilers. 88 Fed. Reg. 55128 (August 14, 2023). We appreciate the opportunity to provide input to the Department.

We strongly support the proposed standards for consumer boilers. Space heating is the biggest utility cost for most U.S. households and a significant source of emissions that contribute to climate change and harm human health. DOE has proposed strong standards for consumer boilers that would ease burdensome energy bills for consumers and help to achieve climate goals. The proposed standards would result in about 0.7 quads of energy savings while reducing carbon dioxide emissions by nearly 40 million metric tons over 30 years of sales.[1] Additionally, the proposed standards would provide net present value savings for consumers of up to $2.3 billion. DOE estimates that the proposed standards for gas-fired hot water boilers would save consumers almost $800 on average over the lifetime of the equipment; annual

[1] 88 Fed. Reg. 55130.

utility bill savings would be $123 per year on average relative to the current standards.[2] For oil-fired hot water and steam boilers, consumers would see average life-cycle cost savings of $666 and $310, respectively.[3] The proposed standards would particularly benefit renters, who are disproportionately low-income and rarely get to choose their home's heating equipment. Furthermore, the benefits to consumers substantially outweigh the costs to manufacturers. DOE notes that the net present value of consumer benefits, even at the more conservative discount rate, is more than nine times higher than the maximum costs to manufacturers.[4] We therefore strongly support the proposed standards and urge DOE to promptly publish a final rule.

We support DOE's decision to evaluate non-condensing and condensing boilers within a single product class. Consistent with the December 2021 final interpretive rule,[5] DOE did not consider non-condensing technology to constitute a performance-related "feature" that would warrant a separate product class.[6] We support DOE's decision to consider condensing and non-condensing boilers within a single product class because both products use gas as the primary fuel source and provide the same utility to consumers.

Condensing technology for gas-fired hot water boilers is proven and widespread. The most significant energy and cost savings from the proposed rule would come from amended standards for gas-fired hot water boilers, which make up the vast majority of the boilers market. The proposed efficiency level for these products would effectively require condensing boilers, which have been available for decades. The current standards in Canada require condensing levels for all household gas-fired hot water boilers.[7] DOE estimates that almost two-thirds of sales of gas-fired hot water boilers in the U.S. today are condensing models, and more than half of current sales already meet the proposed standard levels.[8] The proposed standards would ensure that all consumers benefit from the more efficient condensing technology.

DOE appropriately accounted for jacket losses and domestic hot water heating in the energy use analysis. The current test procedure assigns a value of zero to the jacket loss factor for all boilers that are non-weatherized since these products are assumed to be located in conditioned spaces.[9] For the energy use analysis, DOE accounted for the impact of jacket losses on energy use, but only when the boiler is located in a non-conditioned space, such as an unconditioned basement or garage.[10] Similarly, while the test procedure does not account for the energy used

[2] 88 Fed. Reg. 55185.
[3] 88 Fed. Reg. 55186.
[4] 88 Fed. Reg. 55207.
[5] https://www.regulations.gov/document/EERE-2018-BT-STD-0018-0148.
[6] 88 Fed. Reg. 55142.
[7] https://www.regulations.gov/document/EERE-2019-BT-STD-0036-0043. pp. 3-14 – 3-16.
[8] Ibid. p. 8I-7.
[9] 88 Fed. Reg. 55145.
[10] 88 Fed. Reg. 55159.

by boilers to provide domestic hot water heating, DOE's analysis included the energy consumption for the fraction of consumer boilers that are used to provide hot water.[11] We believe that this methodology is appropriate given that the purpose of DOE's energy use analysis is to determine the energy consumption of boilers in the field across a variety of installation scenarios – including a range of climate zones, building characteristics, and applications. Specifically, since jacket losses (for boilers located in non-conditioned spaces) and the energy used to provide domestic hot water affect real-world operating costs, it is appropriate for the energy use analysis to incorporate these impacts.

We believe that DOE has thoroughly evaluated the annual energy consumption of condensing boilers. Since return water temperature has a significant impact on the operational efficiency of condensing boilers, for the NOPR, DOE conducted a detailed analysis of the variability of return water temperatures based on binned weather data for each household or building installation.[12] DOE then accounted for the differences in operational efficiency by adjusting the AFUE of the sampled boiler based on an average system return water temperature. We believe that this methodology provides a robust characterization of the variability in boiler operational efficiency for individual installations.

