AHRI
AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE
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2111 Wilson Boulevard Suite 500 Arlington VA 22201-3001 USA
Phone 703 524 8800 | Fax 703 562 1942
www.ahrinet.org

December 10, 2015

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

Re: NODA regarding preliminary analysis of efficiency standards for electric pool heaters
Docket No. EERE-2015-BT-STD-0003

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 Heat Pump Pool Heater Section includes many of the manufacturers of heat pump pool heaters that are providing products in the U.S. market. Those manufacturers account for a majority of such equipment sold and installed in the U.S. On their behalf, we submit the following comments in response to the DOE's notice of data availability (NODA) regarding the preliminary analysis of efficiency standards for electric pool heaters issued in the October 26, 2015 Federal Register.

As a general comment the analysis recognizes that electric pool heaters may have input rates up to 300 kW. Furthermore, DOE has stated that there is no capacity limit on pool heaters that are consumer products. However, all of the efficiency levels considered for electric pool heaters in the analysis assume the use of heat pump technology. Although this is clearly beneficial to our members it appears to create some problems for the current electric pool heater market. The highest output capacity for a heat pump pool heater at the specified DOE test condition (high air temperature/mid-humidity) listed in the AHRI Directory is 185,000 Btu/h (about 54 kW) and it is just one model. For many manufacturers listed in the AHRI Directory the highest capacity model is around 130,000 to 132,000 Btu/h (38 to 39 kW). Our heat pump pool heater certification program only covers models with an output capacity up to 200,000 Btu/h. That captures most of the models available in the market but there are a few heat pump pool heaters with higher output capacities. Thus, the analysis appears not to consider that segment of the market that may require a very high capacity electric pool heater. This could include very large pools or pools in colder climates. At the low air temperature/mid-humidity condition, the capacity of the "highest capacity" unit identified above drops to 37.5 kW. The analysis must consider the entire current market for electric pool heaters and should not establish an efficiency standard that will make the product unavailable for some segments of that market. One way to do this may be to establish separate product classes for electric pool heaters based on some capacity breakpoint.

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

1. Whether the product classes proposed adequately describe the electric pool heater market. (See chapter 3 of the TSD.)

The basic concept of the proposed product classes is adequate for the electric pool heater market. However, the proposed definitions of those product classes require further development. We agree with the specification of a maximum output capacity as part of the definition of the electric spa heart product class. None of AHRI's members that manufacturer electric pool heaters have "electric resistance" models with output capacities greater than 11 kW. From that perspective, the proposed 11kW limit for a spa heater is reasonable. The second specification that the spa heater is factory- or field-assembled within the envelope of a spa, hot tub or pool is not clear enough. We do not understand what the "envelope of the spa, hot tub or pool" is. Furthermore, this appears to exclude spa heaters that may be physically separate from the spa, hot tub or pool but which are heating the water for that unit. Either the "envelope" needs to be described in greater detail or this second specification need to be reconsidered.

2. The definition of an electric spa heater, including the maximum capacity covered by the definition. (See chapter 3 of the TSD.)
See response to #1.

3. The assumption that heat pump technology could not be implemented within a spa heater as defined in the preliminary analysis. (See chapter 3 of the TSD.)

We concur with this assumption as presented in the analysis.

4. Technologies that should be considered during the technology assessment and screening analysis that can be used to improve the energy efficiency of electric pool heaters. (See chapter 3 of the TSD.)

No comment.

5. The representative characteristics DOE has identified for electric pool heaters. (See chapter 3 of the TSD.)

As the analysis noted, manufacturers have not measured the standby and off mode consumption for many of their pool heater models. Therefore, we are unable to address the specific "typical" values used in the preliminary analysis at this time. We do note that DOE's estimate is based on a minimal amount of data. As this rulemaking proceeds and as our members' time and resources allow, we will provide additional information on the standby and off mode consumption of heat pump pool heaters.

No other comments.

6. Typical characteristics of the baseline designs for electric pool heaters that are currently on the market. (See chapter 3 of the TSD.)

