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January 20, 2015

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program, MS EE-5B
1000 Independence Avenue, S.W.
Washington, D.C. 20585-0121

Re: Preliminary Technical Support Document on Commercial Packaged Boilers

Docket No. EERE-2013-BT-STD-0030

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 commercial boilers account for the large majority, at least 75%, of all commercial gas and oil boilers with input ratings of 5 million Btu/h or less that are sold and installed in the U.S. These members also manufacture commercial packaged boilers with higher input ratings. We submit the following comments in response to the notice of availability of the preliminary Technical Support Document (TSD) issued in the November 20, 2014 Federal Register. This TSD provides the preliminary analysis for the rulemaking to amend the energy efficiency standards for commercial packaged boilers. Also, DOE provided an Executive Summary of this analysis which included a list of questions and concerns related to the rulemaking on which DOE is seeking information or data. Our comments include both general comments and comments on several of the issues listed in the Executive Summary.

General Comments

At the December 9, 2014 public meeting DOE reaffirmed that there is no upper input limit on the applicability of the minimum efficiency standard for commercial packaged boilers. However, the input rates assigned to the baseline models in the analysis are 800,000 Btu/h for “small” commercial boilers and 3,000,000 Btu/h for “large” commercial boilers. Furthermore most of the analysis appears to be based on information relative to models with input rates of 5,000,000 Btu/h or less. Commercial boilers that have input rates in the high millions of Btus per hour are very different products. Many of the factors that have been considered in this analysis and the associated conclusions cannot be simply extrapolated up to characterize the particular factor as it applies to those very large commercial packaged boiler. We urge DOE to keep that fact in mind as it continues to develop the analysis.

Also at the December 9, 2014 public meeting, DOE indicated that it expected to issue the Notice of Proposed Rulemaking (NOPR) for revising the efficiency test procedures for commercial boilers sometime in the next few months and prior to the NOPR for this efficiency standard rulemaking. We

appreciate that DOE recognizes the need to finalize the test procedure revisions in advance of the standards revisions. It is critical that the revised test procedures be finalized so that the analysis for the revised standard is based properly on the test procedures that will be applied to products to establish their compliance with the revised efficiency standard. Furthermore, there must be sufficient time between the completion of the revised test procedure and the NOPR for the efficiency standard to allow all parties to assess the effect of test procedure revisions on potential increased efficiency standards. AHRI's October 18, 2013 comments on the Framework Document had expressed our concern about the regulatory burden caused by the interjection of a test procedure rulemaking within the schedule for the efficiency standard rulemaking. We encourage DOE to continue its efforts to minimize that burden.

The use of data from the Energy Information Administration's (EIA) 2003 Commercial Building Energy Consumption Survey (CBECS) is the critical component to the estimated annual energy consumption values used in the analysis. As discussed at the December 9, 2014 meeting, information has been gathered from a 2012 CBECS but has not yet been officially published. Recognizing that this rulemaking will be affecting boilers manufactured in mid-2019 and the advances in commercial building construction to reduce energy consumption, both those that have occurred in the past 10 years and those that will occur in the next 4 years, this rulemaking analysis must use the 2012 CBECS data. The continued use of 2003 data will not properly characterize the consumption of commercial boilers being installed in mid-2019 and later. If this rulemaking must be delayed to await the official publication of the 2012 CBECS data, then so be it. Given the significance of that data in the analysis, DOE should not proceed with using outdated information.

Comments on Executive Summary Items

We are including only those items on which we have comments.

2. DOE requests comment on the appropriateness of its tentative decision to classify CPBs into 16 equipment classes as described in Table ES.3.2.

We reaffirm our Framework Document comment that the current 10 equipment classes are appropriate. The addition of separate product classes for natural draft gas and oil boilers appears to be an extension of the DOE activity regarding the definition of commercial packaged boiler and the determination of coverage. As we had noted in previous comments, the minimum efficiency standards specified for commercial boilers in EPA Act have been applied to all models, natural draft or otherwise, for the past 20 years. Similarly, the minimum efficiency standards specified for commercial boilers in ASHRAE Standard 90.1 have been applied to all models since the first edition of the standard more than 35 years ago. There should be no question that natural draft commercial packaged boilers are covered equipment subject to the Department's efficiency standards. Although DOE may see the need to classify natural draft commercial packaged boilers as covered equipment; we do not believe that need extends to creating a separate equipment class for those products in the efficiency standards.

3. DOE seeks comment on CPB standby mode and off mode energy consumption and, in particular, data on the magnitude of energy consumed in the different operational modes.

We support the preliminary finding that standby mode and off mode energy consumption of commercial boilers is a very small percentage of the total boiler energy usage. The magnitude of the energy

consumption in a particular operational mode is of no consequence when the standby mode and off mode energy consumption is mere hundredths of 1 percent of the total boiler energy usage. We recommend that DOE not pursue the development of standby and off mode energy conservation standards.

