

## **EEI Comments to EPA on the Draft 1 Version 3.1 Eligibility Criteria for Residential Water Heaters**

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The Edison Electric Institute (EEI) appreciates the opportunity to submit comments on the Environmental Protection Agency's (EPA) Version 3.1 of ENERGY STAR Program Requirements Product Specifications for Residential Water Heaters that was published on March 27, 2017. EEI is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for 220 million Americans, operate in all 50 states and the District of Columbia, and directly employ more than 500,000 workers. With more than \$120 billion in annual capital expenditures, the electric power industry is responsible for the creation of millions of jobs. Safe, reliable, affordable and clean electricity powers the economy and enhances the lives of all Americans.

The electric sector is engaged in an ongoing transition of its generating fleet, one that will continue over the next decade and beyond. Concurrent with this transition, EEI member companies are making significant investments to make the energy grid more innovative, dynamic, flexible and secure in order to integrate and deliver a mix of both central and distributed energy resources to customers. EEI members also invest in end-use efficiency and demand response programs, which not only reduce demand, but also reduce emissions, while saving customers money.

This transition has led to significant changes in the composition of generating fleet, as approximately 35% of all electricity generated in 2016 came from zero-emitting resources, including nuclear, wind, solar, hydropower, and other renewables. *See EIA Monthly Energy Review* (March 2017). As a result of these changes in the generation mix, as well as other environmental requirements and increased energy efficiency, the power sector has significantly decreased its greenhouse gas (GHG) emissions. At the end of 2016, the sector's GHG emissions were nearly 25 percent below 2005 levels. Emissions of criteria pollutants have been steadily falling as part of the power sector's transition, as sulfur dioxide (SO<sub>2</sub>) emissions are down by 53% since 2014 and 91% from 1990 levels; emissions of nitrogen oxides (NO<sub>x</sub>) are down by 28% and 82%, respectively, over the same periods.

As the power sector continues to transition the fleet to a cleaner, lower-emitting generation mix, electrification across a variety of sectors, including the residential water heating sector (with its unique ability to store renewable electricity produce at a home or from the grid), will be a key driver in achieving national emission reduction goals. In order for this transition to be successful, EEI supports public policies and a streamlined approach to regulation that will continue, in a cost-effective manner, the transformation of the electric grid and our industry. EEI has consistently supported the Agency's ENERGY STAR appliance programs, as the ENERGY STAR program has both provided important benefits in terms of increasing appliance efficiency and providing significant cost-savings to consumers. However, EPA's proposed Version 3.1 of the ENERGY STAR Water Heater specifications does not permit the use of electric resistance water heaters, which, when grid enabled, could provide significant benefits via their participation in demand response programs. In addition, the exclusion of these types of water heaters also

fails to recognize the significant emissions reductions that have resulted and will continue to result from the transition of the electric generating fleet to cleaner sources of fuel. Accordingly, EPA should revise the proposed specifications to include electric resistance water heaters.

**I. EPA Should Adopt the Department of Energy’s (DOE) Most Up-to-Date Source Estimates to Recognize the Emissions Benefits of the Transition of the Generation Fleet.**

EPA’s should revise Version 3.1 to better align the high-efficiency water heaters ENERGY STAR program consistent with providing consumers with increasingly efficient appliance options. EPA should do so by making the program and the appliance qualifying for the ENERGY STAR label align with DOE’s source metrics which appropriately capture the benefits of the transition of the generation fleet. Under the Agency’s current proposal, the efficiency increases required for electric resistance water heaters are much more dramatic than similarly situated other products as a result of EPA’s reliance on the “source energy” estimates. However, the substantial increases in non-carbon emitting electric generating sources in recent and future years casts doubt on utilizing the fuel source metric as a viable rationale for excluding resources from the ENERGY STAR program. The continued increase in these resources, and their likely increase in future years as utility scale renewable projects continue to come online in ever increasing numbers due to a variety of marketplace and other factors, means that EPA’s continued reliance on source energy is likely unfounded. EPA should instead adopt an approach in a final Version 3.1 which would better reflect the continued transformation of the generating fleet and the energy grid by utilizing the source estimates recently adopted by DOE.

