

March 28, 2013

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program, MS EE-2J
1000 Independence Avenue, S.W.
Washington, D.C. 20585-0121

Re: DOE Framework Document on Residential Boiler Efficiency Standards
Docket No. EERE-2012-STD-0047

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. AHRI's 309 member companies include all the major manufacturers of residential boilers (gas and oil fired) doing business in the U.S. We submit the following comments in response to the notice of availability of the Framework Document issued in the February 11, 2013 Federal Register. This notice initiated the rulemaking to consider amending the energy efficiency standards for residential boilers and identified issues related to the Framework Document on which DOE is seeking comments. Our comments address both general issues and the issues listed in the federal Register notice.

General

In November 2007 DOE issued a final rule revising the minimum efficiency standards for residential boilers. The analysis for that rulemaking was conducted during the years of 2004 to 2006. Although some aspects of that analysis have changed since that time, there are other aspects, particularly those technical discussions related to the design and construction of boilers and their vent systems, which have not changed significantly. We urge DOE to use the information from the previous analysis that is still relevant and technically correct in the analysis that will be performed for this rulemaking. It is particularly important that DOE review the information provided by industry for the previous analysis regarding the need to avoid efficiency levels that put boilers into the "near-condensing" area of operation. If such an efficiency level is specified as a minimum standard, there will be some replacement installations using a minimum complying boiler in which unacceptable amounts of condensation will occur regularly in the vent system. This is a safety concern that must be properly recognized in this analysis.

During the March 13, 2013 public meeting the question was raised whether this rulemaking will consider both revised efficiency standards, i.e. performance standards, and revised design requirements. DOE must answer this question quickly and unequivocally before this rulemaking proceeds much farther. It has been long recognized that the provisions of the National Appliance Energy Conservation Act (NAECA) of 1987 authorized DOE to establish minimum efficiency standards for residential covered products in terms of performance requirements. In 2007 Congress passed the Energy Independence and Security Act (EISA) which included a provision specifying certain design requirements for residential boilers. Those design requirements were subsequently added to DOE's regulations in 2008. To our knowledge EISA did not alter any of the provisions of NAECA addressing DOE's authority to develop or revise standards for residential covered products. Therefore, it appears that this rulemaking may address revised minimum

efficiency standards only. For the benefit of all parties, DOE must clearly define the scope of this rulemaking.

DOE has requested shipment information for residential boilers in terms of total annual shipments and some other specific subgroupings. At this time we are unable to provide any such statistical data. We will be consulting with our boiler manufacturer members to determine what information we can provide to DOE and what, if any, one time surveys we will need to conduct to reply to some of DOE's requests.

Issues identified in the April 18, 2011 Federal Register notice

Item 1-1 DOE invites comment on all aspects of the material presented in this document.

Addressed in our general comments.

Item 2-1 DOE welcomes comment on the preliminary scope of coverage and on whether there are any additional types of residential boilers that should or should not be included in the scope of this rulemaking.

We have no recommendations on types of boilers that should or should not be included in the scope.

This rulemaking should not include the regulation of standby mode electrical power consumption on the basis that such consumption on boilers is insignificantly small and that any regulation of standby mode consumption will not result in significant energy savings. Consider a 150,000 Btu/h boiler with standby power consumption of 12 watts. Assume that the boiler is in standby mode 85% of the time and firing the remaining 15% of the time. The standby electrical power consumption of this example accounts for only 0.15% of the power consumed by this product.

This is compounded by the fact that residential boilers are installed indoors. The current DOE test method does not consider heat lost through the jacket as an energy loss since that heat is transmitted into the residence. Similarly, any heat given off by the electronic controls in standby mode provides heat to the space where the unit is installed. As such, standby mode consumption should not be considered an energy loss. Any less heat provided to the space due to lower standby mode consumption will have to be replaced by heat provided by the boiler. There likely will be no net energy savings in terms of the total consumption of the boiler.

We agree that an analysis of off mode consumption should be conducted.

Item 2-2 DOE welcomes comments regarding the need to include combination appliances and electric boilers in this rulemaking.

We support DOE's plan to maintain the scope of coverage as defined by its current regulations.

A clearer definition of combination appliances is needed before further discussion on test procedure and associated regulations takes place. As DOE noted, the rulemaking on revising the furnace/boiler test procedure will be completed prior to the finalization of this rulemaking. The finalized test procedure rulemaking will provide definitive information on the status of DOE's deliberations regarding combination appliances, including a clear definition of such products.

Item 5-1 DOE welcomes data that would contribute to the market assessment, including but not limited to information on national shipments, manufacturing costs, distribution channels, and manufacturer market shares of residential boilers.

Addressed in our general comments.

