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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 20585-0121

Re: Energy Conservation Program: Energy Conservation Standards for Consumer Water Heaters, Docket # EERE-2017-BT-STD-0019

Dear Ms. Hegarty,

The Edison Electric Institute (EEI) appreciates the opportunity to submit comments on the U.S. Department of Energy's (Department or DOE) Energy Conservation Standards for Consumer Water Heaters Notice of Proposed Rulemaking (Proposed Rule) and associated webinar held on September 13, 2023. *See 88 Fed. Reg. 49,058 (July 28, 2023).*

EEI is the association that represents all U.S. investor-owned electric companies. EEI's member companies provide electricity for nearly 250 million Americans and operate in all 50 states and the District of Columbia. The electric power industry supports more than 7 million jobs in communities across the United States. EEI's member companies invest more than \$140 billion each year, on average, to make the energy grid smarter, cleaner, more dynamic, more flexible, and more secure; to diversify the nation's energy mix; and to integrate new technologies that benefit both customers and the environment.

EEI's member companies are leading a profound, long-term transformation in how electricity is generated, transmitted, and used. This clean energy transition already has resulted in significant greenhouse gas (GHG) emissions reductions, as the Environmental Protection Agency (EPA) has recognized, and more than 40 percent of our nation's electricity now comes from clean, carbon-free sources.

EEI's member companies are committed to getting the energy they provide as clean as they can as fast as they can, while keeping customer reliability and affordability front and center. Across the industry, electric companies are investing in a broad range of carbon-free technologies and approaches, with the goal of demonstrating these technologies so that they can help further reduce power sector emissions when they satisfy industry performance requirements and are affordable for customers.

EEL strongly supports the Department's energy conservation standards program for consumer products and certain commercial and industrial equipment. The program has been one of the most successful energy efficiency efforts ever created in large part due to its focus on setting standards that are technically feasible and economically justified for a large majority of consumers. The program's success can be largely attributed to its historical reliance on setting standard levels that ensure that customers who purchase the product save money. Indeed, many EEL members have been providing incentives and rebates for energy-efficient technologies such as electric heat pump water heaters and grid-interactive water heaters. Some members have been running efficiency programs for over 30 years.

As the Department moves toward the next phase of this rulemaking, it is critical that its analysis is methodologically sound and accounts for key issues and information that stakeholders have raised and provided. These issues will have significant impacts on consumers and the marketplace. As discussed in greater detail below, this includes creating a product category for electric resistance products that is separate from electric heat pump water heaters (HPWHs), creating closer parity in the efficiency standards across product categories to support and align with the Biden Administration's climate and clean energy goals, ensuring that DOE's analysis accurately reflects the costs of installing HPWHs, and ensuring that the equivalency factors applied to renewable electric generation reflect the ongoing energy transition. The Department's analysis also should accurately reflect the changes occurring in the power sector and the related reduction in emissions.

In addition, the Department's analysis should align with the Administration's climate and clean energy goals, as well as its related goals for electrification of end-uses in the residential sector. However, as discussed in greater detail below, the cumulative effect of the proposed rule will be to thwart these goals.

Comments

I. Supporting Innovation and Market-Neutrality, Electric Resistance Products Should Be a Separate Product Category with Efficiency Requirements Separate from Electric Heat Pump Water Heaters.

DOE should create separate product classes or require lower efficiency levels for electric resistance products rather than maintaining these technologies in the same product class with HPWHs. Doing so would allow newer technologies at more economic price points a chance to meaningfully compete in the marketplace and, in turn, would support the Administration's climate and clean energy goals.

DOE has shown such flexibility with many other regulated appliances, including consumer water heaters. Currently, there are 7 product classes of residential water heaters and there will be 13 product classes under the Proposed Rule. 88 *Fed. Reg.* 49,176-77. In addition, DOE has created more sub-classes of products based on rated storage volumes for many water heaters, resulting in 24 sets of proposed efficiency requirements (compared to 9 currently).