Condensing boilers can operate efficiently in replacement installations. DOE found that condensing boilers are able to operate in condensing mode much of the time, even in replacement scenarios with existing high-temperature hydronic distribution systems.[13] The NOPR notes that existing heating systems that are intended for higher temperatures are typically significantly oversized and designed to meet the heating load on the coldest day. Thus, DOE estimated that for at least 80% of the heating season, most consumer boilers would be required to consume 50% or less energy than the energy needs at the designed heating maximum. Moreover, condensing boilers use outdoor reset controls to adjust the water temperature based on the heating load. DOE found that for "a large majority" of the heating season, a boiler can lower the water temperature so that return temperatures are below combustion gas dewpoint levels (i.e., so that the boiler can operate at or near its rated efficiency).[14] In addition, modulating burners, which are a typical feature of condensing boilers, allow for part-load operation which increases the overall efficiency of the unit.

DOE thoroughly evaluated installation costs for consumer boilers for the proposed rule. Specifically, we believe that DOE has appropriately evaluated the installation costs associated with switching from a non-condensing to a condensing boiler, including accounting for flue venting, concealment of PVC vent pipes, and installations with an orphaned water heater.[15] In

[11] 88 Fed. Reg. 55160.
[12] 88 Fed. Reg. 55158-55159.
[13] Ibid.
[14] 88 Fed. Reg. 55159.
[15] https://www.regulations.gov/document/EERE-2019-BT-STD-0036-0043. pp. 8D-12 – 8D-16.

addition, for all condensing boilers, DOE incorporated the costs associated with condensate removal, including installing a condensate pump and condensate freeze protection, when applicable. DOE also accounted for costs that would be incurred in the base case for certain homes associated with chimney relining and vent resizing, for example. We believe that DOE's analysis of installation costs is comprehensive and reasonable for boiler installations.

We believe that DOE's assignment of efficiency levels in the no-new-standards case reasonably reflects actual consumer behavior. We note that the assignment of boiler efficiency is not entirely random. Rather, DOE used historical shipment data from the Air-Conditioning, Heating, and Refrigeration Institution (AHRI) and Heating, Air-Conditioning, & Refrigeration Distributers International (HARDI) to determine the market share of each efficiency level at the State level. Then, within each state, DOE used the 2019 American Home Comfort Study (AHCS) to account for subgroups that could select higher efficiency boilers more often; in particular, DOE utilized these data to preferentially assign higher-efficiency boilers to homes with higher square footage.[16,17]

Furthermore, we agree with DOE that assigning efficiencies based solely on cost-effectiveness would not accurately reflect real-world installations. As DOE notes in the NOPR, there are various market failures as well as aspects of consumer preference that significantly impact how boilers are chosen by consumers.[18] The installation of a boiler is done very infrequently (the average lifetime of a boiler is 24.6 years); information about the purchase price, installation cost, and projected energy costs of boilers is not always transparent; and consumers are likely to make decisions that do not result in the highest net present value for their specific scenario. For example, DOE notes that consumers are often motivated by more than simple financial trade-offs and tend to underestimate the energy use of large energy-intensive appliances like boilers, resulting in less cost-effective purchases. Moreover, if a boiler breaks down in the middle of the winter, consumers often do not have the luxury to consider more efficient options. There are also often misaligned incentives in rental properties where the landlord purchases and installs the boiler while the renter is responsible for paying the utility bill. Similarly, contractors install a large share of boilers in replacement situations and can often influence the type of model purchased. We therefore believe that DOE's assignment of efficiency levels in the no-new-standards case is sufficiently representative of actual consumer behavior.

We support the development of a test procedure for air-to-water heat pumps. In DOE's final rule for test procedures for consumer boilers, the Department concluded that air-to-water heat

[16] Data from the 2019 AHCS indicated that households with larger square footage were more likely to have higher-efficiency boilers.
[17] 88 Fed. Reg. 55166-55167.
[18] 88 Fed. Reg. 55167-55169.

pumps (AWHPs) meet the definitional criteria to be classified as a consumer boiler.[19] However, DOE determined that they are not subject to the current DOE standards for consumer boilers due to the lack of an applicable federal test procedure. We understand that DOE and the Environmental Protection Agency (EPA) plan to establish a test procedure for AWHPs.[20] Developing a representative test procedure for AWHPs would enable consumers to have access to efficiency ratings based on a standardized test procedure and could allow for potential Federal energy conservation standards in the future. Thus, we strongly support these efforts.

Thank you for considering these comments.

Sincerely,

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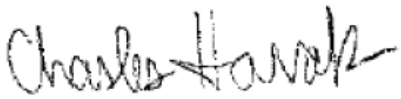

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[19] 88 Fed. Reg. 15516. (March 13, 2023).
[20] ENERGY STAR Residential Boilers Discussion Guide. https://www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Residential%20Boilers%20Discussion%20Guide_0.pdf?_gl=1*103ldbi*_ga*MTAwNjkzMjcyOS4xNjcwNDI3MzMw*_ga_S0KJTVVLQ6*MTY4NTk4ODU4Ny4yODEuMS4xNjg1OTg5MzA5LjAuMC4w.