

Appliance Standards Awareness Project
American Council for an Energy-Efficient Economy
Natural Resources Defense Council
Rocky Mountain Institute

August 1, 2022

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–2021–BT–STD–0027/RIN 1904–AD34: Notice of Proposed Rulemaking for Energy Conservation Standards for Commercial Water Heating Equipment

Dear Ms. Hegarty:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), Natural Resources Defense Council (NRDC), and Rocky Mountain Institute (RMI) on the notice of proposed rulemaking (NOPR) for energy conservation standards for commercial water heating equipment. 87 Fed. Reg. 30610 (May 19, 2022). We appreciate the opportunity to provide input to the Department.

We strongly support DOE’s proposed standards for commercial water heaters, which would significantly improve the minimum efficiency of gas-fired commercial water heaters. For the NOPR analysis, DOE evaluated potential amended standards for commercial gas-fired storage water heaters, residential-duty gas-fired storage water heaters, and commercial gas-fired instantaneous water heaters and hot water supply boilers. DOE proposed to adopt Trial Standard Level (TSL) 3 for these equipment classes, which would set thermal efficiency standards that reflect condensing technology. DOE estimates that the proposed standards would save an estimated 0.7 quads of energy and result in cumulative net present value savings of up to \$1.5 billion over 30 years of sales.¹ Additionally, the proposed standards would result in nearly 40 million metric tons of carbon dioxide emissions reductions over 30 years of sales.² Updated standards for commercial gas-fired water heaters are long overdue since they have not been amended since 2001. We therefore urge DOE to promptly complete a final rule.

We agree with DOE’s approach for analyzing equipment classes and representative equipment for the NOPR. At the public meeting on June 23, 2022, a representative from Spire,

¹ 87 Fed. Reg. 30708-30709.

² 87 Fed. Reg. 30711.

Inc. raised concerns with DOE's methodology of analyzing certain equipment types jointly. However, we believe that DOE's methodology in these cases was appropriate. For example, based on extensive review of the current market and product literature, DOE did not find significant differences in the design and use of commercial gas-fired storage water heaters and storage-type instantaneous water heaters and thus analyzed amended energy conservation standards for the two equipment classes in conjunction.³ Similarly, DOE analyzed amended standards for instantaneous water heaters and hot water supply boilers with storage volumes less than 10 gallons and greater than or equal to 10 gallons together since the two equipment classes would not have significantly different costs and benefits.⁴ Finally, due to a number of shared features, tankless water heaters and circulating water heaters and hot water supply boilers are considered part of the same equipment class. However, in recognition of certain design differences, DOE analyzed "tankless water heaters" and "circulating water heaters and hot water supply boilers" as two separate kinds of representative equipment and presented separate analytical results in the NOPR.⁵

Additionally, DOE used a representative capacity to analyze specific equipment in detail for each equipment category. DOE evaluated models on the market and held discussions with manufacturers to select equipment that would appropriately represent the products within given equipment categories.⁶ For classes that contained comparable equipment with similar components and features, the selected representative equipment served as a basis for the engineering analysis and cost-efficiency relationships. As DOE noted in the NOPR, a single representative equipment capacity may not represent every input capacity or storage volume; however, selecting representative equipment allows for the analysis to be completed feasibly while still being sufficiently representative. Thus, we believe DOE's analysis of equipment is reasonable and sufficiently representative of the products available in the market.

We encourage DOE to evaluate gas absorption heat pump water heaters (HPWHs) as a potential max-tech efficiency level for commercial gas storage water heaters. DOE considered gas absorption HPWHs as a technology option for the NOPR analysis but ultimately screened them out due to the lack of commercial availability.⁷ However, there appear to be gas-fired heat pump models on the market that can provide both space and water heating.⁸ Thus, we encourage DOE to evaluate these models as a potential max-tech efficiency level.

DOE thoroughly evaluated installation costs for commercial water heating equipment in the NOPR analysis. We understand that venting systems and materials for condensing water heaters are different from those for non-condensing water heaters and can be complex to install in certain applications. For the NOPR, DOE evaluated various scenarios associated with installation of condensing water heating equipment, such as the removal of existing venting

³ 87 Fed. Reg. 30631.

⁴ 87 Fed. Reg. 30623.

⁵ <https://www.regulations.gov/document/EERE-2021-BT-STD-0027-0001>. p. 5-4.

⁶ 87 Fed. Reg. 30636.

⁷ <https://www.regulations.gov/document/EERE-2021-BT-STD-0027-0001>. p. 4-5.

⁸ See <https://www.robur.com/en-us/products/gahp-a>.

systems and installation of new venting materials, and estimated the cost impact of such scenarios.⁹ We believe that DOE's analysis of installation costs is comprehensive and reasonable for a wide variety of condensing water heating equipment installations.

