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March 21, 2013 (via email)

Ms. Abigail Daken
Energy Star Product Development Team
US Environmental Protection Agency
1200 Pennsylvania Avenue NW (Postal Code 6202J)
Washington DC 20460

Re: Version 3.0 Product Specification for Boilers

Dear Ms. Daken,

Crown Boiler Company acknowledges EPA's need to adjust the existing Energy Star program specification for boilers in light of both the current large market share of qualifying boilers and the recent increase in Federal AFUE standards. Crown believes, however, that EPA would be better advised to eliminate the Energy Star program for gas boilers entirely than raise the specification to 90% as proposed. This is because we believe that the increased costs associated with the purchase, installation, and shorter average life expectancy of condensing boilers are not justified by the resulting fuel savings.

In support of this position, we are sending an analysis which is similar to one we shared with EPA in late 2011. This analysis shows payback periods that are negative for both condensing boilers considered. The 2011 analysis compared the installation and operating costs of boilers close to today's Federal minimum with those of condensing boilers at or near the 95% "Most Efficient" threshold. The attached analysis compares boilers having AFUEs at the Federal Minimum and Version 3.0 levels. More realistic (i.e. lower) electrical consumption values are also used for the non-condensing boilers, which have no inducers and also use "smaller" pumps than their condensing counterparts.

We are glad to see that EPA has acknowledged the effect that system water temperature has on boiler efficiencies actually realized in the field, particularly for condensing boilers. It is important, however, to recognize that the attached analysis compares both condensing and non-condensing boilers working at the same water temperatures (the 120F inlet /140F outlet temperatures used in the AFUE test procedure). At higher water temperatures the relative efficiencies of these two types of boilers can be expected to be even closer together. Given that the vast majority of residential boilers are sold as replacements, and given that the system design is the primary determinant of operating water temperature, we think it is unlikely that EPA will be able to significantly influence the water temperatures of the heating systems in which condensing boilers are actually used.

We have not performed a similar analysis for oil boilers, but we agree with EPA that the 87% AFUE level is easier to justify. We would therefore not be opposed to the complete elimination of the gas specification while the oil specification is increased to 87% as proposed.

I'm sure you will agree that the creation an Energy Star specification that provides no demonstrable cost savings to the consumer, and is arguably more expensive to the consumer in the long run, is bad for both the consumer and the credibility of the Energy Star brand. We believe that 90% gas specification proposed fits into this category and we urge EPA to reconsider the need for a gas boiler specification at all.

Sincerely,

Paul Sohler
Director of Engineering

Attachment #1

	Case 1: Design Heating Requirement=78000 BTU/hr		Case 2: Design Heating Requirement=132000 BTU/hr		
Boiler Type	Non-condensing	Condensing	Non-condensing	Condensing	Ref #
Boiler AFUE	82.0	90.0	82.0	90.0	1
Boiler Gross Output (BTU/hr)	78000	80000	132000	135000	1
Initial Cost To Consumer:					
Boiler	1626	3164	2007	3690	3
Labor & Other Materials	1549	4061	1549	4061	4
Total	3175	7225	3556	7751	2
Incremental Cost of Condensing Boiler		4050		4195	
Annual Fuel Usage (Ef)(MMBTU/yr)	97	88.3	156	142	1A
Annual Electrical Usage (EAE) (kW-hr/year)	71	189	66	182	1A
Average Cost of Natural Gas ($/Therm)	1.1011	1.1011	1.1011	1.1011	5
Average Cost of Electricity ($/kW-hr)	0.1165	0.1165	0.1165	0.1165	5
Heating Load Hours (hr)	2250	2250	2250	2250	6
Design Heating Requirement (BTU/hr)	78000	78000	132000	132000	7
Rated Design Heating Requirement (BTU/hr)	50000	50000	80000	80000	8
Adjustment Factor	1.6875	1.6875	1.7849	1.7849	9
EAFU (MMBTU/yr)	163.6875	149.00625	278.4375	253.449519	10
EAEU (kW-hr/yr)	119.8125	318.9375	117.8005	324.8438	11
Annual Fuel cost	1802.36	1640.71	3065.88	2790.73	12
Annual Electrical Cost	13.96	37.16	13.72	37.84	12
Total Energy Cost	1816.32	1677.86	3079.60	2828.58	
Annual Energy Savings over Non-Condensing Boiler		138.46		251.02	
Payback Period Before Maintenance/Depreciation(years)		**29.3**		**16.7**	
Boiler Life Expectancy (years)	35	15	35	15	13
Depreciation Cost	46.46	210.93	57.34	246.00	
Annual Maintenance	66.67	200.00	66.67	200.00	14
Total Annual Operating cost	1929.45	2088.80	3203.61	3274.58	
Payback Period After Maintenance/Depreciation(years)		**-25.4**		**-59.1**	

References

1) Representative boilers having Federal minimum and Energy Star ver 2.0 AFUE levels.

1A) Based on 100W PE for condensing boiler and 40W PE for non-condensing boiler. Also based on 93W BE for condensing boiler and 29W BE for non-condensing boiler. Condensing boiler has an inducer and also a higher head pump, which explains the higher electrical consumption.

2) Installed costs for smaller boilers is averaged value provided by three contractors in the northeastern US. Installed costs for larger boilers are based on assumption that "labor and other material" cost is independent of boiler size. Installed cost for larger boilers is therefore calculated using same "labor and other material" costs as for smaller boilers and adding homeowner's cost for boiler (3)

3) Boiler cost to homeowner calculated by applying standard discounts to trade ("list") price and then applying typical mark-ups for wholesaler and contractor.

4) For smaller boilers: Reference (2) - Reference (3). For larger boilers: assumed same as for smaller boiler:

5) Representative Average Unit Costs of Energy, 3/10/11 Federal Register.

6) January 1, 2010 GAMA Directory, Chapter 1, Figure 1 (Mid Atlantic Region)

7) Smaller Gross Output for each pair of boilers

8) January 1, 2010 GAMA Directory, Chapter 1, Table 1

9) January 1, 2010 GAMA Directory, Chapter 1, Procedure for Estimating the Annual Heating Requirements and Comparing the Cost of Operation of Different Models, Step 5

10) January 1, 2010 GAMA Directory, Chapter 1, Procedure for Estimating the Annual Heating Requirements and Comparing the Cost of Operation of Different Models, Step 6

11) January 1, 2010 GAMA Directory, Chapter 1, Procedure for Estimating the Annual Heating Requirements and Comparing the Cost of Operation of Different Models, Step 7

12) January 1, 2010 GAMA Directory, Chapter 1, Procedure for Estimating the Annual Heating Requirements and Comparing the Cost of Operation of Different Models, Step 8

13) For non-condensing boilers - Median life expectancy for cast iron boilers from 1995 AHSRAE Applications Handbook, Chapter 33, Table 3. Life expectancy for condensing boilers based on discussions with various European boiler manufacturers. The latter value can be confirmed by inspection of warranties for various condensing boilers.

14) Assumes one annual $200 service/maintenance visit for the condensing boiler and a similar visit for the non-condensing boiler every three years. Relative maintenance costs will probably be higher for the condensing boiler.