



April 24, 2017

Ms. Abigail Daken
U.S. Environmental Protection Agency
WaterHeaters@energystar.gov

Re: ENERGY STAR® Residential Water Heaters;

Dear Abigail,

The National Rural Electric Cooperative Association (NRECA) and the Natural Resources Defense Council (NRDC) appreciate the opportunity to submit these joint comments regarding ENERGY STAR® Residential Water Heaters Proposed Version 3.1. These joint comments are limited to issues of ‘connected’ requirements as discussed in Section 6) D. of Version 3.1 Draft 1.¹

NRECA is the national service organization for more than 900 not-for-profit rural electric utilities that provide electric energy to over 42 million people in 47 states. Cooperatives own and maintain 2.5 million miles or 42 percent of the nation’s electric distribution lines covering three-quarters of the nation’s landmass. Electric cooperatives provide electric service in all or parts of 2,500 of the nation’s 3,141 counties. NRECA and member cooperatives have long supported ENERGY STAR and energy efficiency generally as benefiting consumers, and participated in development of effective ENERGY STAR specifications.

NRDC is an international nonprofit environmental organization with more than 2 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC's top institutional priorities include curbing global warming and creating a clean and economic energy future. To that end, NRDC has long advocated for strong energy efficiency codes and standards and a vibrant ENERGY STAR program.

The purpose of these joint comments is to encourage EPA efforts to promptly explore, and as appropriate develop, connected criteria for electric water heaters, including both electric resistance (ERWH) and heat pump (HPWH) models. Section 6) D. of proposed Version 3.1 states that “EPA is interested in establishing connected requirements in the next revision.” We believe that prompt consideration of adding connected criteria, including for ERWH, is appropriate for several reasons:

- **Growing importance of load flexibility and system-level efficiency.** To be clear, energy efficiency of devices continues to be of great importance for consumer and environmental benefits. However, with an increasing contribution of variable output electricity generation, including wind and solar, in the electricity grid, facilitating and increasing flexibility in the energy consumption of consumer devices, i.e., connected operation, is becoming increasingly important for an economic and reliable system. The establishment of an intensive ‘building-to-grid’ research and development program within U.S. Department of Energy (USDOE) Building

¹ NRDC also contributed to and supports the comments of Version 3.1 submitted by the Consortium for Energy Efficiency regarding other elements of the draft ENERGY STAR specification.



Technology Office (BTO), as well as the activities of a large and growing number of utilities, demand response service providers, and manufacturing industry both in conjunction with BTO and independently indicate substantial and growing recognition of this development. Further, the “Study Examining Electricity Markets and Reliability” requested by USDOE Secretary Perry on April 14, 2017 further highlights the importance of addressing flexibility and system-level issues in the nation’s evolving electricity grid.

- **Grid-connected water heaters are particularly amenable to providing flexible operation, energy storage, and grid ancillary services.** Ongoing research has added to the understanding of the value of electric water heater load control programs to the electric grid. For example, Rocky Mountain Institute recently described the potential of “demand flexibility” or “flexiwatts” to provide billions of dollars in grid service benefits through thermal load shifting.² The Regulatory Assistance Project highlights water heater thermal storage programs as a way to “Teach the Duck to Fly” or help solve the infamous “Duck Curve” challenges faced in California and Hawaii as solar ramps up and down daily.³ In early 2016, the Brattle Group issued research titled “The Hidden Battery: Opportunities in Electric Water Heating,” which was sponsored by the National Rural Electric Cooperative Association (NRECA), Natural Resources Defense Council (NRDC), and the Peak Load Management Alliance (PLMA). The Brattle Study provides quantitative research that shows the ability of control technologies that make use of electric water heaters can provide significant environmental benefits over non-controlled water heaters.⁴ Notably, this includes not just energy storage, load shifting and peak shaving as has been performed for decades by some two million controlled water heaters in the United States, but also for the rapidly emerging opportunity to provide high value grid ancillary services, if advanced communication and control capability is deployed. Importantly, water heaters are one of the largest energy using devices in households, and the storage and flexibility can be achieved at low cost. NRECA, NRDC, and PLMA also recently co-founded a Community Storage Initiative to support the use of devices located throughout communities across the country, such as water heaters, to provide storage service to the electric grid to help integrate renewable energy and keep energy costs low for consumers.⁵
- **Manufacturers have developed connected products that surpass minimum requirements and may provide a foundation for an ENERGY STAR connected specification.** Major water heater manufacturers representing a majority of the industry have recently introduced products that meet the requirements for “grid-enabled water heaters” as established in the Energy Efficiency Improvement Act of 2015.⁶ Importantly, some manufacturers are going beyond the minimum requirements for grid enabled water heaters and for HPWH, and incorporating the Consumer