Item 5-2 DOE welcomes comments on its proposed product classes. Does capacity or any performance-related features warrant the creation of another product class for residential boilers in accordance with the requirements of 42 U.S.C. 6295(q)?

We do not recommend the creation of any new product class in this rulemaking.

Item 5-3 Are there some product classes with such low volumes of annual shipments that the Department should not undertake analysis to determine if the efficiency standards should be upgraded?

No comment at this time.

Item 5-4 DOE welcomes comments on the technologies identified as well as additional technology options which have not been identified.

The technologies that have been identified should be reassessed in view of the analysis done in 2004 through 2006. Such a review should result in the elimination of some of these technologies and avoid the expenditure of resources of those non-viable or impractical technologies. As noted at the public meeting, pulse combustion should be dropped as a unique technology. It is merely one way to design a condensing boiler. The analysis of electronic ignition systems is unnecessary since the current DOE regulations have banned continuous pilots on residential gas boilers.

With regard to standby power consumption, there is a recommendation to implement a control relay for models with brushless permanent magnet motors (5.2.12). This suggestion has the potential to not only increase product price due to the addition of controls components, but increase the maintenance cost. The primary supplier of BPM motors to the boiler industry (a premix blower manufacturer) has indicated that their electronics cannot tolerate being switched on and off frequently. Consequently this suggestion, which seems to be a design requirement, may provide a small reduction on electrical power consumption while significantly increasing repair costs when the motor has to be replaced because of frequent on/off cycling. This further supports the recommendation to not include any regulation of standby mode consumption in this rulemaking.

Item 6-1 Of the technologies listed in section 5.2, are there any that should be screened out based on the four screening criteria? If so, which criteria apply and why?

See response to Item 5-4.

Item 7-1 DOE seeks input from interested parties regarding the range of efficiency levels that should be examined as part of its analysis.

We suggest DOE group products according to the following product classes and efficiency ranges:

- Gas Hot Water: products suitable for installation with Category I or III venting, generally in the range of 82% - 83.5% AFUE.
- Gas Hot Water: products requiring metal Category II or IV venting but unlikely to condense in the heat exchanger, generally in the range of 83.6% - 87% AFUE.
- Gas Hot Water: condensing products requiring metal Category IV venting, generally in the range of 87.1% - 89.9% AFUE.
- Gas Hot Water: condensing products that may be vented with non metallic materials, generally in the range of 90% - 95.2% AFUE (currently highest efficiency listed in the AHRI Directory).
- Oil Hot Water: 84% - 87% AFUE.
- Oil Hot Water: 87.1% - 91.2% AFUE, (currently highest efficiency listed in the AHRI Directory).
- Gas Steam: products suitable for installation with Category I or III venting, generally in the range of 80% - 83.5% AFUE.
- Oil Steam: 82% - 86% AFUE.

The ranges for gas water heater models that are not designed to be condensing are not absolute but reflect majority of products in that suggested grouping.

Item 7-2 DOE seeks comments on the appropriate max-tech levels for residential boilers.

Hot water boilers identified as “max tech” for the purposes of this analysis should only be those models which are commercially available and for which there is significant field experience in North America. Market forces are already driving manufacturers to develop higher efficiency products in this class and it is therefore unlikely that DOE will identify a technology not already in commercial use that is safe, reliable, and cost effective.

The existing installations of gas steam boilers are more likely than hot water boilers to present the situation where there are no practical alternatives to natural draft venting using a masonry chimney, particularly in urban areas. Therefore, while it may be possible to design a gas steam boiler with an AFUE approaching 90%, the practical “max tech” level for this class should be limited to an efficiency appropriate for Category I venting. Similarly, the “max tech” AFUE level for oil boilers should be limited to that for natural draft venting in a masonry chimney.

Using burner modulation as a way of increasing AFUE is not a practical technology for either oil or gas steam boilers because most residential steam systems are not zoned. Reducing the burner input will therefore result in heat distribution problems in the system (i.e. radiators “closest to boiler” will condense all available steam, leaving none for those further away).

DOE also needs to consider that there are residential units in many urban areas where it is difficult or impossible to vent boilers horizontally through an outside wall.

Item 7-3 DOE seeks input on the representative capacity and other representative characteristics for each residential boiler product class.

DOE should review the baseline models that were used in the analysis done in 2004 - 2006 and then determine whether any modification to those baseline models is required.

Item 7-4 DOE seeks input on characteristics which may require multiple representative products within a single product class.

DOE should consider the following characteristics in each product class:

- (1) Heat exchanger material: Stainless, copper, aluminum, cast iron.
- (2) Heat exchanger construction: Single piece, sectional, water tube, fire tube.
- (3) Burner type: Atmospheric, induced, premix.
- (4) Venting System

Item 8-1 DOE welcomes suggestions and comments concerning its proposed approach to developing estimates of future residential boiler retail prices.

