



CALIFORNIA STATEWIDE UTILITY CODES AND STANDARDS PROGRAM



Notes from May 20, 2014 Stakeholder Meetings

Posted June 18, 2014

MEETING INFORMATION

Meeting Date: May 20, 2014

Topics Discussed: Residential Instantaneous Water Heaters

Host: California Statewide Investor Owned Utility Codes and Standards Team

ATTENDEES

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MEETING AGENDA

10:30 - 10:45	Introduction: Overview of 2016 Title 24 Development; Summary of stakeholder outreach purpose and procedure
10:45 - 11:45	Residential Instantaneous Water Heaters
11:45 - 12:45	Nonresidential Thermally Driven Cooling
12:45 - 1:00	BREAK
1:00 - 1:30	Fan Efficiency (Based on ASHRAE 90.1)
1:30 - 2:00	Direct Digital Controls (Based on ASHRAE 90.1)
2:00 - 2:15	BREAK
2:15 - 2:45	Door & Window Switch Controls (Based on ASHRAE 90.1)
2:45 - 3:15	HVAC and Water Equipment Efficiencies (Based on ASHRAE 90.1)
3:15 - 3:30	Review and wrap-up, next steps



RECAP

- ◆ Residential Instantaneous Water Heaters
 - CASE Team to look into how to address or quantify water and wastewater costs for the energy savings.
 - The new methodology doesn't take into account storage volume but EF. Water heating loads in the Residential Alternative Calculation Method Reference Manual are capped at a 2,500 square foot house. Current performance only looks at EF rating – water heating loads don't increase beyond that base case house.
- ◆ Nonresidential Thermally Driven Cooling
 - Difference between “adsorption” and “absorption”
- ◆ Fan Efficiency (Based on ASHRAE 90.1)
 - Federal, Title 24, ASHRAE, and other standards should all harmonize.
 - FEG will not eliminate any specific fan types.
 - Every fan type has a certain condition in which it is the most efficient.
 - Eliminating entire fan types would not save energy.
- ◆ Direct Digital Controls (Based on ASHRAE 90.1)
 - Proposing same size limits that were defined by ASHRAE.
 - The proposal does include installing DDC to the zone level.
- ◆ Door & Window Switch Controls (Based on ASHRAE 90.1)
 - When you have operable windows, it is better to have smaller zones.
 - People are going to modulate the window to allow for the appropriate air flow to the space.
- ◆ HVAC and Water Equipment Efficiencies (Based on ASHRAE 90.1)
 - No significant comments received.

MEETING NOTES

These notes summarize the discussion that took place during the IOU-sponsored stakeholder meeting that occurred on May 20, 2014 (Residential Instantaneous Water Heaters portion).

Overview of 2016 Title 24 Development

- ◆ Heidi Hauenstein (Energy Solutions, on behalf of the Statewide IOU C&S Team) presented
- ◆ Presentation available here: http://title24stakeholders.com/wp-content/uploads/2014/05/Stakeholder-Meeting_May20_2014.zip
- ◆ No comments or questions received.



Residential Instantaneous Water Heaters

- ◆ CASE Author Sarah Schneider (Energy Solutions, on behalf of the Statewide IOU C&S Team) presented. CASE Author Bijit Kundu (Energy Solutions) provided supplemental information in response to stakeholder questions.
- ◆ Presentation available here: http://title24stakeholders.com/wp-content/uploads/2014/05/Instantaneous-Water-Heaters-Stakeholder-Meeting_May20_2014.pdf

Comments and Feedback:

