



June 8, 2007

Mr. Richard Karney
Program Manager, Energy Star
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC

Subject: Summary of Oral Comments on Energy Star Residential Water Heaters:
Draft Criteria Analysis Presented at June 5, 2007 Stakeholder Meeting

Dear Mr. Karney:

The following points summarize my supplemental oral comments at the subject stakeholder meeting and augment my written comments provided on May 29 (copy attached). This summary is brief and may be reflected in AGA's comments on the stakeholder meeting itself to be provided later. Thank you for the opportunity to provide this follow up to the stakeholder meeting:

The clear primary objective of the Energy Star program for residential water heaters should be saving energy and minimizing externalities associated with energy consumption, principally generation of carbon dioxide emissions. Of the six objectives of the Department of Energy (DOE) that it "considers and balances" in establishing criteria for this program,¹ the currently stated objective of producing "significant energy savings" should be the first focus of DOE. Too often energy savings have been tabulated only after other criteria have been employed to specify Energy Star technologies and setting threshold levels for the Energy Star label. In the case of residential water heating, this is likely to produce suboptimal energy savings and carbon dioxide reductions within the Energy Star efficiency thresholds. This comment is not intended to discount the importance of the other objectives supporting criteria. However, in order to truly "balance" the various considerations implied in the current list of objectives, DOE needs to start with energy savings.

¹ "ENERGY STAR Residential Water Heaters: Draft Criteria Analysis," May 2, 2007, p. 1.

At the very least, DOE needs to provide objective and transparent estimates of energy savings and carbon reductions (over baseline technologies) for each candidate Energy Star technology and proposed threshold efficiency.

Regardless of DOE's implementation of the various current objectives, clear information on these estimates of performance of DOE's proposals needs to be provided. These estimates should be made available in the next version of the Draft Criteria Analysis. Delay in providing this information would be a disservice to the stakeholders in providing complete comments on the DOE proposals.

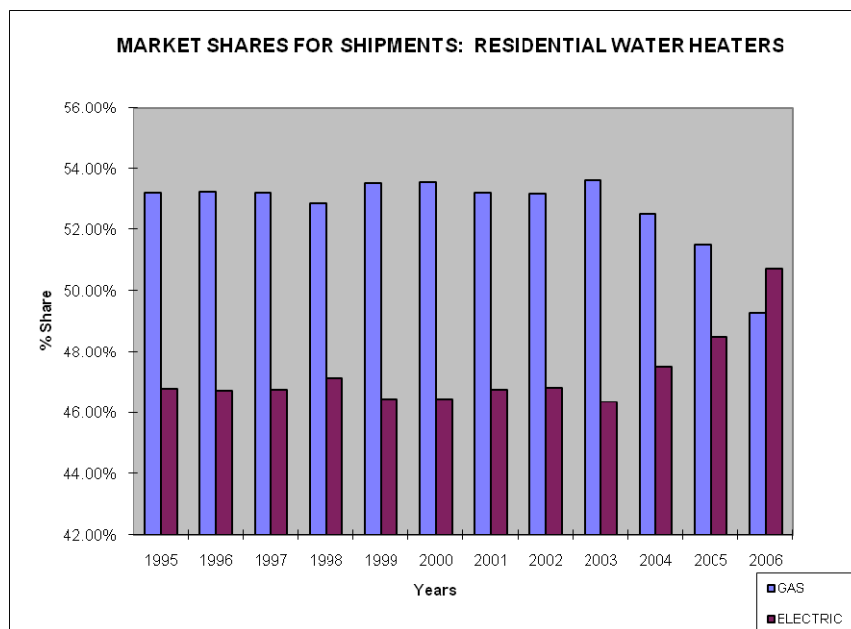
Energy savings and carbon reductions provided by DOE in this effort should be based on full fuel cycle analysis consistent with and based on the methods used by DOE's Energy Information Administration (EIA) for its survey products and public information.