The tear down analysis described in 7.2.3, Methodology, is used to determine manufacturer cost. The examination of boiler parts from such unit teardowns may not reveal chemical treatment, heat treatment, unique sealing or bonding processes that may add to manufacturing cost and be vital to product performance or reliability. We encourage the DOE to include inquiries regarding manufacturing costs that may not be self-evident by teardown when conducting interviews with manufacturers. A review of DOE teardown cost estimates with the manufacturer of a given product is one method that would provide more accurate results.

Also, DOE should analyze the manufacturing costs only for products that are boilers as evidenced by the appropriate certifications to applicable product safety standards and ASME codes.

Item 9-1 DOE seeks stakeholder input on the planned approach of using RECS data for determining the energy consumption of residential boilers in residential buildings.

No comment at this time. We need to review the RECS data.

Item 9-2 DOE seeks stakeholder input on what fraction of large boilers serving multiple housing units are non-residential (commercial) boilers, and what criteria to use to remove such units from the sample.

We do not have any information to respond to this item.

Item 9-3 DOE seeks historical shipment-weighted boiler efficiency data between 2003 and 2011.

Addressed in our general comments.

Item 9-4 DOE seeks stakeholder input on data sources that it can use to characterize the variability in annual energy consumption for boilers. DOE is particularly interested in field monitoring studies and data.

We do not have any information to respond to this item.

Item 9-5 DOE seeks stakeholder input on what fractions of oil-fired and gas-fired hot-water boilers are used both for space heating and domestic hot water.

Addressed in our general comments.

We recommend that when reviewing any data that is provided, DOE distinguish between the different types of indirect water heating: e.g. boilers that supply water for indirect fired water heaters, low-mass combination boilers, and high mass boilers with integral heat exchangers. Each type of combination product has unique characteristics that are likely to have affect its annual energy consumption.

Item 9-6 DOE seeks input on the fraction of residential boilers that is used in combination with hydronic air handlers.

We do not have any information to respond to this item.

Item 9-7 DOE seeks input on the fraction of residential boilers that is used in commercial applications. Is this market large enough that DOE should take it into account?

We do not have any information to respond to this item. Furthermore, we question the need to consider this item in the analysis. If a residential boiler is being used in commercial application it is because the boiler can meet the load of that application. In effect the application is similar to a residential load so considering it as something unique is unnecessary. Conversely if DOE is interested in commercial applications where multiple residential boilers are installed, those applications have no commonality with residential applications. As such they should not be considered as a factor in establishing revised standards for residential products. The very nature of these standards is to focus on residential products as used for their primary intended application; i.e. installation in consumer's residences.

Item 9-8 DOE seeks comments on the rebound effect that may be associated with more-efficient residential boilers.

We do not have any information to answer this question. DOE should review the analysis conducted in 2004-2006.

Item 10-1 DOE seeks stakeholder input on its proposed approach of using probability distributions and Monte Carlo simulations to conduct the LCC and PBP analysis.

No comment at this time.

Item 10-2 DOE requests data from stakeholders to characterize the current mix of boiler efficiencies in the market.

Addressed in our general comments.

Item 10-3 DOE seeks input on the planned approach for estimating future energy prices.

We do not have any information to answer this question.

Item 10-4 DOE seeks stakeholder input on the maintenance and repair costs approach. Specifically, DOE requests comment on frequency and cost of maintenance, major repair issues, repair frequency, and

repair costs for boilers that meet the minimum efficiency standards, as well as for higher-efficiency boilers.

We agree that repair and maintenance costs must be considered at every efficiency level evaluated in the analysis. While there may be some correlation between increased repair and maintenance frequency and increased efficiency, there are several factors that may be causing a shift in that correlation:

- condensing products have matured with improved means of resisting the negative effects of condensation
- water treatment technology has been developed to extend the life of some materials
- changes in city water supply chemistry have reduced the life expectancy of some steam boilers

We recommend that DOE rely on the most recent data it can obtain and consider projections based on trends regarding frequency and cost of maintenance and repair of various classes of product.

Item 10-5 DOE seeks stakeholder input on its proposed installation cost approach. Specifically, DOE requests data on the fractions of installations that would entail significant additional installation expenses.