- ◆ Jim Lutz (LBNL): Has CEC figured out how to address or quantify water and wastewater costs for the energy savings?
 - Mazi Shirakh (CEC): I don't think so. We considered demand recirculation, but it may not be cost effective just based on energy so we should incorporate water savings and costs.
 - Heidi Hauenstein (CASE Team): We can look into that for the measure.
- ◆ Bob Raymer (CBIA): Can you please explain the life cycle cost (LCC) slide again?
 - Bijit Kundu (CASE Team): This table comes from the 2013 Title 24 CASE Report for the Residential High-Efficiency Water Heater Ready measure. The values in blue indicate for the first row below "Gas-Instantaneous Water Heater" indicate where the installation of that type of water heater in single family new construction is cost-effective by California climate zone (columns). As you can see, it's cost-effective across California. The analysis will be updated with current values for this code change cycle.
- ◆ Frank Stanonik (AHRI): What did you use for water heating load?
 - Bijit Kundu (CASE Team): We are updating the energy savings analysis based on the CEC's hot water draw schedule, which was used for the 2013 Title 24 domestic water heating standards.
 - Jim Lutz (LBNL): Can you post somewhere or make available the old assumptions [those used for the 2013 Title 24 water heating standards]?
- ◆ Mike Keesee (SMUD): Were high efficiency heat pump water heaters (HE HPWH) (Energy Factor >2.0) considered as a prescriptive water heater requirement? Why are they not considered as an alternative prescriptive measure? There is value in looking at HPWHs.
 - Mazi Shirakh (CEC): They can use the performance path, likely not considering as prescriptive because of federal preemption. We haven't looked at the performance of heat pumps to determine if they'd be a good prescriptive alternative.
 - Mike Keesee (SMUD): HPWHs can be used as an alternative to gas and propane (i.e. electric-resistance). They may also be cheaper for builders.
 - Mazi Shirakh (CEC): We can't require them as a prescriptive because of preemption.
- ◆ Bob Raymer (CBIA): It clearly is not preemption if CEC applies a credit. Hypothetically, couldn't a manufacturer of storage water heaters be upset because their product will be penalized if it's installed [if storage is no longer the prescriptive]? This is a legal question. I'm not opposing this measure. I'm just pointing out that manufacturers may get upset next year when this standard gets adopted in May 2015.



- Heidi Hauenstein (CASE Team): We will look into this deeper.
- Frank Stanonik (AHRI): The key issue is that you can't preclude the sale of water heaters that meet the minimum federal standards. It's going to take some skill to not bump into federal preemption. On Slide 9, the second bullet down from the first main bullet should be revised to read, "Measure would not prohibit the installation of storage water heaters that meet federal minimum standards."
- Jim Lutz (LBNL): I agree.
- ◆ Mike Hodgson (ConSol): The U.S. Department of Energy (DOE) has a hot water draw schedule. At a recent CBIA/CEC industry meeting, the DOE [water heater test procedure] rulemaking was brought up in which there is controversy over the Energy Factor (EF) for instantaneous water heaters (IWH). Do you know if this has been resolved? How will the CASE Team react to it?
 - Bijit Kundu (CASE Team): So far it has not been resolved. We're tracking it through the public rulemaking process and we will incorporate DOE's findings into our analysis.
- ◆ Frank Stanonik (AHRI): Regarding the DOE's test procedure, the best information we have is that the revised test procedure should be issued this month. The key change is that there will be three draw patterns based on whether the water heater is intended for low, average, or high usage. The new EFs will be very different. It's going to be a little more complicated.
 - Mike Hodgson (ConSol): How would you do the cost effectiveness analysis?
 - Jim Lutz (LBNL): It depends on which baseline house because that would determine what type of water heater to use to cover the small, average, and large usages (e.g., a small one bedroom versus a five bedroom house).
- ◆ Frank Stanonik (AHRI): Why would you use a 50-gallon storage water heater as the baseline?
 - Heidi Hauenstein (CASE Team): Because it's in the current prescriptive requirement.
 - Jon McHugh (CASE Team): Frank, are you recommending a 40-gallon instead?
 - Frank Stanonik (AHRI): Water heaters are sized by the number of bedrooms, not occupancy or actual hot water usage. There is a disconnect between what is designed and the actual number of people in the house (i.e. demographics). I wish I could help fix this problem.
 - Jim Lutz (LBNL): You could use census data to see how many people are living in what size house.
 - Mazi Shirakh (CEC): Would the 2008 CalCERTS registry have this information? It might be possible to do a sampling.
 - Jim Lutz (LBNL): When the federal test procedure comes out you'll have to do a base case [house] for small, average, and large water heaters.
 - Marc Hoeschele (Davis Energy): The new methodology doesn't take into account storage volume but EF. Water heating loads in the Residential Alternative Calculation Method Reference Manual are capped at a 2,500 square foot house. Current performance only looks at EF rating – water heating loads don't increase beyond that base case house.
 - Mike Hodgson (ConSol): 2008 or 2010 Title 24 standards require identification of storage size but I'm not sure the 2013 standards do.
- ◆ Gary Klein (Affiliated International Management): To Mike Keese's question about heat pumps. If there is no preemption regarding on-demand gas water heaters in the prescriptive path, then there



should not be a preemption if a comparable increase in efficiency for HPWHs of say at least 2.0 (Energy Factor). This compliance path needs to be given the same treatment as the gas alternative. We should provide an upgrade path for HP Water Heaters – we are limiting by picking gas; we should keep the options open.