These methods capture transmission and distribution energy losses for natural gas and electricity and generation losses for electricity and carbon dioxide generation and can provide national average estimates of full fuel cycle efficiency. In addition, the U. S. Environmental Protection Agency (EPA) provides a number of tools based on its eGRID Data System, which also capture energy losses and carbon dioxide generation. While national average estimates would not predict specific consumer related impacts, they would be useful for comparative purposes much as current Federal Trade Commission EnergyGuide labels are intended. Consumers need to have confidence in the Energy Star label that these considerations are taken into account, and "while your mileage may vary" in terms of actual savings, consumer do not have another alternative currently for implying savings for these aspects of energy and environment. Site based energy descriptors are not useful in this regard.

While DOE has stated an implicit objective of developing criteria that is "fuel neutral,"² it is unclear that this sort of objective is useful or relevant.

Energy Star criteria should support products that are the most efficient and least carbon intensive (again over the full fuel cycle) while being cost effective for consumers. Preservation of market shares by end use fuel type, as implied by other DOE activities stressing "fuel neutral" policies, does not serve this purpose or the stated objectives in the Draft Criteria Analysis. Indeed, AGA suggests that recent federal policies in the residential water heating market have not to date preserved market shares, and may have contributed to changes in shares, as shown in the graph of shipments data from the Gas Appliance Manufacturers Association (GAMA) shown below:

² Based on Stakeholder Meeting discussion but shown in other DOE activities that cross end use fuel types.



Furthermore, the meaning of “fuel neutral” policies becomes clouded when the growth of gas-fired electric generation, much of which is owned by combination electric and gas utilities, is considered. In this environment, and with the projected growth of renewable energy technologies in both electric generation and end use, preservation of end use fuel market shares may be suboptimal to utilities as well as to society’s efforts to curb fossil fuel consumption and carbon dioxide emissions. With respect to natural gas water heaters, AGA supports letting the technologies and potential market forces demonstrate what makes the most sense, provided the full fuel cycle and transparency is used in the decision making process.

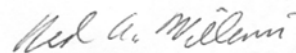
In considering gas-fired water heating, DOE needs to understand and capture in its analysis that technology options are not simple “plug-and-play” technologies. Perhaps unlike other Energy Star appliances, gas water heater technologies that DOE is considering require changes in installation and increased costs beyond the appliance cost, particularly in the replacement market which represents the highest percentage of shipments. The technologies proposed for gas water heaters by DOE, in addition to not meeting the objectives of availability as discussed in AGA’s previous comments, all imply significant cost adders to be installed in replacement applications. In some cases, these costs are clearly “deal breakers” in terms of the cost effectiveness of replacing gas water heaters with the new technologies. In other cases, the incremental costs are likely to be significant

enough to incentivize fuel switching, most likely to a conventional electric resistance water heater. DOE needs to use information that has been provided in previous and current rulemaking on residential minimum efficiency rulemakings and develop more detailed information on these cost adders. AGA is prepared to assist DOE in documenting these costs once the proposed Energy Star gas water heater technologies are clearly defined.

Emission of oxides of nitrogen (NOx) and safety standards requirements clearly need to be included in DOE's consideration of natural gas water heater options. While it is unclear how current stringent NOx requirements in Southern California might impact requirements in other areas of the country, DOE needs to consider NOx emissions performance in the technology options it recommends. NOx performance to even more modest requirements is likely to become important as combustion technologies are squeezed to produce higher efficiencies. Likewise, DOE needs to consider the design certification standards for safety that would apply to all residential water heater options, not just gas-fired water heaters, in development of Energy Star criteria. This points out, again, the practical difficulty of setting up Energy Star criteria that include technologies not in production. How does one test or predict NOx performance for "advance non-condensing" gas water heaters at this time? Similarly, what safety standards changes would be needed (and potential additional costs) to install these technologies? It is clear that based on these issues alone, Energy Star criteria for products not on the market or even available in production designs would be incompletely characterized.

This concludes AGA's follow up comments on the Draft Criteria Analysis. We will be providing separate comments on the stakeholder meeting.

Sincerely,



Ted A. Williams
Director, Codes & Standards
Technical Support

cc: James A, Ranfone, AGA



May 29, 2007

Mr. Richard Karney
Program Manager, Energy Star
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC

Subject: Comments on Energy Star Residential Water Heaters: Draft Criteria Analysis

Dear Mr. Karney:

The following are the comments of the American Gas Association (AGA) on the subject draft criteria analysis. Our comments summarize our preliminary review of the Criteria Analysis and are limited to major issues raised by the document. More detailed comments may be raised at the upcoming public meeting scheduled for June 5, 2007.

