



April 12, 2016

Ms. Abigail Daken  
Product Manager, ENERGY STAR for HVAC  
U.S. Environmental Protection Agency  
Ariel Rios Building  
1200 Pennsylvania Avenue, N.W.  
Washington, DC 20460

Ms. Daken,

Thank you for the opportunity to comment on the Proposal issued on March 23<sup>rd</sup> as a supplement to the Draft 1, Version 1.0 ENERGY STAR Program Requirements Product Specification for Commercial Boilers.

Lochinvar, LLC, headquartered in the Nashville, Tennessee area, is a leading manufacturer of residential and commercial high efficiency boilers, water heaters and pool heaters. Lochinvar has been in the business of manufacturing boilers and related products since 1939 and is a wholly owned subsidiary of the A. O. Smith Corporation. The A. O. Smith Corporation is a proud ENERGY STAR program partner and prides itself on its strong working relationship with you and Product Management team at EPA.

We generally support the proposed Commercial Boiler ENERGY STAR program and believe the efficiency level is justifiable at 93% to 94% thermal efficiency. Lochinvar recommends the following changes be made to the proposal:

- Remove turndown ratio from the qualification criteria due to verification complications.
- Exclude boilers over 2.5 million Btu/h.

Additionally, we encourage the EPA to suspend this program development until the DOE Commercial Boiler Test Procedure rulemaking is finalized as this may change the number of qualifying boilers.

**Minimum thermal efficiency should be 93-94% (comment on the V1.0 Draft):**

Based on our internal evaluation and analysis of publicly available models on the AHRI Directory, Lochinvar supports a minimum thermal efficiency for participation in the ENERGY STAR program of 93-94%, which is a change from our initial comments. Consideration of the publicly available commercial boiler models up to and including 2.5MBtu/h appears to justify a 93% minimum thermal efficiency. All qualifying boilers would be condensing and in the top 18% or 22% of available models if the minimum efficiency levels were set at 94% or 93% respectively\*.

Thermal Efficiency	Commercial boilers on the AHRI Directory with inputs of 2.5 million Btu/hr or less	% of all commercial boilers on the AHRI Directory with inputs of 2.5 million Btu/hr or less
≥ 95%	194	13%
≥ 94%	275	18%
≥ 93%	338	22%
≥ 92%	377	25%
≥ 91%	383	25%
≥ 90%	392	26%

**Turndown ratio verification problem (comment on the V1.0 Draft):**

Upon further review and analysis, we believe including a minimum turndown ratio in the ENERGY STAR program will increase the test burden and associated cost to manufacturers, and should be avoided. This represents a change from our initial comments. Minimum firing rate tests are not a part of current efficiency test requirements. If the ENERGY STAR program adopts a turndown ratio qualification, they will need to develop a method to verify compliance, bearing in mind that additional testing will be yet another barrier to participation in the program. While most commercial boilers with multiple firing rates do have a certified minimum firing rate, the certification is based on a safety certification program (not an efficiency standard) and ENERGY STAR should not assume that all commercial boilers have a certified minimum input rate.

Again, we would remind the EPA that the fact that many commercial boilers are very expensive pieces of equipment, and are built to order. Costs to manufacturers must remain part of the EPA's final analysis. The burden of producing new test data on existing products is much higher for commercial products than residential products. It is difficult for us to understand why the ENERGY STAR proposal for a brand new program with high cost products would include a requirement that will require new and old products to be retested.

### **Exclusion of boilers from 2.5MBtu/h to 5MBtu/h:**

Upon further reflection and analysis, we recommend excluding boilers with inputs greater than 2.5 million Btu/h, which is a change from our initial comments. The burden of testing continues to increase with the input rating of the boilers, so an upper limit on the proposed program is desirable. Since 2.5 million Btu/h is the limit applied by the DOE for testing thermal efficiency, this provides a useful reference point for 2.5 million Btu/h as the upper limit.

We continue to struggle with the benefit of including boilers over 2.5 million Btu/h. According to our analysis, less than 10% of all high efficiency commercial boilers sold in 2015 have over 2.5 million Btu/h input rate. The EPA's theoretical models must acknowledge the small fraction of energy consumption in this category.

Cost of compliance: The cost of including boilers over 2.5 million Btu/h input will be high. Most boilers over 2.5 million Btu/h input are built to order and very few manufacturers maintain inventory of boilers in this size range. The cost to manufacture each unit is very high and the seasonality and infrequent demand makes it impractical to maintain inventory of these products.