- ◆ Rob Hudler (CEC): Currently the reference for water heating is used in the additions and alterations section. This will create a real problem in existing housing stock.
- ◆ Mike Keesee (SMUD): So it seems that this heat pump "adjustment factor" should be reviewed to see if it is still valid, especially given the improvements made in HPWH performance. No?
- ◆ Rob Hudler (CEC): Getting back to cost comparison - information on the internet suggest that while life expectancy may be longer on instantaneous than storage there are some potentially some very high maintenance costs.
- ◆ Rob Hudler (CEC): The real opportunity here is looking at use of instantaneous in combined hydronic. From there you can look at combined fuel so eventually getting to heat pump.
 - Gary Klein (Affiliated International Management): We need to see the cost-effectiveness calculations to see how they treat the maintenance requirements.
- ◆ Rob Hudler (CEC): The 2013 standard references minimum for space conditioning - which allows for heat pumps and furnaces. Why not use the same approach for water heating?
 - Rob Hudler (CEC): The current calculation approach in the compliance software uses gas as the reference budget - so heat pumps being compared to that have a problem because of the adjustment factor used for heat pump.
- ◆ Gary Klein (Affiliated International Management): If I understand the basic math, then a heat pump water heater with an EF of 1.8 would be roughly equivalent to a gas or propane water heater with an EF of 0.6. An EF of 2.4 would be comparable to one of 0.8. While I would prefer that the new code change apply throughout the state, at a minimum it should be allowed for areas where natural gas is not available.
 - Rob Hudler (CEC): The adjustment factors in the compliance tool will degrade the efficiency of the water heater heat pump to a point where an EF of around 2.1 to match the current .575 EF gas fired system.

Follow Up Items

- ◆ CASE Team will:
 - Look into the preemption questions around storage and heat pump water heaters.
 - Revise the language on Slide 9 of the presentation.
 - Explore the heat pump water heater prescriptive option.

Thermally Driven Cooling

- ◆ Matt Tyler (PECI, on behalf of the Statewide IOU C&S Team) presented
- ◆ Presentation available here: http://title24stakeholders.com/wp-content/uploads/2014/05/Thermally-Driven-Cooling-Model-Stakeholder-Meeting_May20_2014.pdf



Comments and Feedback:

- ◆ Difference between “adsorption” and “absorption”.
- ◆ No significant comments received.

Follow Up Items

- ◆ Mazi will provide Matt Tyler with contact information.

Fan Efficiency Grade (FEG)

- ◆ John Baffa (ASWB Engineering, on behalf of the Statewide IOU C&S Team) presented
- ◆ Presentation available here: http://title24stakeholders.com/wp-content/uploads/2014/05/Fan-Efficiency-Grades-Stakeholder-Meeting_May20_2014.pdf

Comments and Feedback:

- ◆ Have manufacturers determined the FEG of their products?
 - Beth Braddy (Trane): Majority of products have total equipment efficiency requirement.
 - Support being in line with ASHRAE because complying with a myriad of code requirements is difficult.
- ◆ Federal, Title 24, ASHRAE, and other standards should all harmonize.
- ◆ Not many engineers have focused on the FEG yet, as it has not become active code (except IGCC).
 - Greenheck: We’re not getting many requests about fan efficiency grades.
- ◆ AMCA is working with the DOE on discussing the PBER. AMCA has already endorsed the PBER, but ASHRAE and DOE have not yet.
 - Greenheck is going to present the proposal during the AMCA hearing in June 21st meeting in Chicago.
- ◆ Is AMCA going to move away from FEG?
 - Greenheck had problems with FEG metric on low-pressure fans.
 - ASHRAE recognized this because they are exempted.
 - Wade Smith (AMCA): We are exploring PBER with the goal of making a recommendation to DOE in time for their rulemaking. DOE requirements will go into effect in 2020.
 - Jon McHugh (CASE Team): The 2016 code cycle would not be impacted by DOE standards that take effect in 2020, but there is a desire to harmonize.
 - AMCA has a database of fans sold in 2012. Fans in the database represent 43% of the U.S. market.
- ◆ Wade Smith (AMCA): We have two metrics that are being debated within the industry.
- ◆ Jeff Stein (CASE Team): What types of fans would be outlawed by either of the two standards?