The economic and energy savings analysis in the updated TSD requires new efficiency standards for the vast majority of electric storage water heaters. The comparative increase in efficiency for electric resistance water heaters versus HPWHs is significant. Compared to the current minimum efficiency requirements, the proposed standards represent an efficiency increase of over 140 percent for 20-to-55-gallon electric storage water heaters and an increase of over 21 percent for 55-to-120-gallon electric storage water heaters that are already required to be heat pumps.

Importantly, only HPWHs would be able to achieve the proposed standards—effectively pushing out other technologies encompassed in the current product category. Rather than finalizing a proposal that would result in eliminating more economic and efficient options, DOE should create a separate product category with separate efficiency standards for electric resistance water heaters.¹

II. To Be Market-Neutral and Align with the Administration’s Climate and Clean Energy Goals, the Proposed Standards Across Water Heaters Should be In Closer Parity.

Beyond the issues within the class of electric water heaters discussed above, the Proposed Rule creates significant disparity between electric storage water heaters and gas- and oil-fired storage water heaters that ultimately will undermine, rather than align with, the Administration’s climate and clean energy goals. More specifically, the Biden Administration’s goal is to reduce economywide GHG emissions 50 to 52 percent from 2005 levels by 2030. In furtherance of this goal, the Administration has supported several programs aimed at increasing residential electrification.²

As noted above, the proposed standards represent an efficiency increase of 21 to 140+ percent for electric water heaters. By contrast, the Proposed Rule requires gas- and oil-fired storage water heaters to only increase their efficiency by 0.0 to 9.7 percent, depending on the size and water draw pattern. As discussed in the next section, the cost impact of this disparity is significant and places gas- and oil-fired storage water heaters a significant competitive

¹ The California IOU similarly has requested that DOE create a separate product class (or lower efficiency requirements) for split-system heat pump water heaters and 115-120 Volt “plug-in” heat pump water heaters. These are newer products in the U.S. marketplace, and under the current definitions and product classifications, many of these products (which have higher efficiency than electric resistance units but lower efficiency than being proposed by DOE for storage water heaters) will be banned from the marketplace. 88 *Fed. Reg.* at 49,080.

² See, e.g., U.S. Dep’t of Interior, President Biden’s Investing in America Agenda Funds Launch of New Tribal Electrification Program (Aug. 15, 2023), <https://www.doi.gov/pressreleases/president-bidens-investing-america-agenda-funds-launch-new-tribal-electrification> (announcing the launch of a new program that includes \$72.5 million in initial funding to help Tribal communities electrify homes); and U.S. Dep’t of Energy, Biden Harris Administration Opens Applications for States and Territories to Implement \$8.5 Billion for Home Energy Rebates as Part of Investing in America Agenda (July 27, 2023), <https://www.energy.gov/articles/biden-harris-administration-opens-applications-states-and-territories-implement-85-billion> (Secretary Granholm explains in the announcement that “[e]nergy savings and electrification upgrades like insulating your home, installing a heat pump, or upgrading to electric Energy Star appliances, lower monthly utility costs and lead to healthier homes. Today’s announcement opens the application period for states and territories to apply for our groundbreaking \$8.5 billion Home Energy Rebates programs. Americans living in energy efficient, electrified homes bring us one step closer to a clean, safer future.”).

advantage, particularly for consumers and builders whose decisions are strongly motivated by cost considerations.

Even before considering the other products on the marketplace that could be substituted for electric storage water heaters, the efficiency increase “mismatch” between electric storage and gas- and oil-fired storage water heaters will create significant market distortions. The consequence, in turn, will be that electric storage water heaters either will not be available or only will be available at a much higher cost relative to gas- and oil-fired storage water heaters, making it less likely that builders and consumers will use higher efficiency electric water heaters.

In the TSD Figure 9.5.7, under the Proposed Rule, DOE projects electric storage water heater (20-55 gallons except small electric storage water heaters) shipments dropping by well over 30 percent in the first year and never recovering compared to the “no new standards” case. This type of demand destruction could lead manufacturers to invest in and increase production of other less-efficient products.