No comment.

7. The max-tech efficiency levels identified for the analyses, including information regarding prototype designs that may be capable of allowing electric pool heaters to achieve integrated thermal efficiency values above those identified in this preliminary analysis. (See chapter 3 of the TSD.)

No comment.

8. The proposed efficiency levels for analysis for each product class, including information about any additional efficiencies or technologies that should be analyzed that may not be captured in the efficiency levels analyzed by DOE. (See chapter 3 of the TSD.)

The proposed efficiency levels for pool heaters are acceptable values for this preliminary analysis. We do have a concern regarding the representation of the integrated thermal efficiency values. COP values are reported to the nearest tenth which translates to the nearest 10%, i.e., 3.6 = 360%. We recognize that the inclusion of the standby and off mode consumptions in the TE_i calculation results in percentages that are lower than the "COP" equivalent. However, the relative scale of the ratings has been lost in this process. Specifically, heat pump pool heaters provide significant efficiency improvements, as illustrated by the significant increase in efficiency that occurs at the various trial levels. The specification of an efficiency requirement as a minimum of 344% or 486% or similar value is out of proportion to the range of efficiency ratings of the product class. It does not make sense to eliminate a heat pump model from the market if it's TE_i is only several percentage points below the specified minimum value when that model's efficiency is multiple times more efficient than the baseline model. For products where the efficiency ratings are less than 100%, a change of 1 or 2 percentage points may make a difference. For products such as heat pump pool heaters with efficiency ratings that exceed 300%, a difference of 1 or 2 points is inconsequential.

9. The typical standby and off mode electrical consumption of electric pool heaters. (See chapter 5 of the TSD.)

See comment on #5.

10. The estimated manufacturer production costs (MPC) for electric pool heaters at each efficiency level. (See chapter 5 of the TSD.)

The preliminary analysis of the estimated manufacturer production costs (MPC) is significantly flawed. On a general basis, the relationship of manufacturing cost to efficiency for heat pump pool heaters is relatively linear and proportional, similar to other consumer products. The preliminary analysis has failed to identify that relationship properly. As a specific example, the design features assumed for EL 1 and 2 mischaracterize how those respective efficiency levels are achieved and provide an unrealistic estimate of MPC, i.e. a 40% improvement in the EL 1 efficiency can be achieved for only a $1 increase in MPC. The use of straight or twisted Titanium tube coils is just two different ways to get to the same end. The two different design features described for EL 1 and 2, respectively do not inherently result in the significantly different efficiencies estimated in the analysis. The efficiency that will result from the use of straight or twisted Titanium tubing will be based on the effectiveness of the overall design of the heat exchanger; the twisted tube provides no significant efficiency improvement of itself.

11. Whether the distribution channels described are appropriate for electric pool heaters.
(See chapter 6 of the TSD.)
No comment.

12. Whether the manufacturer markup used in this analysis (1.28) is appropriate for the electric pool heater market. (See chapter 6 of the TSD.)

No comment.

13. Whether the data sources used to develop the markup values for the wholesalers, pool contractors, pool retailers, and pool builders are appropriate. (See chapter 6 of the TSD.)

No comment.

14. The approach used to determine the electricity consumption of electric pool heaters in residential and commercial applications. (See chapter 7 of the TSD.)

No comment.

15. The geographical distribution of electric pool heater users. (See chapter 7 of the TSD.)

Based on our members' perspective as manufacturers of heat pump pool heaters, the geographical distribution of electric pool heaters has some questionable results. In particular, we question the information that shows that the "Mountain" census division has the second highest fraction of electric pool heaters. Although this region includes eight (8) states, many of those are not highly populated. It seems inconsistent that this "cold" census region would have a higher fraction of electric pool heaters than the "Pacific" census division which include highly populated and warm California. Although the RECS information is readily available and useful, the usage and installation circumstances of electric pool heaters may be such that a more detailed estimate of installations per state is needed to properly analyze an efficiency standard for electric pool heaters.

16. The determination of the effect of climate on the electricity use of electric pool heaters.
(See chapter 7 of the TSD.)

