

Standards Review

February 2019

- Establishing a threshold for “significant” energy savings at 0.5 quads over 30 years; this is about 85 million barrels of crude oil (1 day of world use?)
- Requiring that EERE establish test procedures 180 days before publishing a proposed energy conservation standard;
- Clarifying that EERE will codify industry consensus standards for test procedures rather than establishing its own, separate test methods.

DOE Standards

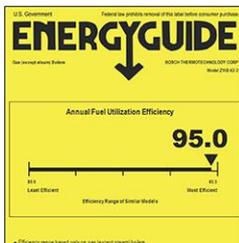
Fuel Costs for Annual Cost Calculations



Type of energy	Per million Btu ¹	In commonly used terms	New England December 2018
Electricity	\$38.83	13.2¢/kWh ^{2 3}	\$0.21/kWh
Natural Gas	10.38	\$1.038/therm ⁴ or \$10.79/MCF ^{5 6}	\$12.24 to \$16.80 (VT) (ME)
No. 2 Heating Oil	20.80	\$2.86/gallon ⁷	\$3.14 (\$22.83)
Propane	21.65	\$1.98/gallon ⁸	\$3.20 (\$34.98)
Kerosene	24.64	\$3.33/gallon ⁹	

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137,500 BTU/gal No. 2 Heating Oil; 1,039 BTU/ft³ therm Natural Gas; 91,455 BTU/gal Propane



AFUE Review

(ii) Except as provided in paragraph (e)(2)(iv) of this section, the AFUE of residential boilers, manufactured on or after September 1, 2012, and before January 15, 2021, shall not be less than the following and must comply with the design requirements as follows:

Product class	AFUE ¹ (percent)	Design requirements
(A) Gas-fired hot water boiler	82	Constant burning pilot not permitted. Automatic means for adjusting water temperature required (except for boilers equipped with tankless domestic water heating coils).
(B) Gas-fired steam boiler	80	Constant burning pilot not permitted.
(C) Oil-fired hot water boiler	84	Automatic means for adjusting temperature required (except for boilers equipped with tankless domestic water heating coils).
(D) Oil-fired steam boiler	82	None.
(E) Electric hot water boiler	None	Automatic means for adjusting temperature required (except for boilers equipped with tankless domestic water heating coils).

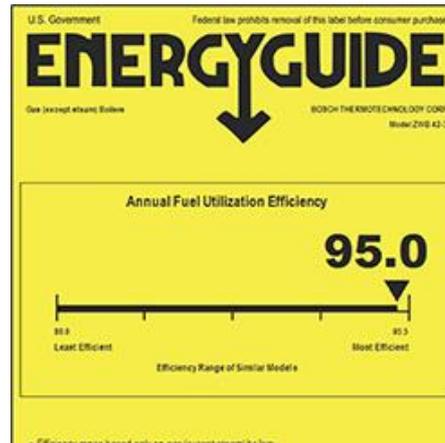
2021 AFUE ¹ (percent)
84
82
86
85
None

¹Annual Fuel Utilization Efficiency, as determined in §430.22(n)(2) of this part.

AFUE Standby Power

(B) Except as provided in paragraph (e)(2)(v) of this section, the standby mode power consumption ($P_{W,SB}$) and off mode power consumption ($P_{W,OFF}$) of residential boilers, manufactured on and after January 15, 2021, shall not be more than the following:

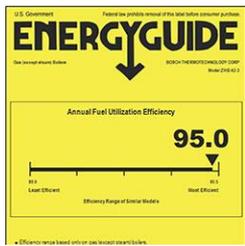
Product class	Standby	Off
	$P_{W,SB}$ (watts)	$P_{W,OFF}$ (watts)
(1) Gas-fired hot water boiler	9	9
(2) Gas-fired steam boiler	8	8
(3) Oil-fired hot water boiler	11	11
(4) Oil-fired steam boiler	11	11
(5) Electric hot water boiler	8	8
(6) Electric steam boiler	8	8



Off Cycle Power – Fuel Supply

- Tanks may need to be heated for higher biofuel levels
- If a fuel tank heater is used is that standby power? No.
- If a nozzle line heater is only on for a minute before the burner starts is that standby power? No. this is not captured.





AFUE2 Review – Furnaces Only

Up to 3% Backslide

Furnaces currently have (3) standards.

The AFUE2 metric accounts for furnace fuel, fan power, and stand-by and off-mode power consumption vs 3 separate metrics. The measured value represents the sum of usable heat and fan benefit, divided by the total fuel and electricity consumed.

Concept: It's simpler to understand a single metric

Only steady-state testing and excluding cyclic testing.

Will likely backslide by 3%, but legal as it is a “new standard.”

Based on an analysis of over 100 models, only a handful demonstrated greater than a 1% difference between measured AFUE and steady-state efficiencies (less jacket loss).

Measure the electrical consumption of the furnace when not in heating mode.

The ventilation energy consumption is measured.

Circulator (Pump) Standards

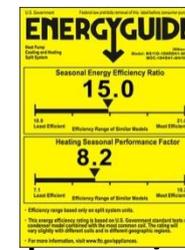
Circulator standard changes

- 2020 Commercial high efficiency
- Residential not yet in the works

ASHRAE standard working groups



SEER2 / HSPF2



- Today's standard 14.5 SEER and 8.2 HSPF single phase in northern climate areas
- “Broadly speaking, [SEER2/HSPF2] address off-mode test procedures, test set-up and fan delays, external static (blower) pressure conditions for testing, represented values for CAC/HP that are distributed in commerce with multiple refrigerants, the methodology for testing and calculating heating performance, and testing of variable speed systems.”
- 17° and 47°F outdoor air temperature test points with optional 5°F cold climate test point. This creates a different curve fit to calculate the seasonal performance.
- January 1, 2023, SEER2 takes effect:
 - The DOE originally was planning 15/8.8 for SEER(1)/HSPF(1)
 - 13.4 SEER2 for Split central air conditioning
 - 14.3/7.5 SEER2/HSPF2 for split heat pump
 - Is this 4.7% to 15% backsliding vs 15/8.8? AHRI data show 14.3/7.5 SEER2 is roughly equivalent
 - January 1, 2023 SEER2 takes effect

Conclusions

- Standards are changing
- Under a new standard, the rating may be lower than the old standard and yet have a higher efficiency
- Heating appliance standards do not compare source efficiency
- Energy costs used on Energy Guide labels may be misleading in regions with substantially higher (or lower) fuel prices. This is especially true when cross-class comparisons are made between oil and electric for example.