AGA, founded in 1918, represents 200 local energy utility companies that deliver natural gas to more than 64 million homes, businesses and industries throughout the United States. AGA's members' account for more than 92 percent of all natural gas delivered by the nation's natural gas utilities. Natural gas meets almost one-fourth of the United States' energy needs. AGA collects, analyzes, and disseminates information and data on the natural gas industry, promotes the safe and efficient delivery and use of energy, and serves as a national voice for the gas utility industry.

- **DOE needs to adhere to the current assumptions of the DOE test procedure (including water temperature assumptions) as it exists today for consistency across DOE minimum standards and voluntary programs such as Energy Star, and for consistency of information to consumers.** Stakeholders have commented that the current DOE test procedure uses unrealistic and outdated assumptions for hot water consumption and other variables in deriving operating costs and other attributes of residential water heater technologies. However, use of the current test procedure needs to be

maintained to provide a consistent basis of comparison of technologies, including available products already available to consumer, and minimum efficiency standards. Operating costs and other dependent variables calculated from test procedure results provide results for comparative purpose only. They are not predictions of consumer experience. Stakeholders should take up this issue during the next round of rulemaking on the test procedures.

- **Since DOE’s objectives include avoiding criteria that would “compromise the functionality or performance of the qualified products,”¹ the criteria should recognize the functionality of gas-fired water heaters that operate without the need for electrical supply.** A well-established utility of gas-fired water heaters is the ability, within the product class, to operate without the need for electric power. This utility provides for operation of the appliance without electrical service and during periods of electrical outages. In addition, retrofit of many gas water heaters commonly involves location without electrical circuits. In meeting the objectives stated by DOE, the Energy Star criteria need to include criteria that preserve this functionality. AGA recognizes that Energy Star criteria that would recognize only condensing combustion and “advanced combustion” water heaters would exclude unpowered water heaters.
- **DOE’s exclusion of conventional gas storage water heaters from consideration is unjustified, even based on DOE’s analysis of available models and energy consumption.** DOE notes available 50 gallon models ranging from 0.58 to 0.67, the upper bound being 16% more efficient than the minimum. However, DOE contends that the “technology in nearly maximized,” with sales predominantly in the 0.58 to 0.62 range for energy factor (EF). Clearly, ample room exists within the range of available product to set an Energy Star threshold that is significantly more efficient than the current federal minimum EF efficiency standard of 0.58 for the 50 gallon unit and, at the same time, that is comparable to the proposed heat pump water heater on a source energy efficiency and emissions basis. DOE’s explanation of “maxed out technology” is not within its current, stated objectives for developing Energy Star criteria and should not be a rationale for excluding these products. On the contrary, with products listed ranging up to 0.67, it is difficult to argue that the technology, relative to average efficiency of current shipments is “maxed out.” Using the DOE-analyzed 50 gallon heat pump water heater and conventional gas storage water heater (and ignoring the issue of equivalent first hour rating, which would compare 40 gallon gas water heater with 50 gallon electric water heaters), the proposed efficiency for the heat pump water heater is estimated by AGA to

¹ “ENERGY STAR Residential Water Heaters: Draft Criteria Analysis,” May, 2, 2007.

consume 36.6 MMBtu of primary energy and produce 1.93 MT/year of carbon dioxide over the full fuel cycle. This estimate is made using DOE's estimated site energy consumption and eGRID data for source energy and full fuel cycle emissions from site consumption. In contrast, a 0.62 gas storage water heater would consume 26.7 MMBtu of primary energy produce 1.56 MT/year of carbon dioxide. Even with the high site efficiency potential of heat pump water heaters, conventional storage water heaters clearly can produce comparable, and even superior, full fuel cycle efficiency and carbon savings.