To be market-neutral and avoid unintentionally undermining the Administration’s goals, the efficiency increases for water heaters of similar type and size should be similar (where technically feasible and economically justified). Having one type of water heater (electric storage) be required to increase its efficiency by 21-140+ percent, while similar water heaters are only required to increase their efficiency by as little as 0.0 percent to 9.7 percent will lead to significant market distortions.

A. Supply Chain Concerns and Price Elasticities of Demand Should Not be Discounted.

A standard that effectively eliminates electric resistance water heaters will necessitate HPWH manufacturers to increase their production capacity by orders of magnitude (by 2 to 5 times) within the next few years.³ As with other appliances with global supply chains, there are supply chain issues and possible trade issues that could significantly impact the production and cost of heat pump water heaters and key components of heat pump water heaters.

DOE’s Proposed Rule and TSD provide estimated price increases of about \$700 to \$800 for electric storage water heaters between 20 and 55 gallons. The estimated price increase for gas storage water heaters in the same size range is under \$150. These significantly different product price increases will create more incentives for budget conscious, price sensitive consumers and builders to fuel switch from electric storage to gas storage water heaters or install smaller water heaters with lower efficiency requirements, negating some or most of the estimated energy and emissions savings assumed in the Proposed Rule.

³ According to Table IV.27 of the Federal Register notice, for electric storage water heaters between 20 and 55 gallons of rated storage volume (except for “small electric storage water heaters”), the market share of high-efficiency electric resistance water heaters in the “no new standards case” in 2030 is between 84.2 and 87.8 percent depending on the draw pattern. Heat pump water heaters are projected to have a market share of 12.2 to 16.8 percent.

As a result of the last DOE rulemaking on residential water heaters, manufacturers stopped producing traditional residential gas storage water heaters above 55 gallons and below 100 gallons. This fact was highlighted during the DOE webinar of September 13, 2023. Where DOE may have estimated a shipment reduction of 10 or 20 percent, the actual shipment reduction was 100 percent, and the resulting energy savings from the regulation was zero to a negative amount as consumers repaired existing water heaters or used smaller water heaters with lower efficiency or used multiple smaller water heaters to replace a larger water heater.

DOE should avoid a similar result for electric storage water heaters and take supply chain considerations and the price elasticity of demand into consideration.

III. DOE Should Reevaluate Its Analysis Regarding the Costs of Installing Electric Heat Pump Water Heaters.

While HPWHs provide a significant energy savings potential, in assessing their costs, it is important to recognize that installing these units in space constrained areas (like closets or under stairs or in crawl spaces) will require significant retrofit costs given HPWHs' physical operating requirements and the potential need for additional equipment.

As shown in manufacturer specifications, non-ducted HPWHs require at least 700 cubic feet of space to operate properly and achieve DOE's estimated efficiency levels and resulting energy savings. Based on a survey by Southern Company, anywhere from 10 to 40 percent of water heaters (depending on the type of residence) are located in closets. DOE's analysis does not include a realistic cost estimate for replacing electric resistance water heaters in closets where walls, ceilings, and doors must be removed and replaced due to the physical operating requirements of HPWHs or adding ductwork in space constrained areas.

DOE's analysis similarly does not accurately account for the replacement costs in other space-constrained environments. For example, the Southern Company survey indicated that 1 to 8 percent of other water heaters are located in crawl spaces and attics that may have space constraints. In addition, 24 to 33 percent are in utility rooms or laundry rooms that may be space constrained, especially in apartments and condominiums.⁴

While EEI raised concerns with the lack of consideration of these issues in its response to the Department's May 21, 2020, Request for Information in this docket, they are not addressed in the Proposed Rule. *EEI Comments on Energy Conservation Program: Energy Conservation Standards for Consumer Water Heaters*, DOE Dkt. No. EERE-2019-BT-STD-0019 (July 6, 2020). Instead, the Proposed Rule and TSD assume energy savings accrue from a significant overstatement of HPWH operating in ideal environments. The lack of consideration of these issues in the Proposed Rule leads to significantly understated installation and labor costs for many retrofit situations, likely by several hundreds of dollars.