4. DOE is interested in views regarding the technological and economic feasibility of the technology options which successfully passed the screening analysis. In particular, DOE seeks information regarding technology options which can be applied to improve the efficiency of natural draft boilers.

We agree with the list of options that successfully passed the screening analysis with the exception of pulse combustion. Pulse combustion is but one way to create a boiler that condenses. DOE has not made clear why it continues to identify this as a design option warranting separate mention. Since many of the options relate to heat exchanger design, it is important that when analyzing these options DOE keep in mind the need to avoid heat exchanger designs that are so restrictive that they adversely affect the safe operation and venting of the boiler.

5. DOE requests comment on the methodology used to calculate incremental costs for increased efficiency for each equipment class. DOE would welcome comments from interested parties about the appropriateness of the incremental costs reported as part of the engineering analysis chapter. DOE would also welcome any additional price-related information, especially for natural draft boilers, which would further improve future analyses for this current rulemaking.

We note one issue which DOE's methodology does not appear to capture. In some cases, particularly for small manufacturers, the supplier of an efficiency-improving component may require the boiler manufacturer to purchase a minimum amount of that component. That minimum amount may exceed the boiler manufacturers immediate or near term needs for that component. In such cases there is an added overhead cost to the boiler manufacturer to store that component. Such components may be relatively small or, such as the case of heat exchanger related components, large. The cost to store these components will be correspondingly small or large. But it is an added cost in all cases.

8. DOE welcomes suggestions and comments concerning its proposed approach to developing estimates of future commercial packaged boiler retail prices.

The approach to estimate the price of a natural draft model by starting with the cost of a mechanical draft model and subtracting the cost of components that would not be employed on a natural draft model is flawed. It does not account for the different components that would be found on a natural draft model but which are not used on mechanical draft models. An example is a flue or vent damper that is used on a natural draft boiler.

We encourage DOE to make additional contacts with contractors and others involved in selling and installing commercial boilers to obtain more information on retail prices for natural draft models.

Also, we note that the analysis currently extrapolates prices assuming a linear relationship between input rate and price. That assumption is incorrect. We recommend that DOE either review the data it has collected so far or obtain additional data on this aspect of the analysis.

10. DOE seeks data on representative annual profiles of return water temperature, supply water temperature, and boiler percent loading.

We have significant concerns regarding DOE's decision to try to adjust boiler consumption estimates to account for differences in return and supply water temperatures. We are conducting a more detailed review of Appendix 7-B and will be providing supplemental comments on this item.

11. DOE seeks data on what return water temperatures boilers are tested at under the test conditions prescribed by the DOE test procedure.

We have previously commented that the analysis should not attempt to adjust rated thermal efficiencies to reflect return-water conditions. The data needed to determine what typical return water temperatures are in the field is not available. So any efficiency adjustment is an unsupported estimate. Furthermore, many installations today employ an outdoor reset which adjusts the boiler operation base on the heating load. With the use of this control, the supply water temperature is adjusted based on either the return water temperature or the outdoor air temperature. This added field condition variable is another reason for DOE to abandon its search for this data.

12. DOE seeks input on data sources that it can use to characterize the variability in annual energy consumption for commercial packaged boilers. DOE is particularly interested in field monitoring studies and data.

We have no such studies but suggest that DOE contact the Minnesota Center for Energy and Environment to inquire if they have any relevant studies.

13. DOE welcomes any data from interested parties about typical boiler sizing practices, including how often multiple boilers instead of a single boiler are installed to cover the building heating load, and how the number of boilers suitable for a specific installation is determined.

We have no specific data but the trend shows that more buildings, new and existing, are being provided with multiple boilers. It should be noted that ASHRAE 90.1-2013 now requires all boiler systems requiring an input rate of 1,000,000 Btu/h or more to have an input turndown ratio of at least 3 to 1. As the system input increases, so does the required turndown ratio. This requirement may be met by installing multiple boilers that are controlled to operate in a manner that complies with the specified minimum turndown ratio.

14. DOE seeks input on how boilers are controlled, particularly in multiple-boiler installations.

There are a variety of control systems. Some systems, such as building energy management systems are independent of the control system provided on the boiler. When the installation includes boilers of different efficiencies the control system usually calls on the secondary, less-efficient boiler to operate only in increased load situations.

15. DOE seeks historical shipment-weighted commercial packaged boiler efficiency data and/or shipment data by efficiency bins. DOE is primarily interested in data during the last 10 years in order to capture the impact of the most current technologies on the boilers market.

We are consulting with our boiler manufacturer members to determine what shipment information we may be able to provide.