- **Inclusion of condensing combustion water heaters and “advanced non-condensing gas storage” water heaters would conflict with the current DOE objectives of providing “ample consumer choice, both in terms of number of models and a wide range of manufacturers”² and avoiding reliance “on proprietary technologies of one or a small set of manufacturers.”** DOE acknowledges that product in both of these categories is not currently available. DOE needs to resolve this conflict either by reconsidering use of these technology descriptors or altering its criteria and timetables for accommodating product that may be forecast but that is currently unavailable. AGA would expect that DOE would do more to advance technology and product development in this area generally to speed up the availability of these technology options.
- **AGA supports DOE's current proposal not to consider electric-resistance storage water heaters under Energy Star and echoes the comments of other stakeholders to not consider electric tankless water heaters.** Water heaters using electric resistance heating elements should not receive consideration for Energy Star status due to the full fuel cycle inefficiencies represented by such products. Using the eGRID data discussed earlier, electric resistance storage water heaters are shown to consume approximately twice the primary energy over the full fuel cycle and produce twice the carbon dioxide emissions of conventional gas storage water heaters, even with the high site efficiencies possible with electric resistance units. Also, AGA must remind DOE of the controversy surrounding electric storage water heaters during the 2001 final rule on minimum efficiency standards in which testing of electric storage water heaters by the National Institutes of Standards and Technology (NIST) found that all six of the tanks tested did not meet rated efficiency as shown in the GAMA directory.³ To AGA's knowledge, this discrepancy has never been resolved, although DOE stated at the time that it was “still examining this issue.” The major issue for this discussion is that presumption of high efficiencies of electric

² Ibid.

³ Federal Register, Vol. 66, No. 11, January 17, 2001, p. 4482.

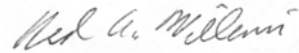
resistance water heaters owing to their use of heating elements and standby efficiency is not assured. DOE should also review the record of state energy efficiency rebate programs for “high efficiency electric resistance water heaters” where follow up investigations have reported water heaters as not meeting their rated efficiencies. With respect to electric tankless units, the suggestion of potentially troublesome peak demand and deliverability issues go beyond the problems of electric storage water heaters and may have a number of unintended consequences in terms of electricity reliability and emissions from power plants.

- **DOE’s proposal for gas water heaters must recognize that tankless and storage water heaters are fundamentally different products, particularly in the retrofit market (85-90% of shipments), where installation cost adders for an instantaneous unit might otherwise make gas water heating uneconomic.** Tankless gas water heaters require unique pipe sizing, venting, and potentially even meter size capacities, which typically add to the cost of installation and particularly when a tankless unit is to replace a conventional gas water heater. These changes in installation (in addition to the cost of the tankless unit itself) need to be fully captured in DOE’s analysis as it would affect fuel choice. It is not unrealistic for consumers to consider a change in fuel for heating water if a competing storage electric water heater does not require these incremental costs of installing a tankless water heater in retrofit. While the incremental costs for new construction may not be as significant in the fuel choice for heating water, the incremental costs of installing a tankless unit, nevertheless need to be captured accurately and robustly across the housing stock.
- **DOE’s assumptions for installed and operating costs for gas tankless water heaters needs to consider additional factors not currently captured.** DOE’s assumptions for gas tankless water heaters need to be reviewed in a couple of areas. Again, piping, metering, and venting costs need to be properly reflected separately for retrofit applications and new construction. Also, DOE’s current flow capacity lower limit of 3.5 gpm is too small compared to functionality of storage water heaters based on analysis conducted for AGA. DOE needs to also develop concrete means of avoiding recirculating loop installations (i.e., piping system storage), which would go beyond the current test procedure. Finally, DOE needs to review its unrealistic presumption of a 20 year life for a tankless unit and include significant maintenance adders, particularly delimiting.
- **DOE’s baseline assumptions for storage water heaters needs to properly reflect equivalent first hour ratings, which are typically benchmarked to a**

40 gallon unit for gas fired residential water heaters and a 50 gallon electric unit. These relationships of gas and electric storage water heaters are commonly used in water heater installation guidance.

This concludes AGA's comments on the criteria document. We will be prepared to discuss these comments and additional issues at the upcoming meeting.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ted A. Williams".

Ted A. Williams
Director, Codes & Standards
Technical Support

cc: James A, Ranfone, AGA