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Via Electronic Mail



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Office of Air and Radiation
Washington, DC 20460

Re: Energy Star Water Heaters; Proposed Product Specification, Draft 1

The following comments are submitted for the record of the Agency's above-captioned proceeding regarding the **Version 2.0 Product Specification, Draft 1 for Energy Star water heaters**. They are submitted on behalf of the Northwest Energy Efficiency Alliance (NEEA).

The Northwest Energy Efficiency Alliance is a non-profit organization working to encourage the development and adoption of energy-efficient products and services. NEEA is supported by the region's electric utilities, public benefits administrators, state governments, public interest groups and efficiency industry representatives. This unique partnership has helped make the Northwest region a national leader in energy efficiency.

Overview

Draft 1 of the specification has addressed two of the concerns we raised in our comments on the framework. Specifically, we are pleased to see that EPA has decided to combine the "gas-fired storage" and "gas condensing" categories. We are also pleased with EPA's recommendations for rating add-on heat pump water heaters (HPWHs).

However, three of our most critical concerns – an appropriate specification for all heat pump water heaters, the inclusion of electric point-of-use water heaters (POUs), and the inappropriate warranty requirements for add-on heat pump water heaters – have not been addressed. We will reiterate and expand upon our concerns in these comments, as well as commenting on some of the more nuanced aspects of the Draft Specification.

Heat Pump Water Heater Specifications, Generally

In our June 24th comments on the specification framework, we said the following with regard to the performance rating of heat pump water heaters (HPWHs):

"The most important thing EPA should do is ensure that its specification certifies products that will actually deliver the performance promised by their ratings, with high levels of consumer satisfaction. The Northern Climate Heat Pump Water Heater Task Force is a NEEA-facilitated stakeholder group working to encourage the development and adoption of heat pump water heater technologies that deliver superior energy efficiency performance and consumer satisfaction in the more severe operating environments of the northern half of the United States. We strongly endorse the Task Force's work and urge EPA to adopt its

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specifications, or key elements thereof, for these products. The associated test procedure and rating conditions may or may not be adequately addressed in changes to the federal test procedure, but **EPA should ensure that its own specifications are appropriate to the field use of this technology, including the conditions under which they are rated and the features that will maintain the energy savings and consumer satisfaction.**”

We strongly believe that the integrity of the Energy Star brand depends on its ability to identify for consumers products that deliver significant energy savings with a high degree of reliability and user satisfaction. We also strongly believe that, for heat pump water heaters, this requires a specification that ensures, to the maximum extent possible, such performance in all climates and installations. So we again suggest to EPA that the Northern Climate specification and its associated test methods is a means to that end.

In the last two months, the Northern Climate Heat Pump Water Heater specification has been more fully developed, and a Northern Climate rating method has been designed. This rating method is based on the USDOE water heater test method, but adds a critical second set of rating points that allows a HPWH to be rated in the lower-temperature ambient conditions expected in the northern half of the country.

Once again we urge EPA to make use of this rating method and specification so that Energy Star water heaters can provide consumers in the northern half of the country a high level of performance and satisfaction. In order to make this possible, EPA should:

- Adopt the Northern Climate EF rating methodology for heat pump water heaters that will be Energy Star-rated in the northern part of the country. The Northern Climate test method uses the current DOE test method draw patterns but adds a second set of rating conditions that are more appropriate for colder climates – 50-degree F ambient air temperature and 50-degree F inlet water temperature. The COP performance at standard DOE conditions and at the Northern Climate conditions are then combined with a compressor cut-off test to establish COP performance in a set of ambient temperature bins that are representative of those likely to be found in northern climate installations to generate a bin-weighted COP for computing the water heater EF. The rating methodology is provided as an attachment to this document.
- Adopt a minimum Northern Climate EF (EF_{NC}), based on the Northern Climate rating method. We recommend a minimum EF_{NC} of 1.8.
- Establish a climate-based minimum electric water heater EF specification for the northern and southern half of the country, with the northern minimum being the above-suggested EF_{NC} of 1.8 and the southern minimum being a standard DOE test method-rated EF of 2.0 (as in the current draft Energy Star specification). We strongly suggest adopting the northern states specified by USDOE in the most recent climate-based furnace efficiency standards for the Energy Star program.¹

¹ These states are Alaska, Colorado, Connecticut, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Washington,

- Adopt the other Northern Climate specification elements (freeze protection, exhaust ducting for integral models, compressor shutdown/notification, warranty, condensate management, air filter management, and sound levels). The most recent version of the Northern Climate specification is provided as an attachment to this document.