**a. DOE’s Source Metrics Are the Appropriate Approach for EPA’s ENERGY STAR Program**

Specifically, EPA should utilize appropriate criteria for Certified Solar Water Heaters in the final Version 3.1 in order to fully capture the transition of the generating fleet and the electrical grid to be cleaner given the tremendous amounts of zero-carbon resources being utilized to generate electricity. Under the Agency’s current and proposed ENERGY STAR specification, the Solar Energy Factor (SEF) for a solar water heater is  $\geq 1.8$  SEF if it is backed up by a high-efficiency electric water heater but only  $\geq 1.2$  if it is backed up by a gas water heater.<sup>1</sup> According to the Agency’s specification document, the “Solar Energy Factor (SEF) refers to the energy delivered by the total system divided by the electrical or gas energy put into the system.” Therefore, assuming that 100 units of energy are used by a water heater, with a gas water heater, an SEF of 1.2 means that:

$100 / 1.2 = 83.33$  units of gas are used per year, while the solar water heater provides 16.66 units of energy.

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<sup>1</sup> See ENERGY STAR Program Requirements Product Specification for Residential Water Heaters Eligibility Criteria Draft 1 Version 3.1, p. 5.

In other words, the solar water heater has to be sized to provide 16.66% of the water heater energy per year, reducing gas energy use by 16.66%. However, the requirements for a solar water heater with an electric backup, is significantly higher:

$100 / 1.8 = 55.55$  units of electricity are used per year, while the solar water heater provides 44.44 units of energy.

In other words, the solar water heater has to be sized to provide 44.44% of the water heater energy per year, reducing electricity use by 44.44%. This disparity effectively requires solar water heaters to save less energy with a natural gas water heater backup is inconsistent with conservations and efficiency goals embedded within the ENERGY STAR program.<sup>2</sup>

EPA should, instead of the SEF, utilize the Solar Fraction Metric and apply that same value to all backup water heaters regardless of fuel type in order to be fuel neutral and capture the benefits of the industry's transition to cleaner energy sources. The Solar Fraction would apply the same value to all backup water heaters, regardless of fuel type or product category. The U.S. Department of Energy defines the Solar Fraction Metric as "the portion of the total conventional hot water heating load (delivered energy and tank standby losses). The higher the solar fraction, the greater the solar contribution to water heating, which reduces the energy required by the backup water heater. The solar fraction varies from 0 to 1.0. Typical solar factors are 0.5–0.75."<sup>3</sup> As a result, the true value of solar water heaters that are then concomitantly backed up by an ever cleaner grid are truly captured, consistent with the ENERGY STAR's mission to promote greater efficiency amongst products, and does so in a fuel neutral manner.

However, moving to this type of metric in which the specification should require the same (or nearly the same, based on products being offered in the market place) efficiency increase, regardless of fuel type, would allow a wider variety of similarly situated products to utilize the ENERGY STAR label and allow for the growth of the program consistent with its aims and mandate. A metric expressed as a raw percentage efficiency improvement across all similarly situated products would allow for this to occur. EPA should adopt this approach in the final Version 3.1.

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<sup>2</sup> As currently constituted, EPA's version 3.1 effectively excludes 99% of effective market share products from participating in the ENERGY STAR program. The following types of water heaters are not able to receive Energy Star labels (even though their efficiency is higher than other qualifying Energy Star water heaters): Electric Resistance Storage Water Heaters, Electric Resistance Table Top Water Heaters, Grid-Enabled Electric Resistance Water Heaters, and Instantaneous Electric Resistance Water Heaters. Based on the data from the EPA Energy Star unit shipment reports, these high-efficiency products had a 99% market share of electric water heater sales in 2015. Excluding these products is not reconcilable with the stated goals for the Energy Star program. Moreover, for electric water heaters greater than 75 gallons, a recent review of AHRI heat pump water heater data reveals that *all* products currently listed in the directory except one would qualify. So below 75 gallons 99% would not qualify but above 75 gallons 99% would qualify. On their face, these data points are problematic.

