



March 25, 2013

United States Environmental Protection Agency
Washington, D.C. 20460
Attn: Abigail Daken

Reference: ENERGY STAR® Version 3.0 Boiler Specification memorandum of February 26, 2013 Comments

I firmly believe that a properly applied use of idle loss metrics and calculations across heat only boilers and combined heat and hot water systems will create a win-win-win for manufacturers, the environment, and consumers. Most consumers, home energy auditors, and contractors are not aware that savings may be much more significant than estimated with AFUE alone. With AFUE, consumers have very limited information to make an informed decision. Beyond just awareness, auditors do not have a formal metric to use to demonstrate that heating system replacements can be at least as attractive an investment as other building upgrade options.

1. Idle Loss allows for differentiation of both boilers and combination systems. It is a very effective way to estimate performance upgrades over the existing installed base of both heat only boilers and combined systems.
 - 1.0 The idle loss and the corresponding input/output method of determining annual efficiency is not limited to domestic hot water producing appliances. It applies equally well to heat only systems.
 - 1.1 Idle loss is not a percentage of annual fuel use. It is a metric that allows a more accurate representation of annual efficiency for heat only boilers and combined systems. In the Brookhaven National Laboratories study, Performance of Integrated Hydronic Heating Systems, a difference in idle loss of 4.7% is demonstrated to show savings of 39%. The AFUE difference between these same systems is only 4%.
 - 1.2 AFUE specifically sets operating water temperatures, and as such excludes the impact of energy efficiency controls.
 - 1.3 Idle loss also accounts for oversizing effects instead of using the fixed 1.7 oversizing factor defined in the AFUE metric.
2. Consider a bridge strategy as follows:
 - 2.0 Adopting both options in the Energy Star program: 1) AFUE alone for qualification of a boiler or combination systems, or 2) AFUE combined with an idle loss value. Keeping the current AFUE intact until a better measure can be developed will reduce testing burden and simplify comparison between boilers and furnaces.
 - 2.1 Systems with an idle loss of less than 0.5% may qualify with an 85% AFUE for oil or gas systems.
 - 2.2 Establish default idle loss factors for systems with different physical characteristics. Manufacturers would be able to test products' idle loss, or simply use the established

- default factor. These physical characteristics may include control strategy, boiler insulation, boiler operating temperature, and optionally heat only or combined domestic hot water functionality. This has both the benefits of considerably reducing manufacturer test burden and greatly improving savings analysis.
- 2.3 A field validation of this direction would help make the program stronger.
 - 2.4 The lowest idle loss factors for top performing systems, specifically values less than 0.5% for low mass thermal purge systems and condensing boilers, identify very significant savings over products with less efficient physical characteristics. An appropriate idle loss default value below 0.5% may be accurate enough to limit optional manufacturer equipment test burden. It is important that a rigorous foundation be developed to ensure that low idle loss defaults are only provided to those systems that really should have them.
 - 2.5 Default idle loss factors may be applied to estimate efficiency of currently installed products, offering more accurate savings insight for consumers. These savings may be significantly greater than calculated with AFUE alone, especially for best in class heat only and combined heat and hot water systems.
 - 2.6 Adopt a Most Efficient qualification for any heat only or combined heat and hot water system with an 87% or greater AFUE and an idle loss of 0.5% or less. Further information about qualification and calculation should be provided on the ENERGY STAR Most Efficient site.
 - 2.7 Provide a simple user interface using the Brookhaven algorithm or similar approach to demonstrate upgrade savings based on selected ENERGY STAR products and a range of existing products. The interface could have default values customizable by the website visitor.
- 3. I have a concern that if idle loss is not applied to both heat only and combined heat and hot water systems, the new metric may cause market confusion.
 - 3.0 The idle loss method, if used as part of a procedure to develop a more accurate annual efficiency number, may lead to results that could be misinterpreted as “lower efficiency than AFUE,” when in practice, idle loss methodology results should be more accurate and useful overall.
 - 3.1 I feel that the idle loss, combined with a linear input/output measure is a very good approach towards developing a more accurate annual efficiency.
 - 3.2 Clear communication of the savings potential demonstrated with the idle loss metric is critical for successful implementation and to maximize consumer savings. This extends to the ENERGY STAR website and in all other appropriate outreach efforts.
 - 3.3 The idle loss method may lead to results that could be inappropriately compared to furnace AFUE as well. Communicating the high efficiency of hydronic distribution and lower efficiency of conventionally ducted distribution is important to provide context in cases where furnaces and hydronic systems may be compared.
 - 3.4 Overall, additional context and consumer friendly presentation is necessary for successful implementation and to realize the savings potential of top performing products.
 - 4. EPA notes that “high efficiency boilers deliver significant savings, but care must be given to installation factors in order to glean the largest savings possible.”
 - 4.0 When compared to higher idle loss systems, low idle loss systems inherently perform much closer to peak efficiency regardless of load and oversize factors; this minimizes the impact of installation factors.
 - 4.1 Ensuring that condensing boilers run throughout the heating season in condensing mode implies that the radiation in the building is suited to delivering design day output

at boiler temperatures that are uncharacteristically low for American homes. This means that homes may require expensive modifications to installed radiation (and/or building envelope heat loss improvements) to optimize the condensing performance. The modifications and related radiation upgrade costs are even greater if rapid recovery from night setback is desired. Many systems which use outdoor reset to enable condensing include reset override features to ensure rapid recovery from setback. This can lead to significant operating periods in a non-condensing mode. However, the energy savings from night setback may be greater than the loss of this period of condensing mode operation.

- 4.2 Although only a few percent greater savings may be achieved from the latent heat of condensate in condensing boilers operating in a low temperature distribution system, low idle loss systems may provide much more significant savings.
- 4.3 The lack of perceived payback may delay purchases and corresponding energy savings; idle loss can provide important insight into payback analysis and savings not found in AFUE alone.

We respectfully are submitting our comments in the interest of moving the country forward to a more efficient and sustainable future.

Yours truly,

A handwritten signature in cursive script, reading "Roger D. Marran".

Roger D. Marran
President