16. DOE requests input on ancillary energy use by commercial boilers (i.e., in addition to fuel energy use) that should be included in the energy use analysis.

The analysis should not consider any energy used by the commercial boiler other than the fuel supplied to fire the boiler. The consideration of any ancillary energy is not useful to the analysis.

17. DOE seeks input on what fractions of hot-water commercial packaged boilers are used both for space heating and hot water.

Although we have no specific data, our collective opinion is that in commercial buildings the fractions of hot-water commercial packaged boilers used both for space heating and hot water is far less than 50% assumed in the analysis.

18. DOE requests data to characterize the current distribution of commercial packaged boiler efficiencies in the market.

See comment on Item 15.

19. DOE requests comment on frequency and cost of maintenance, major repair issues, repair frequency, and repair costs for commercial packaged boilers that meet the minimum efficiency standards, as well as for higher-efficiency boilers.

DOE should not assume that there is a linear relationship between the size of the boiler and the costs of its components. See our general comment about the analysis of larger sized commercial boilers. Also the repair costs may be representative of historical models, but the estimates are not indicative of repair costs for current boiler models. Newer commercial boiler models require more specialized equipment and technicians to install and repair them. Accordingly, the incremental repair cost increase is underestimated for higher-efficiency equipment.

20. DOE seeks input on how often boiler maintenance is performed by on-site staff versus external contractors, specifically for hot water boilers versus steam boilers and small boilers versus large boilers.

We have no data on this, but the industry trend is towards using external contractors who specialize in servicing advance design boilers or boiler systems.

23. DOE seeks input on how often plastic versus stainless steel venting is installed for condensing boilers.

This is a function of system design, and we do not have this data. There is a size limit for plastic venting. When the required vent size is 8" or larger the vent is typically stainless steel. When the required vent size is 4" or smaller, plastic vent material is often used.

25. DOE seeks input on the fraction of stainless steel venting in existing boiler installations by efficiency.

For existing installations of commercial boilers with efficiencies in the low 80s, stainless steel venting is rarely used. We are unable to make an estimate of the fraction of stainless steel venting used for other existing installations.

26. DOE seeks input on where boilers are typically located within buildings and where the vents typically terminate. DOE is interested in whether such placements change by geographic region or boiler type.

Boilers located within buildings are usually in the basement or penthouse. In high-rise buildings boilers are often located in intermediate floors. The vent termination is most often vertical. We are not aware of any regional variations of boiler placement within buildings.

27. DOE seeks data on how often common venting occurs in multiple-boiler installations and whether commercial water heaters are commonly vented with commercial boilers.

The National Fuel Gas Code requires condensing boilers to be separately vented. It is common practice to commonly vent non-condensing boilers. Commercial water heaters usually are not commonly vented with commercial boilers.

28. DOE seeks comments on the methodology used to determine equipment lifetimes for commercial packaged boilers.

The methodology is inadequate. There are two distinct classes of gas commercial packaged boilers on the market today; models that are non-condensing and condensing models. Because condensing gas commercial boilers have been a significant part of the commercial boiler market for the past 15 years or so, they have a comparatively short history of field use from which to try to estimate a product lifetime. The estimated lifetime for these models in the analysis must be determined differently because of this limited history.

31. DOE requests data on the efficiency distribution and welcomes comment on the likelihood and degree of improvement in efficiency of commercial packaged boilers in the next 5 to 10 years as a result of market forces or industry trends (in the absence of amended energy conservation standards).

See comment on Item 15.

33. DOE invites comments regarding the selection of appropriate economic drivers and sources of data for historical shipments and shipment breakdowns by equipment class.

DOE should not assume that the price elasticity of residential products can be applied to commercial boilers. The owner of a commercial boiler is more likely to repair an existing boiler because of the generally higher installed cost of a new boiler and the time involved to remove the old boiler and install a new unit.

34. DOE seeks historical commercial packaged boiler shipments data, disaggregated by equipment class and efficiency level if available.

See comment on Item 15.

35. DOE seeks input on the potential impact of amended standards on commercial packaged boiler shipments.

Incremental increases in the standard are not likely to have significant effect on shipments. Large increases in the standard will result in lower shipments since more existing installations will choose the repair option rather than replace when the existing boiler is not operating properly.

36. DOE seeks comments on the appropriate assumptions to use regarding long-run changes in commercial packaged boiler energy efficiency independent of amended energy conservation standards.

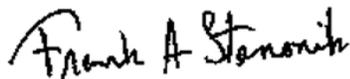
We may be able to better address this item once we address Item 15.

37. DOE requests input as to what consumer subgroups are appropriate to evaluate for commercial packaged boilers.

We suggest that DOE contact the Association of Facilities Engineers.

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

Respectfully 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