



2111 Wilson Boulevard Suite 500 Arlington VA 22201-3001 USA
Phone 703 524 8800 | Fax 703 562 1942
www.ahrinet.org

October 14, 2015

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program, Mailstop EE-5B
1000 Independence Avenue SW
Washington, DC 20585-0121

Re: Proposed Rule Energy Conservation Standards for Residential Furnaces;
Docket Number EERE-2014-BT-STD-0031

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 that manufacture residential gas furnaces account for practically all residential gas furnaces that are sold and installed in the U.S. We submit the following comments in response to the Department of Energy's (DOE) notice of data availability (NODA) regarding amended efficiency standards for residential non-weatherized issued in the September 14, 2015 Federal Register.

We appreciate that DOE has given consideration to the comments and concerns raised by AHRI and others regarding the number of consumers that would be negatively affected or would switch fuels for heating if an amended minimum efficiency standard of 92%, or similar condensing level AFUE, were adopted as a DOE national regulation for non-weatherized gas furnaces (NWGF). We also appreciate that DOE is analyzing an alternative concept of separate standard levels for small and large furnaces as a way to minimize these potential negative aspects of the proposed standard in the March 2015 NOPR.

However, AHRI's July 10, 2015 comments on the NOPR documented our concerns with fundamental flaws in the basic tools utilized in the NOPR analysis. Specifically, we addressed conceptual mistakes in its modeling process and errors in its assumptions. Those comments also provided information supporting a conclusion that no revision to the efficiency standards for either NWGF or mobile home furnaces is justified. Although, the NODA analysis modifies the NOPR analysis in some areas, it does not correct these fundamental flaws. Thus, those same concerns apply to the NODA analysis. The NODA does not counter or otherwise resolve our position that DOE's analysis does not justify any change in the minimum efficiency standard for NWGF. The specific values and estimates generated by the NODA analysis illustrate the concept of separate standards for small and large furnaces but we do not accept that the NODA values are any more valid than the NOPR analysis. In one sense, with correct analytic tools, the NODA analysis may support the conclusion of our July 10, 2015 comments. As we will discuss later in these comments, the NODA analysis indicates that as the input rate value defining a "large" furnace gets larger, the average life cycle cost savings remains fairly stable at the highest average LCC values estimated by the analysis but the estimated percentage of consumers who would experience a net cost decreases significantly. That trend does raise a question as to whether any revised standard is needed.

We do agree that the "separate standards for small and large gas furnaces" concept warrants further consideration with a refined analysis. Some of the advantages of this concept if the residential furnace standards are revised are:

It provides a reasonable solution for most of the installations that cannot accommodate a condensing furnace without extraordinary costs or installation site renovations.

It addresses the concern of those areas of the U.S. that have low heating loads where the installation of a condensing furnace is not economically justified.

It maintains the enforcement simplicity of the single standard.

It focuses the benefit of a “condensing” standard level on the input sizes where the energy savings is maximized.

The September 14, 2015 Federal Register notice indicated that DOE might issue a supplemental notice of proposed rule (SNOPR) following this NODA. AHRI requests that DOE issue a SNOPR but it not be issued before the end of the year. We further request that the analysis be updated as discussed in our July 10, 2015 comments and below. Taken together, we expect that the two-tier standards approach and correction of DOE’s analysis will show the the impacts of standards to be significantly different than DOE forecasted in the March 2015 NOPR. Without this information, it would not be possible to estimate the likely effects of the proposed amended furnace energy efficiency standards.

The information provided in the NODA shows the potential to use this concept to structure an amended minimum efficiency standard for NWGF that may be satisfactory to all stakeholders. AHRI will be meeting with other stakeholders in order to try to develop a jointly supported recommendation of small and large gas furnace standards to replace the single standard for the March 2015 NOPR. Deferring the publication of any SNOPR for three (3) months or so will provide DOE time to correct the analysis and provide us time to determine whether such a recommendation can be achieved.

The NODA included a summary of the updates made in the LLC spreadsheets as compared to the NOPR spreadsheets. Recognizing that the NODA sought comments on these changes, we have the following specific concerns about the NODA analysis:

Share of Sample Households by Furnace Size

Table II.2 shows the percentage of households that are assumed in the analysis to install a “small furnace”. The percentage are generally too high for each input rate definition and significantly overestimated for the 60k Btu/h and 65k Btu/h values. On page 55041 of the NODA it explains:

“If there is a separate standard for small furnaces, DOE expects that some consumers who would otherwise install a typically-oversized furnace would choose to down-size in order to be able to purchase a non-condensing furnace. For the NODA analysis, DOE identified those sample households that might down-size at the considered small furnace definitions. DOE first determined if a household would install a non-condensing furnace with an input capacity greater than the small furnace size limit without amended standards. In the standards case, DOE assumed that a fraction of such consumers would down-size to the input capacity limit for small furnaces.”