Further, assuming the Commercial Boiler ENERGY STAR audit testing program follows Directive 2011-04, each model selected for audit testing would either:

- Be required to meet the meet or exceed the rated efficiency with no tolerance; or
- Have 4 units produced, with one of them being tested with a 5% tolerance. After a successful test the audit could be released back to inventory.

Manufacturer's would either be forced to produce costly inventory that might not be sold for years or risk the consequences of failing an efficiency audit due to the lack of the testing tolerance that accounts for test variation and has been determined necessary by decades of industry testing.

There is too much disagreement regarding the appropriate minimum efficiency level for boilers 2.5MBtu/h to 5MBtu/h. The EPA has recommended a combustion efficiency minimum of 95%, which would include only 9% of available models\*. Bradford White recommended using the same thermal efficiency as smaller units, but the DOE compliance is based on combustion efficiency and would also include about 11% of available models\*. It is inappropriate to start an ENERGY STAR program with less than 20% of available models meeting the requirement. A totally new program should not be so aggressively positioned.

Again, the proposal to include boilers with inputs greater than 2.5 million Btu/h to 5 million Btu/h will place a huge cost and risk burden on manufacturers while offering negligible energy conservation benefits.

**Suspend the development of the proposed program until the DOE Commercial Boiler Test Procedure rulemaking is finalized:**

We recommend suspending development of the commercial boiler ENERGY STAR program until the DOE commercial boiler test procedure rulemaking that is currently in process is finalized. The DOE has proposed changes to the commercial boiler test procedure that are likely to change the efficiency ratings of commercial boilers. The test procedure changes could significantly impact the distribution of models that can meet the proposed minimum requirements for the proposed ENERGY STAR program. These views are shared universally by boiler manufacturers.

**All commercial boilers with efficiency  $\geq$  90% are condensing boilers**

In our view the EPA proposal makes a very confusing, and perhaps, erroneous statement, *“Upon reviewing the AHRI certified products directory, EPA identified a clear distinction between condensing and non-condensing boilers at 92.0% TE.”* While there is not a specific thermal efficiency that defines a boiler as condensing or non-condensing, the line between condensing and non-condensing categories is near 87% combustion efficiency. Categorization of boilers as condensing and non-condensing is based on the ANSI Z21.13 test standard and is not an arbitrarily assigned designation. No boiler with a thermal efficiency of 90% or more is categorized as non-condensing.

**Timing and Underlying Data in the Comment Period**

The EPA set a deadline for comments for the draft commercial boiler ENERGY STAR program of September 25, 2015. The EPA has had 6 months to review the comments provided before issuing the current proposal on March 23, 2016, but has allowed less than 3 weeks to comment on the latest proposal. We think it would be in the best interest of the Program and manufacturers to be afforded more time to allow all implications of the proposed program changes to be more deliberatively considered.

## **Summary**

While we support commercial boiler ENERGY STAR program, we encourage the EPA to eliminate the most controversial and burdensome aspects of the proposal. The thermal efficiency minimum should be 93-94% and the scope must not include boilers with inputs over 2.5MBtu/h. Any program must not include a turndown ratio limit since it will require the creation of a new test method and will impose a huge burden on manufacturers. With the revisions we recommend, the new commercial boiler ENERGY STAR program will be manageable for manufacturer participation and encourage the use of higher efficiency equipment.

Respectfully submitted,



Jeff Kleiss  
Product Certification Engineer  
Lochinvar, LLC  
300 Maddox Simpson Parkway  
Lebanon, TN 37090  
615/889-8901 Ext. 2224  
[jkleiss@lochinvar.com](mailto:jkleiss@lochinvar.com)



Joshua C. Greene  
Vice President, Government & Industry Affairs  
A. O. Smith Corporation  
11270 West Park Place  
Milwaukee, WI 53224  
(301) 325-1315  
[jgreene@aosmith.com](mailto:jgreene@aosmith.com)

\*Note: AHRI directory searches were conducted with the following selections:

- Model Status = "Active"
- Input (MBH) Min. = "2501" for large commercial boilers and "300" for small commercial boilers
- Input (MBH) Max. = "5000" for large commercial boilers and "2500" for small commercial boilers
- Fuel Type = "Natural Gas" and "Light Oil"

These selections were made to remove duplicate models that have separate listings for "natural gas" and "propane gas" so they would only be counted once. There are still some models that are listed multiple times due to different model numbers with identical ratings.

Ratings may change after the effective date of the DOE commercial boiler test procedure final rule currently in development.