NEEA has made a major investment in HPWH technology and its performance because we strongly believe that the Northern Climate specification is critical in assuring consumer satisfaction with these products. We believe that Energy Star should be equally concerned about high levels of marketplace acceptance of these products, and that adoption of the Northern Climate specification and its test methods will go a long way toward assuring this.

Point-of-Use Water Heaters

The inclusion of these products in the Specification is perhaps the most troubling element of the proposed draft, both to NEEA and its funding organizations – the electric utilities of the Pacific Northwest. While we acknowledge the interests of the manufacturers of these products in having the Energy Star logo on their products, we find EPA’s rationales for including them to be thoroughly unpersuasive.

As we pointed out in our comments of June 24th, there are a number of reasons why these products have no obvious place today in an Energy Star Water Heater Specification:

- ***These products impose the same or more electric demand on the grid compared to a typical electric storage water heater, and substantially more demand than a heat pump water heater.*** This demand occurs at shoulder peak periods on the grid, and so if these products were used widely, they would impose new capacity requirements on the electric utilities serving these loads. In making this assertion, we assume the manufacturers of these products intend that their use of the Energy Star logo would result in significant new demand for their products, and that the use of them as a point-of use product makes them an *additional* load rather than a substitute load.² While the cost of added utility generation capacity would not be paid directly by the users of these products (at present, residential demand charges do not exist in most markets), the costs would ultimately be borne by all ratepayers as generation capacity is reserved to meet these unfortunate incremental loads.
- ***There are almost no energy savings associated with this technology now that electric storage water heater efficiency is 90 percent or higher.*** The EPA response to this circumstance is to focus on the notion that these are point-of-use products and so save energy by avoiding the energy losses associated with hot water waste at fixtures distant from the main storage water heater. There is little data available to quantify such savings, but anecdotal information suggests they are small. And the POU product energy use and electric demand are *additive* to that of the electric storage water heater that serves the rest

West Virginia, Wisconsin, and Wyoming. See **TABLE I.1—AMENDED ENERGY CONSERVATION STANDARDS FOR FURNACE, CENTRAL AIR CONDITIONER, AND HEAT PUMP ENERGY EFFICIENCY** in FR 76, No. 123, p.37410.

² We assume here that a home using one such POU product would either have others, or a conventional storage tank water heater elsewhere in the home. Thus, the demand load of the POU unit would be additive to the other(s).

of the home, which means that the standby losses from the storage unit are spread over a smaller fraction of the home's hot water use.

- ***The installation costs of these products are very high.*** A unit with 8 to 10 kW capacity at 240 volts requires 8-gauge service wire (a rarity in residential wiring). A 12 kW unit would require 6-gauge wire. The maximum current draw of a 10 kW unit is about 40 amps at 240 volts, which given NEC circuit breaker loading limitations would imply at least 50 amps of electric panel capacity. A 12 kW unit would require 60 amps of panel capacity. These requirements are *in addition to* the typical 30 amps of panel capacity required for the home's main electric storage water heater. The POU products themselves are not inexpensive, costing about the same as a 50-gallon electric storage water heater. ***All of these costs are incremental*** – on top of the cost of the home's main storage water heater.

While there may be valid reasons for using POU water heating products in a residential setting, energy and cost savings are not among them. Therefore there is no valid rationale that we can see for including them in the Energy Star program, which is, above all, supposed to be about providing homeowners cost-effective energy savings. POU water heaters impose incremental electric loads on the grid at unfortunate times of day, save very little energy, and add significant incremental cost to the hot water system of a home. As we pointed out in our June 24th comments, US DOE drew this same conclusion in 2008 during its residential water heater standards proceedings.