We have no comment specific to this issue. However, it should be noted that any changes in the assumed geographical distribution of electric pool heaters would alter the effect of this issue on the analysis.

17. The difference in geographical distribution of electric pool heaters according to efficiency. (See chapter 7 of the TSD.)

We were unable to identify the information in Chapter 7 of the TSD that showed the geographical distribution of electric pool heaters by efficiency. Is this being represented by pool use hours?

18. The prevalence of electric pool heaters in commercial buildings and multi-family housing complexes. (See chapter 7 of the TSD.)

No comment.

19. The assumption that most consumers are unlikely to set their electric pool heaters to the off mode during the non-heating season. (See chapter 7 of the TSD.)

We disagree with this assumption. The decision by a consumer to set their electric pool heater to the off-mode during the non-heating season is connected to geography, i.e., the length and climate of the non-heating season. In northern climates with a long and cold non-heating season, many consumers will put their pool heater in the off mode as part of the process of closing their pool for the season. In those parts of the country where the non-heating season is either relatively short or relatively mild, some consumers still will put their pool heater in the off mode. In those parts of the country where there is a minimal non-heating season consumers are unlikely to put the pool heater in the off mode.

20. The current distribution of product efficiencies in the market for electric pool heaters. (See chapter 7 of the TSD.)

There has not been much change in the distribution of electric pool heater efficiencies in the market since July of 2015.

21. The approach used to develop the estimates of future electric pool heater consumer prices. (See chapter 8 of the TSD.)

This approach is incorrect and inappropriate for estimating future prices of electric pool heaters. The analysis uses information on the price trends for central air conditioners (CAC) and heat pumps (HP) solely on the basis that heat pumps pool heaters use technology similar to that used for CAC and HP units. That commonality does not justify an assumption that the experience of price trends for the CAC and HP units is relevant to heat pump pool heaters. There are significant differences in the heat pump pool heater market which show it has little in common with the CAC and HP market. Most significantly, the CAC and HP market has sales of about six to seven million units per year, whereas, the heat pump pool heater market has annual sales that are in the tens of thousands; more than 100 times less than the CAC/HP market. Additionally, a baseline unit with an output capacity of 110,000 Btu/h is significantly larger than a baseline CAC or HP unit. Given these differences, there is no economy of scale available to the manufacturers of heat pump pool heaters. The factors that influence and shape the price trend of CAC and HP units have no relevance to heat pump pool heaters.

Also, the looming change in the refrigerant that will be used in heat pump pool heaters is of such significance that any estimate of future prices at this time is probably irrelevant.

22. The rebound effect value (10%) used in the analysis. (See chapter 8 and 9 of the TSD.)

The decision to ignore the rebound effect in estimating the cost of operating higher efficiency electric pool heaters is arbitrary. Although DOE estimates that the rebound effect at 10%, the cost associated with the increased energy consumption caused by this effect is not factored into the LCC for these models. DOE justifies this omission with the rationale that the value of the increased use of the heated pool resulting from a higher efficiency pool heater offsets the increased energy cost resulting from that increased use. Thus, the rebound effect in the analysis does not increase the LCC nor extend the payback period even though the household with the new higher efficiency pool heater will operate that unit more than the old pool heater it replaced, and the actual savings in the monthly energy bill will not be as great as estimated based on the incremental efficiency increase of the new pool heater. We agree that the increased use of the heated pool is real but, it has no real monetary value. Operating the pool heater more often to heat the pool will increase the consumer's monthly heating bill by "x' dollars. That is real. If the potential monthly reduction in a consumer's monthly pool heating bill could have been 400% but actually was only 360 % because of the rebound effect those added dollars paid by the consumer cannot be considered savings. The cost of the new higher efficiency pool heater must be compared against the real benefit of the actual monthly energy bill paid to operate the pool heater, not a mythical benefit that pretends the consumer's bill is less than it really is.

23. The approach and data sources used for assessing installation costs for electric pool heaters. (See chapter 8 of the TSD.)