⁴ A recent report from the Northwest Energy Efficiency Alliance discusses the impacts of space constrained environments on HPWH efficiency. Larson, B. and Larson, S., *Heat Pump Water Heaters in Small Spaces Lab Testing: "The Amazing Shrinking Room"*, Northwest Energy Efficiency Alliance (Nov. 21, 2022).

DOE's analysis does not adequately reflect real world limitations or retrofit costs. Therefore, the economic analysis must be updated to reflect real world circumstances, especially for retrofits/replacements, including the associated costs to at least 10 to 40 percent of consumers.

IV. DOE's Application of Fossil Fuel Equivalency Factors Fails to Account for the Ongoing Energy Transition.

The fossil fuel equivalency methodology, employed in DOE's impact assessment of proposed changes to efficiency standards, was developed in an earlier era when the penetration of renewable energy generation was low. Per DOE, continuing to apply fossil fuel equivalency factors leads to the false conclusion that renewable energy generation has the same primary energy losses as fossil generation and that these energy losses represent similar economic loss.⁵

Renewable energy as a share of the electric power system is not *de minimis* and sound public policy analysis requires sound methodological choices.

The mix of resources used to generate electricity in the United States has changed dramatically over the last decade and is increasingly clean. In 2022, for the first time, renewable energy sources⁶ surpassed coal as a generation resource: 22.6 percent of total generation at utility-scale facilities in the United States came from renewable sources compared to 19 percent from coal-based generation. In total, more than 40 percent of America's electricity came from clean carbon-free resources in 2022, including nuclear energy, hydropower, solar, and wind, putting clean resources at parity with natural gas generation, which provided approximately 40 percent of the country's total electricity generation in 2022.

Going forward, renewable and clean energy technology deployments will continue. The U.S. Energy Information Administration (EIA) predicts that declining capital costs for solar panels, wind turbines, and battery storage, along with government support such as that provided through the Inflation Reduction Act, will make these technologies increasingly cost-effective compared to the alternatives when building new power generating capacity. In the 2023 *Annual Energy Outlook*, EIA projects that renewable generation in the United States will more than triple by 2050, with both wind and solar responsible for most of the growth.

As part of the move toward resilient clean energy, electric companies are deploying more energy storage, which is a key asset that helps integrate increasing amounts of renewables into the energy grid while also enhancing resilience and reliability. Electric companies are the largest users and operators of the approximately 32 gigawatts (GW) of operational storage in the country—representing 93 percent of active energy storage projects.

⁵ U.S. Dep't of Energy, *Accounting Methodology for Source Energy of Non-Combustible Renewable Electricity Generation*, (Oct. 2016).

⁶ Renewables here include wood, black liquor, other wood waste, biogenic municipal solid waste, landfill gas, sludge waste, agriculture byproducts, other biomass, geothermal, hydroelectric conventional, solar thermal, photovoltaic energy, solar, and wind. See U.S. Energy Info. Admin., *Electric Power Monthly: Data for February 2023—Table 1.1 Net Generation by Energy Source: Total (All Sectors), 2013-February 2023* (Mar. 24, 2023), https://www.eia.gov/electricity/monthly/xls/table_1_01.xlsx.

In addition, the changes in the mix of resources used to generate electricity have profoundly decreased the sector's carbon dioxide (CO₂) emissions, the primary GHG emissions associated with electricity production. EIA's preliminary full-year estimates for 2022 find that electric power sector CO₂ emissions were 36 percent below 2005 levels, as low as they were almost 40 years ago. These reductions will continue.

