

**Interim Document Version 1.0 ENERGY STAR Commercial Boilers Specification Stakeholder
Comment Summary and Response**

Topic	Stakeholder Comment Summary	U.S. Environmental Protection Agency Response
Delay Specification	Three stakeholders requested EPA delay further work on this ENERGY STAR Version 1.0 specification until DOE finalizes the commercial boiler test procedure.	<p>EPA does not see delaying the specification as necessary or beneficial, due to several factors. Most importantly, the timeline of DOE action is not always predictable. Given that there would be a delay before the required compliance date with the changes in the test method, the sooner the ENERGY STAR specification is released, the more time it will be in effect before the DOE compliance date of the new test method might require a revision. In addition, DOE found that the aggregate change to boiler ratings due to all proposed changes are minimal. While manufacturers are concerned, none have data that contradicts this finding.</p> <p>Regarding market confusion and duplicative testing, EPA and DOE have a history of collaboration to ensure that the test burden on manufacturers is minimized and that information developed for one Agency can be used for both.</p> <p>Regarding extension of the comment period and the contrast between the short comment period and the long time between drafts, EPA encourages stakeholders to reach out to us if they need additional time to submit comments or if they have additional information to offer after the close of a comment period.</p>
Opposed to the Specification	Two stakeholders oppose the adoption of the ENERGY STAR specification for commercial	EPA understands not all manufacturers see a way to use

	boilers noting there is no need to set up an additional government program that mirrors an existing program (e.g., FEMP).	ENERGY STAR certification to encourage specification and purchase of high efficiency commercial boiler systems. This is often true with new specifications, and EPA relies on the creativity of the market to find ways to use certification, as with other product categories. The FEMP program applies to government ordering only, while ENERGY STAR reaches a much larger audience.
System Parameters Impact Efficiency	Several stakeholders alluded to the idea that actual efficiency is dependent on the system parameters. Efficiencies determined in accordance with 10 CFR Part 431.86 are based on return temperatures that are not representative of actual operation. The majority of hydronic systems in the U.S. operate at temperatures of 140-180°F versus the test standard's 80°F. Hydronic boiler operation efficiency is primarily dependent on the operating water temperature of that system. That, along with other boiler and system parameters (i.e., how the boiler is controlled, piped, and operated) will result in actual efficiencies much lower than the proposed ENERGY STAR levels.	EPA is aware that system parameters strongly affect achieved efficiency. In addition to assuming reduced efficiency in calculating payback, EPA is developing design guides to help purchasers and specifiers understand how to get the highest efficiency from ENERGY STAR boilers, and when a condensing unit is appropriate. This specification in tandem with education will support better decision making and design practices with future retrofit and new design hydronic systems.
Scope Reduction	Multiple stakeholders suggested excluding boilers over 2.5MBtu/h due primarily to small market penetration for large, high-efficiency boilers (about 10% sales in 2015) and that the scope should remain limited to boilers with input rates of 2.5MBtu/h until experience on the initial program has been evaluated.	Industry opinion has evolved since EPA was asked to include larger boilers. In recognition of this, EPA will limit the scope of the specification to 2.5 MBtu/hr.
Status	ASHRAE 155 is under development to address DOE concerns about measuring efficiencies as part load conditions to be adopted by DOE as part of the efficiency metric. The new measurements may impact the new efficiency metric. Consider adopting ≥90% TE level.	EPA welcomes changes to test methods that will better reflect field conditions and will adjust the specification as necessary when and if the test procedure changes.

Turndown Ratio	<p>Two stakeholders requested EPA remove the turndown ratio criteria due to verification complications. Additionally, stakeholders claimed this criteria is an additional burden on manufacturers, which is based on a safety certification program, not an efficiency standard, and not all commercial boilers may have a certified minimum input rate. The turn down ratio specification would unnecessarily discourage the use of Energy Star commercial boilers in multiple boiler installations where turndown is provided in the system design rather than by the boiler model. One stakeholder also mentioned that it was unclear if the turndown ratio was applicable to models greater than 2.5 MBtu/h.</p>	<p>Turndown ratio would not be a tested value, but one that is verified through examination of safety certification documentation. Both ANSI Z21 and UL 795 require determination of turndown ratio, in a comparable manner. Thus, there is minimal additional burden associated with this requirement. While system turndown is the truly important element, in many cases where few boilers are installed, a high turndown ratio is an important contributor to efficiency. EPA will retain this requirement. With boilers larger than 2.5 MBtu/hr now being out of scope, the requirement is not relevant to them.</p>
Thermal Efficiency	<p>Two stakeholders mentioned that TE should be set at 90%, stating that there is a clear distinction between condensing and non-condensing products at 85% CE (dependent on net flue temperature and CO₂ in the flue gases). The vent categorization test in the ANSI Z21.13/CSA 4.9 standard clearly identifies and distinguishes between condensing and non-condensing products. Calculations show that the line between condensing and non-condensing occurs around 85% CE. As such, it is requested this ENERGY STAR specification begin with 90% TE (or ~91% CE for boilers larger than 2.5 MBtu/hr) which is similar to what has been done with the Residential Boiler ENERGY STAR program (90% AFUE). This alignment creates an opportunity in the future to provide for a "Most Efficient" classification of ~94% TE (~95% CE) which also is similar to what is currently done for the Residential Boiler ENERGY STAR category. Furthermore, 94% TE threshold is unnecessarily restrictive and appears to be driven to match the FEMP specification. 90% is a reasonable TE level since the significant energy savings will be realized due to the condensing models that would meet.</p>	<p>Setting the level at 90% TE would not provide sufficient distinction between ENERGY STAR and conventional boilers, given the large proportion of models with TE > 90%.</p>

