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Sent: Monday, May 14, 2012 6:38 AM
To: publiccomments@njcleanenergy.com
Subject: Comments to New Jersey Clean Energy Program - Draft Revisions to the July 2011 Protocols (issued April 2012)

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Subject: Comments to New Jersey Clean Energy Program - Draft Revisions to the July 2011 Protocols (issued April 2012)

Ryan Inc. T/A Ryan Building Performance ("Ryan") would like to thank the Board of Public Utilities ("BPU" or "Board") for the opportunity to present our comments on the proposed revisions ("Draft Protocols") to the Clean Energy Program Protocols ("Protocols") submitted in red-line form to stakeholders for comment by Applied Energy Group ("AEG"), the Market Coordinator for the Clean Energy Programs ("CEP"), on April 17, 2012.'

Background

Ryan is a New Jersey 'Home Performance with Energy Star' contractor performing residential energy auditing and energy mitigation contracting services throughout the state. As licensed plumbers, part of our work encompasses the installation of tankless water heaters and combination boilers (which provide both space heating and water heating functions). Our observation and testing of these systems have shown that they provide significant benefits to the goal of reducing energy consumption in the State of New Jersey.

Executive Summary

The Board is proposing to lower the presently recognized energy benefits of tankless water heaters by de-rating the United States Department of Energy ("DOE") Energy Factor (EF) by 8.8%. This proposed reduction is based on the questionable conclusions of testing performed 9 years ago on a single field-installed tankless water heater. By reviewing the methods of that testing, we hope that the Board will reconsider the implementation of the proposed change.

Comments

These comments are regarding Page 22 of the Draft Protocols, Water Heaters table, Component: EFq, Value: For tankless units only: EF_q= EF*91.2% along with Footnote 6 Calculation of estimated Energy Factor based upon unit-rated thermal or recovery efficiency and unit rated standby losses are based upon the DOE Test Protocol (http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/d-2.pdf) for residential water heaters.

The proposed change is basis on a publication (see www.energy.ca.gov/pier/project_reports/CEC-500-2008-082.html) which was sponsored by the California Energy Commission, and cited as "Lutz J.D. (Lawrence Berkeley National Laboratory). 2008. *Water Heaters and Hot Water Distribution Systems*. California Energy Commission, PIER Buildings End-Use Energy Efficiency. CEC-500-2005-082" ("Publication").

The Publication consists of the report (see http://www.energy.ca.gov/2008publications/CEC-500-2008-082/CEC-500-2008-082.PDF) ("Report") together with its appendixes (see http://www.energy.ca.gov/2008publications/CEC-500-2008-082/CEC-500-2008-082-APA.PDF) ("Report Appendixes"), and more specifically, Appendix K prepared and issued by the Davis Energy Group, Inc. on April 14, 2006 ("Davis Report").

An analysis of the Report and the Davis Report indicates a number of noted deficiencies which should preclude its findings from being used as a basis for the proposed changes.

First: Testing Was Designed and Performed Specifically for California

The Report's Executive Summary states "This project conducted research to improve the efficiency of water heaters and hot water distribution systems ***in California***" [Emphasis Added].

California is primarily Climate Zone 3. New Jersey is entirely Climate Zones 4 and 5. Building America lists the California region as Hot Dry and Marine and New Jersey as Cold and Mixed-Humid. (See http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/ba_climateguide_7_1.pdf.)

California, being a cooling dominant location, is very different than New Jersey which is a heating dominant location. Thus, conclusions that may be appropriate for California may not be appropriate for New Jersey. For example, for most of the year here in New Jersey, a water piping btu lost into the thermal-pressure boundary of a structure is, in fact, not lost at all. Rather, it is utilized in the capacity of heating the structure.

Second: The Purpose of Report Indicated a Predetermined Bias Against Tankless Water Heaters.

Page 1 of the Report states that a purpose of the Report was "to support the Super Efficient Gas Water Heater Appliance Initiative" (SEGWHAI). SEGWHAI is an initiative formed by interested parties to find low cost **non-condensing** (i.e., non tankless) solutions to conventional water heater inefficiencies. Thus, the studies performed were not designed using sound scientific principles and methods but rather instituted with pre-determined biases against tankless water heaters which would lead to questionable (i.e., non-objective) results.

Third: The Report Admits That It Does Not Understand Hot-Water-Draw Usage Patterns

Page 69 of the Report recommends an 8.8% degradation of the stated DOE EF, but goes onto say, "Although this approach is technically not accurate.... Given the current lack of knowledge on hot water usage patterns..., it is premature to propose a more detailed modeling methodology...." Yet, even after this startling admission, they nonetheless capriciously choose this 8.8% degradation.