We believe that DOE's assignment of efficiency levels in the no-new-standards case

reasonably reflects actual consumer behavior. At the public meeting on June 23, 2022, a representative from Spire, Inc. argued that the DOE analysis is flawed by assigning efficiencies in the no-new-standards case randomly without reflecting economic considerations.¹⁰ However, as DOE describes in the NOPR, there are various market failures as well as aspects of consumer preference that significantly impact how products are chosen by consumers, which means that assigning efficiencies for given installations based solely on economic factors such as life-cycle cost or payback period would not reflect actual consumer behavior.¹¹ For example, in commercial settings, there are often misaligned incentives, where a building owner chooses the equipment while the tenant is responsible for paying the energy costs. Additionally, energy efficiency metrics may not be as visible to investment managers, so firms may be biased towards more certain or familiar investment options. Furthermore, DOE noted in the 2022 supplemental response to comments for the Final Rule for commercial packaged boilers that buildings are likely to adopt a "like-for-like" equipment replacement with the same technology, even in scenarios where high-efficiency products would be expected to prevail.¹² In summary, there are various market failures in the commercial and industrial sectors that add complexity to the decision-making process and result in an under-investment in energy efficiency. Thus, purchasers are likely to make decisions that do not result in the highest net present value for their specific scenario. We therefore believe that DOE's assignment of efficiency levels in the no-new-standards case is sufficiently representative of actual consumer behavior.

We encourage DOE to evaluate heat pump technology as a technology option for electric

storage water heaters. In the NOPR analysis, DOE did not analyze thermal efficiency standards for electric storage water heaters because these units already approach 100% efficiency.¹³ Electric resistance water heaters cannot achieve efficiencies greater than 100%, but heat pump technology has the ability to increase the efficiency of electric storage water heaters significantly above 100%.¹⁴ However, given that DOE found only one commercial integrated heat pump model on the market, DOE did not evaluate this technology in the NOPR analysis and instead plans to analyze standards for commercial HPWHs in a future rulemaking. Given the significant potential for energy savings using heat pump technology, we support DOE's plans to analyze commercial HPWHs in the future and urge the Department to evaluate heat pump technology as a technology option for the electric storage water heater equipment class.

⁹ <https://www.regulations.gov/document/EERE-2021-BT-STD-0027-0001>. p. 8D-5.

¹⁰ <https://www.regulations.gov/document/EERE-2021-BT-STD-0027-0013>. pp. 52-53.

¹¹ 87 Fed. Reg. 30671.

¹² 87 Fed. Reg. 23426. (April 20, 2022).

¹³ 87 Fed. Reg. 30623.

¹⁴ A.O. Smith's commercial integrated heat pump water heater has a rated coefficient of performance of 4.2. <https://www.hotwater.com/water-heaters/commercial/water-heaters/heat-pump/chp-120-fully-integrated-heat-pump/>.

In the NOPR, DOE solicits comment on whether integrated heat pump water heaters are capable of meeting the same hot water loads as commercial electric storage water heaters that use electric resistance elements.¹⁵ We note that, similar to residential HPWHs, the commercial integrated HPWH model on the market also has electric resistance elements that would allow it to meet the required hot water demand when heat-pump-only operation would not suffice.¹⁶ Notably, when both backup elements and the heat pump compressor are operating together in hybrid mode, this unit can achieve almost twice the heating capacity of a 12 kW commercial electric resistance water heater.¹⁷ Residential HPWHs are available across a wide range of storage volumes and first hour ratings,¹⁸ and we are not aware of any reason why commercial heat pump water heaters could not meet the same hot water loads as commercial electric storage water heaters.

Thank you for considering these comments.

Sincerely,



Kanchan Swaroop
Technical Advocacy Associate
Appliance Standards Awareness Project



Michael Waite, Ph.D., P.E.
Senior Manager, Buildings Program
American Council for an Energy-Efficient Economy



Joe Vukovich
Energy Efficiency Advocate
Natural Resources Defense Council



Mark Kresowik
Manager, Carbon-Free Buildings
Rocky Mountain Institute

¹⁵ 87 Fed. Reg. 30623.

¹⁶ <https://www.hotwater.com/water-heaters/commercial/water-heaters/heat-pump/chp-120-fully-integrated-heat-pump/>.

¹⁷ [https://www.hotwater.com/Resources/Literature/Spec-Sheets/Commercial-Heat-Pump/CHP-120-Commercial-Heat-Pump-Spec-Sheet-\(AOSZE55000\)/](https://www.hotwater.com/Resources/Literature/Spec-Sheets/Commercial-Heat-Pump/CHP-120-Commercial-Heat-Pump-Spec-Sheet-(AOSZE55000)/).

¹⁸ Out of the residential electric storage water heater models listed in the DOE Compliance Certification Database as of 7/11/22, there are 250 heat pump models with storage volumes ranging from 36 gallons to 107 gallons and first hour ratings ranging from 41 gallons to 95 gallons.