NEEA's funding utilities would no doubt be forced to exclude these products from their water heater efficiency programs, if not on the basis of the electric demand profile of the technology, then on the basis of a lack of cost-effectiveness.³ The energy losses associated with hot water-using fixtures that are distant from a traditional storage tank could be captured far more effectively by using an on-demand circulator system, which provides all of the benefits of a POU water heater at lower cost. Again, if EPA has data on electric demand profiles, energy savings and/or system installed costs that would support different conclusions than presented here, we ask that it be provided to stakeholders to examine.

In the absence of such data, we once again strongly urge EPA to drop electric POU water heaters from the program.

Add-on Heat Pump Water Heaters

We support EPA's proposal to rate these with a standard 50-gallon electric resistance storage water heater that meets minimum federal efficiency standards. When rating any HPWH product, the efficiency of the tank has minimal impact on the overall EF rating of the system. This has been made evident to us in our own laboratory testing of unitary (integral) HPWH products now on the market, where the efficiency of the product in electric resistance back-up mode (without the compressor being in operation) is significantly lower (e.g. EF = 0.85 for a 50-gallon unit) than that of a new standard electric resistance storage water heater of the same storage capacity (EF = 0.904

³ While this may seem obvious, we remind EPA that regulated utilities, several of which fund NEEA's energy efficiency market transformation work, cannot recover costs incurred in promoting technologies that do not deliver cost-effective energy savings for their ratepayers.

for a 50-gallon unit). This suggests that the insulation levels of the storage tanks associated with these products are significantly lower than that of most electric resistance storage water heaters now in service in the U.S. This further suggests that over time, the efficiency of some add-on HPWH systems might very well prove to be higher than that of some unitary (integral) products, because the insulation levels of the tanks to which they're added will be greater than those of the competing unitary (integral) products. ***All of this suggests that EPA should not be concerned about the efficiency of the storage tanks to which add-on HPWH products are connected.***

We do not support EPA's proposal to make add-on HPWH manufacturers responsible for any portion of the warranty for the tanks to which they are attached. We also suspect that ***no*** manufacturer would willingly submit to being made responsible for the performance or integrity of a product that they neither manufactured nor installed, even those advocating for this unfortunate provision (e.g. General Electric). We have seen no data to suggest that there is a problem that EPA is proposing to solve with this provision. If there is such documentation, we request that EPA provide it to the stakeholders in this docket. In the absence of same, we can think of no reason to include such a provision in the Specification, as there is no evidence that consumers would be placed "in the middle of a dispute between the original tank manufacturer and the add-on heat pump manufacturer." ***We urge EPA to drop this provision as unnecessary and potentially counterproductive to the project of increasing the efficiency of whole-home water heating service.***

Gas-fired Water Heaters

While we support EPA's combining the "gas-fired storage" and "gas condensing" categories, we are disappointed in the minimum efficiency requirements proposed for them (EF = 0.67). As we stated above in the case of heat pump water heaters, we believe the integrity of the Energy Star brand depends on its ability to identify for consumers products that deliver significant energy savings with a high degree of reliability and user satisfaction. While we have no reason to doubt the reliability of gas-fired water heaters with an EF of 0.67, the energy savings compared to a minimum federal standard gas-fired storage water heater are minimal (15-18 therms per year). In many service territories, such minimal savings will not be cost-effective if there is any notable incremental cost for these products. Indeed, in USDOE's water heater standards rulemaking, they found that gas-fired storage water heaters with an EF of 0.67 (Trial Standard Level 5) had negative LCC savings (-\$218) and a payback period of more than 20 years – far longer than the lifetime of the water heater.⁴ ***In order to uphold the integrity of the Energy Star brand for this product category, EPA should establish a minimum EF rating of at least 0.80.***

Summary

A lot of progress has been made with the water heater specification. With the changes we recommend, we think the Energy Star label can bring extraordinary value to the programs of those organizations that are pursuing domestic water heating efficiency, and deliver exceptional savings and product satisfaction to consumers. We look forward to working with EPA to make this a reality.

⁴ See Table VI.7 in FR 75, No. 73. p.20186.



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