<sup>3</sup> See <https://energy.gov/energysaver/estimating-cost-and-energy-efficiency-solar-water-heater>

## **b. EPA Should Differentiate Uniform Energy Factors (UEF) Based on Hot Water Draw Patterns**

In the Agency's current draft specification showing values for ENERGY STAR products, the specification shows one UEF value for electric water heaters, regardless of the estimated daily hot water draw pattern, but shows two different UEF values for gas storage water heaters, based on medium or high hot water draw pattern.<sup>4</sup> This approach is problematic since manufacturers may list water heaters at different hot water draw patterns, and thus a one-size-fit-all EPA approach to setting UEF values does not appropriately capture differences in draw patterns and thus could inappropriately exclude certain products from qualifying for the ENERGY STAR label.<sup>5</sup> EPA should therefore show UEF values at different hot water draw patterns for all categories of water heaters, for all fuel types. Even though some UEF values may be the same for different hot water draw pattern, this more inclusive approach that would not restrict the technologies that could receive an ENERGY STAR label, and allow the program to increase market share and provide consumers with greater choices for efficient products.

## **II. EPA Should Include Grid-Enabled Electric Resistance Water Heaters as Part of the ENERGY STAR Program**

EPA should reevaluate its exclusion of high-efficiency grid-enabled electric resistance water heaters and instead include those products as part of ENERGY STAR Version 3.1. As discussed above, EPA's decision to exclude these products in its proposal on the "source energy" of the product is misplaced, and should not be utilized as a basis for their exclusion from the program. EEI therefore urges EPA to revisit its exclusion of high-efficiency electric resistance water heaters from the Scope Section (2B) of Version 3.1. EEI also offers the following additional reasons for including these products in the final Version 3.1:

### **a. Certain Grid-Enabled Water Heaters Can Provide Demand Response, and will Save Energy and Money for Consumers**

High-efficiency grid-enabled electric resistance water heaters provide important flexibility in operational modes that other water heaters in the ENERGY STAR program do not. Specifically, grid-enabled water heaters have electric resistance elements that can provide nearly immediate

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<sup>4</sup> Hot water usage is declining as the result of DOE appliance standard efficiency increases. EEI would support use of the lower two draw patterns instead of the higher two.

<sup>5</sup> The minimum efficiency electric resistance water heaters have the highest EF and UEF values compared to all other non-electric storage water heaters. The differences are especially dramatic when comparing electric resistance water heaters at very small (10 gallons per day) and low (38 gallons per day) water draws. *See* 10 CFR 430.32. Water heaters are experiencing less total daily usage as the result of appliance standards promulgated by DOE such as low-flow shower heads, more efficient clothes washers and more efficient dishwashers. Less daily usage disproportionately affects gas and oil storage water heaters vis-à-vis electric resistance water heaters.

demand response and “ancillary services” for variable energy resources such as solar or wind. Such services cannot be provided by a heat pump water heater, as the compressor needs to be turned off for several minutes (or more) to ensure safe operation, longevity, and reliability. EPA should therefore allow grid-enable water heaters to participate in the ENERGY STAR program.<sup>6</sup> It is important to also note that grid-enabled water heaters are already “connected” water heaters since they are (by definition) connected to the grid, and should thus be able to qualify for the ENERGY STAR label. As such, EPA should include grid-connected water heaters as eligible for the ENERGY STAR program in the final specification, and this would represent another significant step in the program’s ability to increase market share and provide consumers with efficient product options.

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

Respectfully submitted,

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<sup>6</sup> Specifically, EPA notes in the specification that, “several stakeholders have mentioned that the time may be approaching for EPA to develop connected requirements for electric storage water heaters. EPA is interested in establishing connected requirements in the next revision. Water heater models that meet these optional requirements would be identified as “connected” on the ENERGY STAR certified products list. EPA plans to consider criteria similar to those in the ENERGY STAR Version 1.1 Pool Pump specification, with requirements for open standards and an Interface Control Document (IDC) covering similar capabilities. This would include the same three types of demand response (i.e., a short deep load reduction, a longer shallower load reduction, and a temporary load increase) originally derived from the Electric Power Research Institute (EPRI) device framework. EPA would also consider user message criteria to include a notice of fault condition or similar. EPA seeks stakeholder feedback on the best way to encourage useful demand response capability.” *See* Technical Specification, p. 7.