June 24th, 2011
Via Electronic Mail

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Office of Air and Radiation
Washington, DC 20460

Re: Energy Star Water Heaters; Proposed Product Specification Framework

The following comments are submitted for the record of the Agency's above-captioned proceeding regarding the product specification framework 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

Because NEEA's funders are, at present, the electric utilities in the Pacific Northwest, our comments on EPA's Energy Star Water Heaters Product Specification Framework will be confined to those that relate to the electric water heater category. These comments are also written from a federal energy efficiency standards perspective, as NEEA (along with the Northwest Power and Conservation Council or NPCC) is a directly involved stakeholder in those US DOE proceedings.

One of the most significant shortcomings in the Energy Star Water Heaters specification is also a major shortcoming from a federal efficiency standards perspective. The federal test procedure for water heaters is widely acknowledged to do a poor job of predicting the actual energy efficiency performance of water heaters generally, and especially in northern climates. There are a number of reasons for this, including unrepresentative ambient conditions and draw patterns, an inappropriate hot water temperature setpoint, and an inability to appropriately measure the actual performance of the variety of technologies and designs brought to bear by the marketplace to provide residential hot water. Electronic controls are the latest wild card in the test methodologies. The test procedure is being considered for significant revisions by a large stakeholder group at the same time EPA is considering significant revisions to its specifications. The test procedure revisions will have a significant effect on federal efficiency standards, and therefore also on EPA's product performance specifications.

In view of this fact, EPA's time line for its specification revisions may be inappropriately short. To the extent that proposed federal test procedure revisions are reasonably well known at the time EPA publishes its new specifications, we can be assured of good alignment of things like product classes and baseline efficiencies. **We urge EPA to ensure that this is the case, regardless of its preferred time line.**

Technology Neutrality

In spite of EPA's focus on this concept (one we endorse), the Agency seems to be going in the wrong direction in implementing it. We presume that the term "technology neutrality" means technology neutrality with regard to providing adequate supplies of sufficiently hot water for household (residential) end uses. Given the fundamental technology differences in how our various *fuel* choices are used to produce hot water, it makes sense to divide water heater categories by fuel type. We regard this as a useful and appropriate type of technology specificity. We are not supportive of technology specificity beyond that level. We believe that some of EPA's current proposals promote technology specificity (or favoritism, if you will) rather than technology neutrality.

The current product classes for the regulation of residential water heater efficiency are gas-fired storage, electric storage, oil-fired storage, and gas-fired instantaneous. These categories are not technology neutral. Different minimum efficiency standards have been set to accommodate specific technologies (e.g. separate standards for gas-fired storage and gas-fired instantaneous products). The same is actually true for electric water heaters because the standards apply only to electric storage water heaters larger than a minimum size; there are no standards for electric instantaneous water heaters, again making this standard technology-specific, not technology neutral.

Today, the electric utility industry is spending billions of dollars on "smart grid" technologies and systems in order to manage residential electric loads. The loads targeted for management include air conditioning and domestic water heating. The demand for a typical water heater load, experienced by utilities as shoulder peak load, is 4.5 kW. The diversified demand for large groups of water heaters is quite a lot lower than this. This tends to be far lower than the instantaneous demand imposed by electric on-demand water heaters, which can range as high as 28 kW. Many of these are larger than what might be termed "point-of-use" (POU) products, but even typical POU units of 9 kW impose twice the demand of a typical electric storage water heater, and dramatically higher demand than that imposed by a typical heat pump water heater (HPWH). In view of these facts, EPA should not expect utilities to be entirely technology neutral when it comes to water heaters.

Revisions to Existing Product Categories

Heat Pump Water Heaters

Unlike EPA, we see substantial opportunity for specification improvements here. 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 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.**

Gas-fired Water Heaters

From an overall efficiency standards and technology neutrality perspective, we see no down side to combining the "high efficiency gas storage" and "gas condensing" water heater categories. Indeed, as levels of efficiency converge upward, we see no down side to combining *all* gas-fired water heater categories, including "tankless," into a single category. We note here (because of EPA's discussion question #9 in this section) that any storage water heater where heat exchangers are involved (those without immersed or highly confined heat transfer processes) will experience efficiency loss as tank temperatures rise toward setpoint. This is true for all gas-fired storage water heaters and heat pump water heaters, not just condensing gas-fired models. To the extent that the test procedure for these products captures that effect in the efficiency ratings, this isn't an issue EPA should worry about. The key to dealing with this issue is a test procedure that accurately captures product performance under actual field conditions.

Solar Water Heaters

We regard solar as another water heater fuel, and so support putting these products in their own product category. While there are installations where a solar thermal water heating system (STS) is the only water heating system in a residence, by far the most common installations use another water heater as back-up. In a majority of the country, the back-up system will do most of the water heating in the winter and very little in the summer, so both parts of the system are critical to year-round hot water.