Combustion Efficiency Vs. Thermal Efficiency	<p>One stakeholder commented that EPA introduced the CE metric for commercial boilers larger than 2.50 MBtu/hr up to 5 MBtu/hr in accordance with the DOE current metric and a proposed ENERGY STAR level of >95.0% CE while the proposed level for commercial boilers equal to or greater than 3 MBtu/hr and less than or equal to 2.5 MBtu/r is >94.0% TE. The proposed level was intended to be >95.0% CE. Another stakeholder suggested that basing CE 1% higher than TE is an unreasonable method for setting the value due to the inaccuracy of TE measurements. It was also pointed out that for larger boilers (2.5 MBtu/h to 5 MBtu/h) the 95% CE would include 9% of available models. Another stakeholder mentioned that boiler insulation practices vary across manufacturers. Using a fixed % for radiation and convection losses to assume combustion efficiency gives an unfair advantage to manufacturers that use little to no boiler jacket insulation and hurt manufacturers that use plenty of boiler jacket insulation.</p>	<p>EPA's intent was to expand scope to include boilers of 2.5MBtu/h to 5MBtu/h, using the CE metric in accordance with DOE. The CE level for the larger capacity commercial boilers was proposed to be > 95 CE. However, as EPA has decided to limit scope to <2.5 MBtu/hr, CE will no longer appear in the requirements and the relationship between CE and TE is no longer a relevant question.</p>
Retrofit	<p>Due to the complexities of boiler systems, the cost of retrofitting a commercial installation is high. The surface area of the heating system must be increased to meet current heating requirements or the customer will raise the thermostat for additional heat until an acceptable comfort level is attained. This will be counter-productive to the desire to reduce energy consumption.</p>	<p>The design guides will treat retrofit and new installations separately, making clear for which applications condensing boilers are beneficial and what changes they would need to make to achieve savings with a condensing boiler.</p>
Guiding Principles	<p>One stakeholder challenges EPA's claims that the specification will achieve large national savings, provide equivalent or better product performance, or provide reasonable purchaser payback.</p>	<p>Specific objections that the stakeholder claims will prevent meeting each of these principles have been accounted for in EPA's estimates. For instance, in estimating national savings, EPA assumes that condensing boilers will be more broadly adopted even without the ENERGY STAR program, though not as quickly. EPA also assumes in calculating savings and payback that not all boiler installations will ever include condensing products, and that those that do will not achieve condensing efficiencies all the time. EPA has no information showing that boiler performance is reduced for boilers meeting this specification.</p>

Market	<p>The commercial boiler market has a well-established, widely accepted appliance efficiency rating certification program (AHRI). The addition of another certification program (ENERGY STAR) may bring confusion to the commercial boiler market and may be misleading to consumers as misguided understanding that installing an ENERGY STAR boiler will result in automatic energy savings. The ENERGY STAR brand should ensure consumers that the labeled equipment is indeed going to operate at the efficiency rating the ENERGY STAR label implies with the result of a reduction in energy consumption. Applying the ENERGY STAR label to hydronic commercial boilers in systems that cannot achieve these efficiencies detracts from the ENERGY STAR brand.</p>	<p>The influence of ENERGY STAR is in communicating simply that products save energy without requiring the purchaser to reference a specific efficiency rating. In tandem with the design guide, EPA will clearly communicate to purchasers where savings are practical to achieve and how to maximize those savings.</p>
Additional Requirements	<p>Requirement that a system is properly sized and equipped to handle condensing boilers at lower operating temperatures before certification eligibility.</p>	<p>EPA is not able to certify systems as installed, only products as manufactured.</p>
Safety Certification	<p>ENERGY STAR certified boilers should have to comply with nationally recognized safety standards for boilers by an independent 3rd party certification agency.</p>	<p>EPA plans to include requirement to be certified to either UL 795 or ANSI Z21. We do not expect this to impose any additional burden, as reputable manufacturers already certify their products for safety.</p>