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May 8, 2015

Ms. Brenda Edwards  
U.S. Department of Energy  
Building Technologies Office, Mailstop EE-5B  
1000 Independence Avenue SW  
Washington, DC 20585

Re: NOPR regarding residential solar-thermal water heating systems with secondary heat sources  
Docket No. EERE-2014-BT-STD-0045

Dear Ms. Edwards:

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) is the trade association representing manufacturers of air conditioning, space heating, water heating and commercial refrigeration equipment. The AHRI member companies which manufacturer residential water heaters account for essentially all such equipment sold and installed in the U.S. Many of those companies supply water heaters that are provided as secondary heat sources for residential solar water heating systems. We submit the following comments in response to the DOE's notice of proposed rulemaking (NOPR) regarding residential solar-thermal water heating systems which use electric or fossil fuel-fired water heaters as secondary heat sources issued in the April 8, 2015 Federal Register.

We support DOE's effort to address this issue and to clarify that solar assisted storage water heaters are not subject to the minimum efficiency standards for residential storage water heaters. However, there are significant issues with the proposed definitions such that the NOPR does not provide the desired and needed result.

A critical issue is the use of certified first hour rating as a criterion in the definitions of solar assisted electric, gas and oil storage water heaters. Since these models are excluded from the energy efficiency standards for water heaters, it is not clear what test procedure would be used to determine the first hour rating value. If the presumption is that the current DOE efficiency test procedure for residential water heaters will be used to measure the FHR of a solar assisted water heater, then additional revisions are needed to specifically address the determination of FHR for these models. These modifications should address the starting condition of the solar assisted water heater, whether any heat contribution is provided by the solar heating component and the set up for the thermostat's controls on the water heater. One example of a problem with the current test procedure is establishing the initial tank temperature condition of a solar-assisted electric storage water heater. By definition, this model has an electric resistance element only in the upper half of the tank. With this heating element configuration it will be extremely difficult to establish the current starting condition of a mean tank temperature of  $135F \pm 5F$ . A similar situation exists for the fossil fueled models with a burner located in the upper half of the storage tank. If a

different test procedure is intended to be used to determine the FHR for solar-assisted storage water heaters, then such a procedure needs to be specified.

A second issue is that the restriction to models below a specified FHR can counter the benefit of the solar heating component. The proposed FHR limits will preclude the use of larger volume storage water heaters. Yet with a larger volume storage tank, more of the energy that is delivered by the solar panels will be stored and available for use when the household needs it; often not during the daytime. The benefit and value of a solar water heating system is increased in direct proportion to the amount of solar energy stored as heated water. A FHR criterion that effectively prohibits the use of larger than average storage tanks appears counterproductive.

A necessary feature of a solar assisted storage water is the ability to meet the water heating load of the residence on days when solar energy is not available. The criterion in the proposed definitions results in solar assisted models that can satisfy this need only if the household is an average household and the hot water load on that day is no more than average.

The NOPR identifies several issues on which DOE seeks comment. Our comments are provided below.

1. Are the criteria proposed to define solar-assisted water heaters sufficient to describe these types of water heaters?

No, as described in our general comments the criteria are not precise enough. Also they exclude some models currently used as auxiliary storage water heaters for solar water heating systems.

2. Are there alternative ways to define solar-assisted water heaters including additional prescriptive design criteria or performance-based criteria that might involve tests to determine whether the definition is met?

As we noted, the issue is to more precisely define solar-assisted water heaters. This may be done through performance based criteria but the imprecision of the current FHR criterion highlights that the procedures for determining compliance with any performance based criteria must be sufficiently detailed and specific to properly measure those criteria for the products that are to be included within the definition of solar-assisted water heater.

3. Should a criterion be added to the definition of solar-assisted fossil fuel fired water heaters that requires the burner to be located in the upper half of the tank?

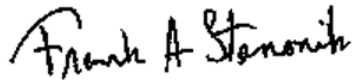
This proposed criterion severely limits the models that will be available as solar-assisted gas storage water heaters. There are only a few models of gas storage water heaters and no oil-fired water heater models that meet this criterion. This criterion also complicates the test set up for measuring the FHR if the procedure from the DOE test procedure is to be used.

4. Is the uniform test method for measuring the energy consumption of water heaters appropriate for representing the performance of solar-assisted electric and fossil fuel-fired storage water heaters?

No. We have noted the problem with using the DOE test procedure to measure FHR. This question is somewhat perplexing. If solar-assisted storage water heaters are excluded from the federal minimum efficiency, why would this test procedure be used to measure the energy consumption? Additionally, at present there is the current DOE efficiency test procedure for residential water heaters and a revised uniform efficiency descriptor test procedure scheduled to go into effect on July 13, 2015. Since this rulemaking may well not be finalized until after that date, it is not clear to which version of the residential water heater efficiency test procedure this question is referring. We note that neither test procedure specifically addresses a model that uses solar energy as an additional means to heat the water.

AHRI appreciates the opportunity to provide these comments. If you have any questions regarding this submission, please do not hesitate to contact me.

Respectively Submitted,

A handwritten signature in black ink that reads "Frank A. Stanonik". The signature is written in a cursive, slightly slanted style.

Frank A. Stanonik  
Chief Technical Advisor