² Rocky Mountain Institute, “The Economics of Demand Flexibility” August 2015.

http://www.rmi.org/electricity_demand_flexibility

³ Lazar, J. (2016). Teaching the “Duck” to Fly, Second Edition. Montpelier, VT: The Regulatory Assistance Project. <http://www.raponline.org/document/download/id/7956>

⁴ Brattle Group, “The Hidden Battery: Opportunities in Electric Water Heating” Feb 2016.

http://www.brattle.com/system/news/pdfs/000/001/007/original/The_Hidden_Battery_-_Opportunities_in_Electric_Water_Heating.pdf?1455129462

⁵ <http://www.communitystorageinitiative.com/>

⁶ <http://www.gpo.gov/fdsys/pkg/PLAW-114publ11/pdf/PLAW-114publ11.pdf>



Technology Association CTA-2045 standard. This standard enables connection of appliances to any communication network using a common protocol and mechanical interface. Notably, CTA-2045 was co-developed and demonstrated by EPRI with strong utility and manufacturer support. Inclusion of CTA-2045 or equivalent could be a useful inclusion in an ENERGY STAR connected specification.

- **Grid-connected ERWH and HPWH both appear to offer consumer and environmental merit under different grid and consumer conditions.** To date, the ENERGY STAR specification for electric water heaters has been directed to HPWH. This is understandable given the large efficiency gain that HPWH offers relative to ERWH, and to the lack of a clear opportunity for grid-connected ERWH. However, exploration of a grid-connected ERWH specification is appropriate at this time in part due to the recent developments noted above. In addition, the joint NRECA, NRDC, and PLMA study of advanced water heaters found a strong economic and environmental case for grid-connected ERWH under certain grid conditions, as well as for HPWH. Of particular note, the very low capital cost of grid connected ERWH made it economically attractive where the system cost of electricity, including ancillary services, varies significantly over time. As installed capital costs of HPWH decline over time, it is reasonable to anticipate that they will be increasingly attractive in ever growing applications. In the mean time, development of a grid connected ERWH ENERGY STAR specification would facilitate both an additional consumer and environmental opportunity where HPWH is not economic, and also help build utility and manufacturer experience with connected operation that will benefit the expansion of all connected products, including connected HPWH.
- **Achieving market transformation in advanced, controlled electric water heating will facilitate environmentally beneficial electrification as an economic approach to achieving environmental goals.** NRDC has recently noted that electrification is one of two key strategies to achieve deep decarbonization of building energy use (the other being decarbonization of fuels e.g., through production of biogas or synthetic natural gas).⁷ The opportunity for environmentally beneficial electrification will grow as the share of low emissions generation on the grid grows. Importantly, effective water heater control strategies can reduce emissions both by ensuring that energy consumption occurs when marginal emissions on the grid are low (e.g., when there is an abundance of wind or solar power), and also by making the grid more flexible and able to effectively integrate variable output renewable generation. Thus, it is important to EPA's mission to promote the wise use of energy by enhancing the marketplace for electric water heating products that will be available to average consumers.

We recognize that adding an advanced electric water heater that does not make use of heat pump technology to the Energy Star program may be counterintuitive as the program is currently supporting only heat pump technology. While the Joint Stakeholders applaud efforts to transform the market for heat pump water heaters, we note that somewhere in the ballpark of 95-99 out of every 100 electric water heaters that are sold do not include heat pump technology despite years of exclusive specification of the technology by ENERGY STAR. We also note the considerations that ENERGY STAR request consumers make about use of heat pumps due to some limitations of their application in small spaces

⁷ <https://www.nrdc.org/experts/merrian-borgeson/slashing-emissions-fossil-fuels-burned-buildings>



and cold climates.⁸ At the same time, there are increased calls for market transformation of the electric resistance water heater market to advance grid-interactive functionality through adoption of a standard communications port. By allowing a specification on the larger market potential opportunity for a period of time, the ENERGY STAR program could provide a vital market transformation function. At any point, the ENERGY STAR program could then re-focus its efforts on heat-pump technology if it so chooses.

Thank you for your review and consideration of our comments, and we look forward to working with you on this opportunity. If you have any questions, please contact Robin Roy at 650-888-7806 (rroy@nextenergyus.com), or either of the signatories below.

Respectfully submitted,

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⁸https://www.energystar.gov/products/water_heaters/high_efficiency_electric_storage_water_heaters/considerations