Further, 50 EEI member companies have announced voluntary, forward-looking carbon reductions goals, 41 of which include a net-zero by 2050 or earlier equivalent goal, and member companies routinely increase the ambition or speed of their goals or altogether transform them into net-zero goals to reflect changing expectations about the cost and availability of renewable generation and other clean energy resources. In addition, the electric power industry has significantly reduced emissions of traditional air pollutants, such as mercury, hazardous air pollutants (HAPs), sulfur dioxide (SO₂), and nitrogen oxides (NO_x). As of 2022, SO₂ and NO_x emissions have declined 95 and 88 percent, respectively, since 1990. In addition, mercury emissions have declined by 95 percent since 2010, and total HAPs—including all acid gas emissions—declined by 96 percent between 2010 to 2017.

EEI appreciates DOE's recognition of this significant methodological issue in the Proposed Rule and the Department's position on the importance of being consistent with EIA as the rationale for continued use of the fossil fuel equivalency methodology. 88 *Fed. Reg.* at 49,123-24. However, as of June 2023, EIA is moving to the captured energy approach in all of its analyses, and DOE should follow EIA's lead. EEI received EIA's e-mail to interested parties on June 22, 2023, entitled "*Changes to the Monthly Energy Review (MER) coming in September.*" The e-mail stated: "We are updating the way we calculate primary energy consumption of electricity generation from noncombustible renewable energy sources (solar, wind, hydroelectric, and geothermal). Beginning in September, we will calculate consumption of noncombustible renewable energy for electricity generation using a constant conversion factor of 3,412 British thermal units (Btu) per kilowatt hour, which is the heat content of electricity. This calculation is a change from our current methodology, called the fossil fuel equivalency method. This approach, also known as the captured energy approach, is more consistent with international energy statistics standards than the fossil fuel equivalency approach we currently use. The statistics using the fossil fuel equivalency approach will be available in the MER appendixes."

In addition, EIA has asked interested parties for input regarding "updating the way [EIA] calculate[s] primary energy consumption of electricity generation from noncombustible renewable energy sources (solar, wind, hydroelectric, and geothermal). Beginning in October, the State Energy Data System (SEDS) will calculate consumption of noncombustible renewable energy for electricity generation using a constant conversion factor of 3,412 British thermal units (Btu) per kilowatt hour, which is the heat content of electricity. This calculation is a change from our current methodology, called the fossil fuel equivalency method. This approach, also known as the captured energy approach, is more consistent with international energy statistics standards than the fossil fuel equivalency approach we currently use." Given the ongoing transition to clean energy, the decision to use fossil fuel marginal heat rates for renewables results in a

compounding and distortionary effect. The use of older “business as usual” scenarios will also significantly overstate emissions from electricity production going forward.⁷

Therefore, DOE needs to update its methodology as soon as possible to create more realistic estimates of primary energy savings and electric sector emissions reductions.

Conclusion

DOE needs to revise the proposed rule to ensure that the market for high-efficiency electric water heaters is not distorted to the detriment of the Administration’s electrification and decarbonization goals. The analysis needs to be updated to provide realistic cost estimates, realistic life cycle economic impacts, realistic energy savings estimates, and realistic emissions impacts.

As currently written, the Proposed Rule is not fuel or market neutral and will lead to unintended consequences that will likely include higher energy usage and higher emissions from fossil-fuel fired water heaters.

Thank you for your review and consideration of our comments. Please contact Steve Rosenstock (202-508-5465, srosenstock@eei.org) if you have any questions about EEI’s comments.

Respectfully submitted,

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cc: Alex Bond
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⁷ Recent DOE and EPA reports published in August 2023 and September 2023 respectively show significant electric sector emissions reductions by 2035 due to the impacts of the Bipartisan Infrastructure Law and Inflation Reduction Act. See U.S. EPA *Electricity Sector Emissions Impacts of the Inflation Reduction Act* (Sept. 2023); and U.S. DOE, *Investing in American Energy: Significant Impacts of the Inflation Reduction Act and Bipartisan Infrastructure Law on the U.S. Energy Economy and Emissions Reductions* (Aug. 2023).