No comment.

24. The methodology and data sources used for assessing changes in maintenance and repair costs for more-efficient electric pool heaters. (See chapter 8 of the TSD.)

The estimated annual maintenance and repair costs are too low. Although the 2015 RS Means Facilities Repair and Maintenance Data may be a recognized reference, we are not aware that it has information specific to the repair and maintenance of heat pump pool heaters. Accordingly, we question the relevance of that data to this analysis.

25. The lifetimes for electric pool heaters. (See chapter 8 of the TSD.)

Table 3.2.8 shows an estimated an average lifetime of an electric pool heater as 10 years. Yet, in Chapter 8 of the TSD, an estimated average lifetime of just over 11 years is shown. The average 10 year life is the more accurate value and should be used consistently in the analysis.

26. The methodology for estimating discount rates for consumers of electric pool heaters. (See chapter 8 of the TSD.)

AHRI's July 10, 2015 comments on the notice of proposed rulemaking for amended efficiency standards for residential furnaces included comments on DOE's methodology for estimating discount rates for consumers. Those specific comments apply to this preliminary analysis too. The true marginal discount rates for consumers are much more likely to cluster around 8-9% than around 3-5%. First, as demonstrated by both reasonable analysis of consumer balance sheets and the survey data, only a minority of consumers will be able to use cash or other savings in order to pay for a pool heater. Even then, cash is not a low/no cost source of funds since it must be replaced with high cost funds or deferred consumption in order to rebuild the liquidity cushion. The marginal source of funds for most consumers is credit card debt (estimated by DOE at 14.2-15.0%). According to the American Housing Survey, only 7% of respondents had home equity loans or lines of credit (the lowest cost of borrowing for most consumers).

27. The appropriate distribution of energy efficiencies for electric pool heaters in 2022 (compliance year of the standard) in the absence of amended energy conservation standards. (See chapter 9 of the TSD.)

Table 8.2.18 in the TSD has some inaccuracies. Most notably, not all commercial indoor pools using electric pool heaters in 2022 will use electric resistance models. This is not even the current case. By 2022, some percentage of commercial indoor pools will be heating the pool with a heat pump pool heater.

28. DOE's methodology and data sources used for projecting the future shipments of electric pool heaters in the absence of amended energy conservation standards. Specifically, DOE is interested in the historical data from the past 10 years for electric pool heaters. (See chapter 9 of the TSD.)

DOE's projection of future shipments assumes a rate of growth that is significamtly too high. AHRI has a statistics program that collects data on heat pump pool heater shipments. The historical rate of growth reflected by our statistics program information does not support that rate of shipment increase estimated in the analysis. We are consulting with the participants in that program to determine what heat pump pool heater shipment information can be provided to DOE.

29. The potential impacts of amended standards on product shipments, including impacts related to fuel and product switching. (See chapter 9 of the TSD.)

No comment.

30. The methodology used to determine long-term changes in electric pool heater efficiency independent of amending energy conservation standards. (See chapter 9 of the TSD.)

No comment.

31. Electric pool heater consumer subgroups that should be considered in this rulemaking (if any). (See chapter 11 of the TSD.)

No comment.

32. The planned approach for conducting the emissions analysis for electric pool heaters. (See chapter 13 of the TSD.)

No comment.

33. The planned approach for estimating monetary benefits associated with emissions reductions. (See chapter 14 of the TSD.)

No comment.

34. The planned approach to conduct the utility impact analysis. (See chapter 15 of the TSD.)

No comment.

35. The planned approach for assessing national indirect employment impacts of amended energy conservation standards. (See chapter 16 of the TSD.)

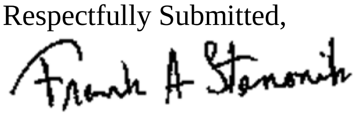
No comment.

36. The planned approach for assessing non-regulatory alternatives to mandatory energy efficiency standards. (See chapter 17 of the TSD.)

No comment.

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

Respectfully Submitted,



Frank A. Stanonik
Chief Technical Advisor