Although this informs us that some fraction of consumers are assumed to downsize, the NODA does not inform us either of the amount of that fraction or how it was derived. Footnote 6 on that same page explains that the distribution of input capacity is based on “shipments by input capacity bins” data for the year 2000. Attachment A is the average percentage of gas furnace shipments for those same bins covering the last 20 years (1995 – 2014). The data for 2000 is shown to the right for comparative purposes. The 20 year average reflects the furnaces that have been sold and installed in the past 20 years. This information indicates that only 10% of consumers are installing a furnace with an input rate under 60 kBtu/h; Table II.2 estimates that 15% of consumers install such units. The shipment data indicates that

21% of consumers are installing a gas furnace with an input rate less than 70 kBtu/h; Table II.2 estimates that as high as 38% of consumers install such units. This is not a minor inconsistency. Our data shows that over the last 20 years, only 43% of installations were of units with an input rate less than 80k Btu/h. The implication of Table II.2 is that 4 out of 5 consumers (17 out of 22) who have a gas furnace with an input rate from 70 kBtu/h up to, but not including, 80 kBtu/h would downsize the furnace when it is replaced so that they could install a non-condensing model. This is an unsupported, questionable assumption on its own. It becomes unbelievable when is considered in conjunction with the facts that nearly 1 out of every 2 furnaces shipped today is a condensing unit and that in areas of the country with significant cooling loads and low heating loads, the furnace is sized on its the ability both to meet the heating load and to accommodate a properly sized air conditioning system

Installation Cost

The NODA includes minor updates in markups and product price trend which change the installed cost of gas furnaces. AHRI's July 10, 2015 comments provided data from contractors installing units today indicating that DOE's estimate of installed cost derived by multiplying markup values, that are themselves estimates, is significantly underestimating the total installed cost of a gas furnace. The failure to address that information in the NODA analysis is a significant flaw that prevents complete consideration of the two standards concept. As the analysis of this concept goes forward, this error in the estimated total installed cost must be corrected.

Life Cycle Cost Analysis

The average LCC savings information in Table III.1 only addressed the small furnace input rate definition up to 65k Btu/h. The spreadsheets provided with the NODA did include additional options up to 90k Btu/h. We ran those other small furnace definitions in DOE's spreadsheets using the Crystal Ball software. Attachment B is the results of that effort presented both as a spreadsheet and as graphs. There are several things worth noting. The combination of standards "92% for large and 80% for small" provides the highest average LCC savings for every input definition. Furthermore, the average LCC savings for the input definitions from 70 kBtu/h to 85 kBtu/h are all higher than the LCC saving for the input definitions lower than the 60 kBtu/h value and do not vary by very much in the range of 60 kBtu/h to 85 kBtu/h. The average LCC savings for that group can be characterized as $\$530 \pm 23$; considering the accuracy of the analytic tools this suggests that the LCC savings across this range of input definitions is essentially the same.

Table III.2 shows the estimated share of consumers that would experience a net cost at each of the alternative definitions and standard level combinations. Again, the "92% for large and 80% for small" combination appears to be optimal in limiting the number of consumers that would be adversely affected by the proposed standards. However, in this case, the input definitions higher than 65 kBtu/h show markedly better results. At an input definition of 80 kBtu/h or higher, the percent of consumers with a net cost drops to 2%; less than 1/3 the percentage for the 65 kBtu/h input definition and less than 1/8 the percentage at the 55 kBtu/h input definition.

National Energy Savings

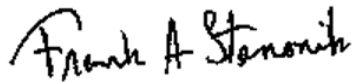
Table III.8 provides estimates of the National Energy Savings for input definitions up to 65 kBtu/h. In this case, the NODA analysis is incomplete. Unlike the LCC savings spreadsheets, we are unable to fill in the information for the input definitions from 70 kBtu/h to 90 kBtu/h. In order for all interested parties to fully evaluate this concept, it is critical that DOE provide the estimate of national energy savings at these other optimal input definitions. Equally important, the national energy savings analysis must be made with revised and accurate assumptions. This includes a more representative distribution of furnaces by input, a smaller adjustment for down-sizing and more realistic installed costs. We request that DOE

conduct this expanded and corrected national energy savings as soon as possible so that the information is available to us during our discussion with other stakeholders.

The trend indicated by Table III. 11 is that the two standard concept can save more energy on a national basis than the single standard proposed in the March 2015 NOPR. That is one of the aspects of this concept that warrants it being further considered. However, the actual estimates of those national energy savings must be recalculated starting with the base estimate for the single standard proposal. AHRI's July 10, 2015 comments contested the NOPR's estimate of 2.78 quads of energy savings and provided our analysis that estimated the total energy savings to be less than 1.7 quads. We agree that the national energy savings for a single standard should be recalculated in the NODA analysis. However, the recalculated estimate in the NODA of 2.6 quads for a 92% AFUE minimum standard is too high; our July 10, 2015 comments suggest by as much as 1 quad. Without the complete analysis of the other input definition options above 65 k/Btu/h, we cannot assess the change in the national energy savings. The NODA shows a trend of decreasing savings as the small furnace definition expands, but we have no information on the nature of that trend at those higher input definitions. Does it drop at a constant rate or does it level off. More significantly, what are the energy savings totals if a revised analysis is done addressing the flaws we have noted, and how do those energy savings in the area of the 80 kBtu/h input definition compare to the recalculated single standard estimate. The input definitions in that range provide close to the maximum LCC savings and the lowest percentage of consumer that experience a net cost.

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

Attachments A and B

Percentage of Residential Gas Furnace Shipments by Input Ranges
 Compared to Distribution of Units Assumed in DOE NODA

	20 Year Average	Shipments in 2000
Input Rate	%	%
Less than 60,000	10	9
60K under 70K	11	9
70K under 80K	22	25
80K under 90K	14	14
90K under 110K	21	23
110K under 125K	13	14
125K and Over	7	7