Fourth: DOE Testing Already Accounted for Six Unique Hot-Water-Draw Sessions per Day

On page 1 of the Davis Report, the authors admit that "tankless gas water heaters are tested under procedures defined by the U.S. Department of Energy. The Energy Factor testing procedure prescribes six equal hot water draws (totaling 64.3 gallons) at one-hour intervals. The remainder of the 24-hour test period is used to account for standby losses.... [T]ankless units experience greater sensitivity to the number and frequency of draws since the heat exchanger must be raised to temperature for each draw event." In other words, the Report readily admits that the tankless units are already measured for losses related to daily water draws.

The Report authors would want its audience to believe that homeowners turn their faucets on and off to a much greater degree than realistic. A review of the hot water habits of New Jersey residents would lead one to conclude the DOE testing (and its de-rating) is wholly adequate. Certainly, the units should not be de-rated multiple times.

Fifth: Choosing an 8.8% De-rating Is Mathematically Flawed

A water heater with an EF of.70 would suffer a 5.6% reduction in efficiency. A more efficient unit with an EF of .95 would suffer an 8.4% reduction. This would result in systems which are *more* efficient suffering greater penalties. By the Davis Report's own logic, it should come out the other way around.

Sixth: No Offset Credit Was Provided Due to the Fact Tankless Water Heaters Run at Lower Temperatures

The Davis Report did not consider the fact that tankless water heaters run about 10°F less than tanked models. Testing was performed at 120°F when tankless water heaters typically run at 110°F. (It should be noted that tankless water heaters are not credited with this benefit since neither DOE testing nor the Davis testing account for this phenomenon. Perhaps the Board might study and consider this benefit in some future Protocol update.)

Seventh: The Testing Thermocouple Was improperly Located in the Field Tested System

Page 2 of The Davis Report shows the TDH immersion thermocouple was installed in the field install piping somewhere AFTER the unit's heat exchanger. This would result in non-heat exchanger heat losses being counted against the heat exchanger. These losses should have been determined and deducted from any final degradation factor.

Eighth: An Air Handler Used for Space Heating Was Installed and Operational During the Testing

The Davis Report, page 2, Figure 1, shows that a system air handler was either intentionally or unintentionally left in the system operation which would have introduced error into the report results. Primarily, it would have added dramatically to the draws which are being attributed to domestic hot water calls. (Note the location of FLDHW water flow meter.) This may explain why the test generated more calls than is typical for the average household. The lab unit is then used to confirm low draw losses as if this somehow legitimizes the extraordinary quantity of draws.

Ninth: The Davis Reports Is Based on an Inadequate Sampling Set

According to Page 1 of the Davis Report, the EF degradation analysis ***is based on a test pool of just ONE field-installed water heater***. A sampling of one unit is wholly inadequate from which to draw a scientifically or statistically significant conclusion. Furthermore, testing was performed with this one unit placed in an atypical household structure with an atypical system design.

Tenth: The Field Unit Tested Was Obsolete

Page 2 of the Davis Report indicated that the unit was manufactured 9 years ago. Today's modern tankless units have make great technological strides from this early version. De-rating modern efficiencies based on antiquated models seems problematic.

Eleventh: The Lab Unit Tested Was Not Energy Star Rated and Also Obsolete

The Davis Report Page 3 indicates that a Takagi water heater, rated at 81% efficiency, was used for corroborative lab testing. Thus, the unit was not even Energy Star rated. Further, the Takagi heat exchanger was made of Heat Resistant Alloy HRS35 Copper. Most modern heater exchangers use stainless steel plate technology, a significant advancement in tankless heat transfer technology.

Conclusions

We believe that the existing DOE Energy Star testing standards for these systems promulgated at 10 CFR Chapter II, Part 430 Subpart B, Appendix E (see http://www.law.cornell.edu/cfr/text/10/430/subpart-B/appendix-E) are thorough, accurate and adequate in their present state, and that the conclusion of the Report and the Davis Report are of questionable methods and conclusions.

In the interest of prudence and sound public policy, we respectfully ask that any rule updates should be held in abeyance until such time there is compelling and convincing evidence of actual losses (or gains) of efficiency. To do otherwise may have the unwanted effect of impairing the very technologies the State and OCE should be supporting.

Furthermore, we respectfully note that if the Board finds any one of the eleven deficiencies listed herein to be true, that that in itself should carry the necessary weight to invalid the study's results in its entirety.

We thank the Board for this opportunity to present our views.

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