One aspect of the previous analysis that has changed relates to the consideration of households which have lower efficiency, natural draft units that would require extraordinary installation costs, i.e. significantly more than the standard drop in replacement, if the minimum standard was set at a level that required condensing boilers. The percentage of condensing residential gas boilers shipped annually has steadily increased since 2003. Most of those shipments went into replacement installations. Since those upgraded installations were made voluntarily by consumers, it is reasonable to assume that the majority of those replacements went into installations that did not require major modification of the installation site. If the specific installation could not easily accommodate a replacement boiler that condensed, the estimated installation cost was likely higher than a standard replacement installation increased and it is likely the consumer would not choose to have the condensing boiler installed. The number of replacement installations with lower efficiency boilers that are candidates for the energy efficiency upgrade of a replacement condensing gas boiler is less today than in 2003. Furthermore, the proportion of those replacement installations that would present a “problem” installation for a condensing boiler is larger now than in 2003. This has relevance both to the consideration of costs for condensing gas boilers in replacement installations and the energy savings associated with those installations. The “average” installation cost will be higher and the national energy savings will be less.

Item 10-6 DOE seeks comments on the methodology used to determine product lifetimes for residential boilers.

See comments on Item 10-4. Longevity estimates need to be segregated by product class (including separation of condensing and non-condensing products) and year over year trends need to be considered to project shifts in life expectancy for each class. DOE should also seek information on average life of condensing boilers used in Europe, keeping in mind that the frequency of product maintenance is different in Europe.

Item 10-7 DOE seeks stakeholder input on its planned approach for estimating discount rates for residential consumers.

DOE should review the analysis performed in 2004-2006.

Item 10-8 DOE seeks comments on the appropriate distribution of energy efficiencies for residential boilers in the absence of amended energy conservation standards.

The continued existence of programs that provide incentives for the consumer to install more efficient products will continue to increase the percentage of higher efficiency boilers in the field.

Item 11-1 DOE seeks historical shipments data from stakeholders, disaggregated by efficiency level if possible.

Addressed in our general comments.

Item 11-2 DOE seeks input from stakeholders on the potential impact of amended standards on residential boiler shipments.

Unless a product class is eliminated, it is unlikely that this regulation will significantly affect the number of boilers sold. Weather and rebate programs will affect total annual volume of boiler sales.

Item 12-1 DOE seeks comments on the appropriate assumptions to use regarding long-run changes in residential boiler energy efficiency independent of amended energy conservation standards.

The roll-up scenario as described in the DOE proposal is appropriate up to a point. However, there are limits to the efficiency of some product classes and gaps in the efficiency offerings of gas fired water boilers that may affect the roll-up. Few if any condensing gas fired steam or condensing oil fired boilers exist.

Item 13-1 The Department requests input as to what consumer subgroups are appropriate to evaluate for residential boilers.

We agree that low-income and senior only households merit consideration.

Item 14-1 DOE seeks comment on appropriate manufacturer subgroups, if any, that DOE should consider in a manufacturer subgroup analysis for residential boilers.

We have no recommendations for any manufacturing subgroups to be considered in DOE's analysis.

Item 14-2 DOE welcomes comments on what other existing regulations or pending regulations it should consider in its examination of cumulative regulatory burden.

In examining the cumulative regulatory burden DOE should consider:

The increased minimum efficiencies and design requirements implemented for residential boilers in 2012
The test procedure correction that is currently in process.
Revised test procedures for residential boilers that are in process.
The certification reporting requirements imposed by DOE.

The testing and certification requirements of the EPA Energy Star program.
Revised Energy Star criteria that are in development.
Revised FTC Energy Guide labels and regulations that have been recently finalized.

Pending revised DOE regulations on certification and enforcement of efficiency standards for commercial products.

Possibly revised test procedures for commercial boilers.

New DOE Item 14-3 DOE requests industry feedback on the number and names of small business manufacturers in its examination of cumulative regulatory burden.

No comment at this time.

Item 15-1 DOE seeks input on its approach to conduct the emissions analysis for the residential boiler products covered by this rulemaking.

The information provided in the rulemaking framework document regarding emissions analysis seems to be focused on power plant emissions. There are insufficient details in the document for significant comment on emissions analysis relevant to residential boilers.

Item 16-1 DOE requests comments on the approach it plans to use for estimating monetary values associated with emissions reductions.

We do not have any information to answer this question.

Item 17-1 DOE welcomes input from stakeholders on its proposed use of NEMS-BT to conduct the utility impact analysis.

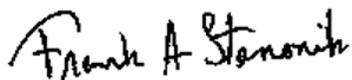
We do not have any information to answer this question.

Item 18-1 DOE welcomes feedback on its proposed approach to assessing national employment impacts.

Non-condensing products are generally domestic products; however, high efficiency (condensing) products generally involve imported heat exchangers. Assuming that the total number of boilers sold is relatively unaffected by the regulation, a shift to more condensing boilers will result in some reduction in manufacturing personnel and increased consumption of imported assemblies.

We appreciate this opportunity to provide comments and participate in this rulemaking.

Respectfully submitted,



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