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November 21, 2014

Mr. Mazi Shirakh
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Dear Mr. Shirakh,

We had submitted comments previously on the draft proposed revision to the Title 24 Building Energy Efficiency Standards concerning residential gas instantaneous water heaters as it was being developed over the past several months. Since the draft proposed revision regarding residential gas instantaneous water heaters discussed at the November 3, 2014 staff workshop was changed significantly from the earlier version, we are submitting these additional comments.

Although, the current draft proposal for Section 150.1(c)8 does allow the installation of a gas storage water heater that meets the federal minimum efficiency standard, it does so with some additional requirements to the building and the hot water piping or distribution system. This attempt to address the concerns raised by us and others underscores the complexity of this issue. In this regard, the proposal continues to be developed with an under appreciation of the significant increase in complexity that will be occurring in the next several months. The suggestion that the impending changes can be dealt with later is ill advised and, from our perspective, ignores the issue.

Because of those looming changes, described below, we recommend that the CEC defer any further consideration of this proposal at this time. Once the changes have been implemented and their ramifications identified, the consideration of this proposal can be taken up again, as appropriate based on the better information that will exist at that time. The major changes are: revised minimum efficiency standards for residential water heaters go into effect on April 16, 2015; and a drastically revised efficiency test procedure goes into effect on July 13, 2015.

In the case of gas storage water heaters, the revised minimum Energy Factor (EF) standard has separate criteria for models above 55 gallons and models at 55 gallons or smaller. The minimum standard for models above 55 gallons will require all models in this subclass to employ condensing technology; they will have EF ratings of at least .74. Based on the CEC adjustment for gas instantaneous EF ratings, the CEC Title 24 would consider these storage models to be as efficient as a .82 gas instantaneous model. So, this proposal would impose added requirements on a builder who chooses to install a 65 or 75 gallon gas storage water heater in a new home in 2016, even though that water heater is considered by the CEC to be equivalent in efficiency as a .82 gas instantaneous model. The cost effectiveness of this situation needs to be analyzed. The minimum standard for models at 55 gallons or smaller will increase the EF ratings of 30, 40 and 50 gallon models incrementally. However, as we had noted there are many gas storage water heaters in the 30, 40 and 50 gallon sizes which have energy factors (EF) of .67 or higher. In

our October 2, 2014 comments we noted that 58% of the 40 gallon gas storage water heaters listed in AHRI's Residential Water Heater Efficiency Directory45 have EFs of .67 or higher. By the time the revised minimum standard goes into effect, there will be more models with EF ratings at .67 or higher. This situation will be repeated for the 30 and 50 gallon sizes. In view of this changing mix of available gas storage water heaters with better than minimum efficiency, the cost/benefit analysis should be reevaluated.

The final rule on the revised DOE efficiency test procedure for water heaters was issued on July 11, 2014 and becomes effective of July 13, 2015. This revised test procedure establishes a Uniform Efficiency Descriptor, called the Uniform Energy Factor (UEF) for water heaters used in residential applications. This includes products defined by DOE as residential models and a subset of commercial water heater models, identified as residential-duty commercial water heaters. Whereas the existing DOE test procedure applies the same daily hot water usage and draw pattern to every model, the revised test specifies four usage patterns with their own total volume draws: very small-10 gallons; low-38 gallons; medium-55 gallons; and high-84 gallons. The specific usage pattern and corresponding total draw applied to any given storage water heater model will be determined by the model's first hour rating (FHR). The FHR breakpoints which determine the usage pattern to be used are:

FHR < 18 gallons	Very Small
18 ≤ FHR < 51 gallons	Low
51 ≤ FHR < 75 gallons	Medium
FHR ≤ 75 gallon	High

This same concept is being applied to gas instantaneous models except that the model's maximum gallon per minute (GPM) rating will be used to determine the specific usage pattern and corresponding daily usage that will be applied in the test. The maximum GPM breakpoints which determine the usage pattern to be used are:

GPM < 1.7 gal/min	Very Small
1.7 gal/min ≤ GPM < 2.8 gal/min	Low
2.8 gal/min ≤ GPM < 4.0 gal/min	Medium
GPM ≤ 4.0 gal/min	High

There is no question that the UEF ratings for gas storage and instantaneous water heaters will be different than the current EF ratings; for some models likely very different. Yet at this point no one has a good estimate of how different. DOE is developing a conversion factor which is intended to translate current EF ratings to UEF ratings that reflects the revised test procedure. A Notice of Proposed Rulemaking (NOPR) will be issued by DOE to establish the conversion factor(s). If that NOPR is issued sometime in December the conversion factor rule may be finalized by April of 2015. It is our expectation that there will be more than one conversion factor since the difference between the UEF and the current EF will be different for each one of the four new usage patterns.

In conjunction with this, DOE will have to translate the April 2015 minimum efficiency standards to specify a corresponding minimum UEF based on the revised test procedure. This is necessary because Federal law requires that any test procedure revision cannot change the stringency of the related minimum efficiency standard. The determination of translated minimum efficiency standards to reflect the revised UED test procedure will be based primarily on the effect of the revised standard on models which are rated at the current minimum efficiency standard. In this case, this analysis is complicated by the fact that the single standard by fuel and type will have to be translated to multiple standards; one for each usage pattern. The following table illustrated the minimum EF standards that likely will be required for various types of water heaters once the UED test procedure is finalized.

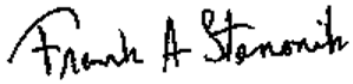
Water Heater Type	EF_L	EF_M	EF_H	EF_{VS}
Gas Storage ≤ 55G	X	X	X	
Gas Storage > 55G		X	X	
Gas Instantaneous (Res)	X	X	X	X
Electric Storage ≤ 55G	X	X		
Electric Storage > 55G		X	X	
Electric Table Top	X			
Electric Instantaneous (Res)	X			X
Oil Storage			X	
Gas Storage Res-Duty (Com)		X	X	
Gas Instantaneous Res-Duty (Com)			X	
Electric Storage Res-Duty (Com)			X	
Oil Storage Res-Duty (Com)			X	

Note: EF_L, EF_M, EF_H, and EF_{VS} represent the low, medium, high and very small usage patterns.

Recognizing the nature of the Title 24 proposal, just consider how things will change for gas storage and instantaneous water heaters. The two standards for gas storage models will become 5 standards and the single standard for gas instantaneous models will become 4 standards. We repeat, we know the changes are coming but we do not know the specifics of the changes. Models with an UEF based on a specific usage pattern cannot be compared to models with UEF ratings based on a different usage pattern, regardless of whether the other pattern uses a smaller or larger total daily draw. At this point we do not know how the UEF ratings of gas storage and instantaneous water heaters tested with the same usage pattern will compare or whether that difference will be constant for each unique usage pattern. How will this proposal be rewritten to accommodate both a major reclassification of residential water heaters based on the usage pattern to which it was tested and the 9 translated minimum efficiency standards that will apply to gas storage and instantaneous water heater? A proper appreciation of this situation leads to a conclusion that it is incredibly complex. So much so that any proposal developed under the current construct of EF ratings and the related test procedure may be rendered useless by the new UEF ratings and the revised test procedure.

The changes to residential water heater efficiency standards and efficiency ratings will restructure the product lines that will be available in the market and redefine the efficiency ratings for the models in those product lines. The magnitude and complexity of these changes is unprecedented. In the interest of the most efficient and prudent use of everyone's resources, the consideration of the proposal to amend Section 150.1 (c) 8 should be deferred. We appreciate your consideration of these comments.

Respectively Submitted,



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