The data held by some of our funders suggest a number of things about this type of water heater. As pointed out above, households almost always add these onto an existing hot water system, with the solar system pre-heating the water that enters the back-up unit. They are almost never bought on the basis of energy savings only, as the $4,000-6,000 installed cost of a typical system that provides half of a household's hot water needs could never be asserted to be cost-effective in energy markets that are so heavily cross-subsidized. But a combination of relatively large incentives, regional climate change response initiatives, and the general favor that renewable energy technology enjoys have combined to maintain a steady though low level of household interest in these systems.

In these circumstances, we believe that Energy Star should focus its specifications strongly on helping purchasers choose the most efficient STS products from among the many that are offered, and on maintaining its list of required system features in order to ensure system reliability and performance over time. The SEF metric, measured using a consistent and appropriate set of test conditions, is an adequate one for efficiency rating purposes.

New Product Categories

Add-on Heat Pump Water Heaters

These products will likely have a marketplace role to play for some time to come as HPWH technology becomes better known and more common in the marketplace. In part this is because they are often the best solution for a particular physical set of installation circumstances. The use of an add-on HPWH can allow the unit to draw on an appropriate air volume (not house air or confined space) while minimizing plumbing alterations imposed by moving a storage tank. This may be true for new construction, major remodel or replacement situations.

While COP at an appropriate set of rating conditions would be reasonable metric for rating the efficiency of these products, we think this might be a needless complication of the specifications. After the new federal water heater standards for electric storage products go into effect in 2015, the range of efficiency for these products will be very small. Even in situations where an add-on HPWH is placed in service with an existing water heater, it will not be too many years down the road when that tank is replaced with one that meets the new federal standards. And even with an existing, older tank, the tank standby losses degrade the performance of the whole system only slightly. A good installation is far more important for efficiency than the EF of the tank to which the unit is added.

So we believe that EPA should not worry about the efficiency of the tank to which an add-on HPWH is added. No one will throw away a fully functioning add-on HPWH when the storage tank must be replaced, and any new tank will highly likely be more efficient than the one replaced, and so system efficiency can only improve with time, all else equal. This means that add-on HPWHs should be rated in conjunction with a new, minimum federal standard efficiency storage tank, with the plumbing connections and tank size and settings specified in the test procedure. This would yield a standard EF rating, as for any other HPWH. Once again, our comments with regard to the Northern Climate Heat Pump Water Heater Specification and test methods apply.

Warranty requirements (on the heat pump unit itself only) should not need to be any different than those for other HPWH products. **It is not at all useful or necessary to have an add-on HPWH manufacturer or installer assume any kind of warranty liability for the tank to which it's added.**

Point-of-use Electric Water Heaters

In simple terms, we do not find EPA's case for adding point-of-use water heaters, of any kind, to the program to be at all compelling. We agree with DOE's 2008 conclusions that whole-home electric tankless water heaters offer limited savings over conventional water heaters, though we would apply that conclusion to electric tankless water heaters generally, without regard to whether they are whole-home of point-of-use (POU) models. If EPA has energy savings data that argues to the contrary, we'd love to see it.

If there is little or no efficiency or environmental benefit for this particular technology, we're struggling to understand why EPA would even include it in the program, much less violate EPA's stated preference for technology neutrality.

We also disagree with EPA's assertion that "increased peak load may not be an issue." Again, if EPA has field data that demonstrates otherwise, we'd like to see it on the table as part of this discussion. It is also highly unlikely that the smaller POU products avoid "the need for upgraded electrical capacity." While a 9kW unit might not require too much in the way of upgrade in a utility space where a typical whole-home water heater is located, it is seldom that bathrooms and kitchens have separate, 40-amp 240-volt circuits associated with the sink, especially when the wiring calls for 8-gauge or larger wire. Given that the products cost about the same as a standard storage-type water heater while providing less than whole-home service, and that they are highly likely to cost more to install, and that multiple water heaters would then be required to serve a whole home's water heating needs, why is EPA even considering this proposal?

There may be valid reasons why point-of-use water heaters would be specified in certain niche applications, but none of these reasons is particularly relevant to the Energy Star program, and so none of them are valid reasons for including this kind of water heater in the program. As electric utility investments in "smart grid" capabilities for managing (moving from peak to off- or shoulder peak periods) some of the largest loads in a typical residence, we find it more than ironic that EPA would, for the first time, start promoting a water heating technology that, even in POU capacities, imposes a larger load on the electric grid than the loads currently targeted for control. **We strongly urge EPA to reconsider this proposal, and stick to water heaters that can provide whole-home water heating service.**

Summary

We suggest that Energy Star's residential water heater specification framework needs less adjustment than EPA currently believes. In some cases, EPA proposes to add complexity to the program without being able to identify a resulting benefit. This certainly wouldn't benefit those purchasing water heaters, and isn't likely to benefit those who plan to use the program to promote the most efficient water heaters. We urge EPA to keep the program as simple as possible, and align its specifications as much as possible with the revised federal test procedure and DOE's framework for energy efficiency standards. Thank you very much for the opportunity of early stakeholder involvement in this important process.

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