- FEG will not eliminate any specific fan types.
- Every fan type has a certain condition in which it is the most efficient.
- Eliminating entire fan types would not save energy.
- Wade Smith (AMCA): For now, none. The standard would not outlaw specific fans, but some inefficient fans may be phased out over time as standards become more stringent. The standard aims to encourage good design practices. Each type of fan has an application where it is the most efficient option.
- Jeff Stein (CASE Team): All fans have good applications and bad applications. Do the Standards actually address fan selection?
 - Wade Smith (AMCA): Yes. FEG directs fan selection. PBER does the same thing – directs fan selection but uses a different approach.
 - Jeff Stein (CASE Team): Neither is directing manufacturers?
 - Wade Smith (AMCA): The standard does direct manufacturers because if the fan does not meet FEG 67, it cannot be sold. There are some fans being sold that do not meet the FEG 67. There is some cost premium to increase FEG. Change in cost and change in efficiency of increasing FEG is not nearly as dramatic as selecting a fan within 15% of the peak.
 - Need LCC to move from FEG 65 to FEG 67.
 - Need an LCC for selecting.
- ◆ Armin Hauer (ebm-papst): Regarding the statement "AMCA developed FEG Metric in conjunction with ASHRAE TC5.1 Task Force" are you sure there was such TC 5.1 task force?

Follow Up Items

- ◆ Need LCC to move from FEG 65 to FEG 67.
- ◆ Need an LCC for selecting.

Direct Digital Control (DDC)

- ◆ Scott Bailey (ASWB Engineering, on behalf of the Statewide IOU C&S Team) presented
- ◆ Presentation available here: http://title24stakeholders.com/wp-content/uploads/2014/05/Direct-Digital-Controls-Stakeholder-Meeting_May20_2014.pdf

Comments and Feedback:

- ◆ Can you define “very small”?
 - We define “very small” in terms of the size of the air handling system, chilled water plant, or hot water plant as opposed to square footage.
 - Proposing same size limits that were defined by ASHRAE.
- ◆ Why did you choose to use EQuest?
 - Suggestion to use CBECC-com or Energy Plus.



- ◆ Jeff Stein (CASE Team): There are set-point reset requirements in Title 24. There may not be a savings opportunity due to set-point requirements.
- ◆ Jon McHugh (CASE Team): Revisit Demand-control ventilation baseline.
- ◆ The proposal does include installing DDC to the zone level.
- ◆ Steve Rawski (CASE Team): If DDC becomes mandatory, then it extends the requirement to buildings that already have control systems in place.

Door and Window Switch Control

- ◆ Jeff Stein (Taylor Engineering, on behalf of the Statewide IOU C&S Team) presented
- ◆ Presentation available here: http://title24stakeholders.com/wp-content/uploads/2014/05/Door-and-Window-Switches-Stakeholder-Meeting_May20_2014.pdf

Comments and Feedback:

- ◆ Can the control be integrated with the building security system?
 - Yes. Integrating with security systems is common.
- ◆ Does it matter if the window is serving a small space or a very large space?
 - People are going to modulate the window to allow for the appropriate air flow to the space.
 - Concern is what happens when somebody opens a window in a large space and it impacts everybody in the space, even the people that are not close to the window, because the heating system to the entire space is impacted.
 - This is an issue whenever there are operable windows whether there is a switch or not.
 - When you have operable windows, it is better to have smaller zones.
- ◆ Mark Alatorre (CEC): Have you talked HVAC manufacturers to get their feedback on whether there is a concern about increased cycling on HVAC equipment?
 - Jeff Stein (CASE Team): Would not stop the cycle in the middle of operation. Typically people do not open and close their windows multiple times in a day. There will be negligible impact on HVAC equipment. Less total cycling than the system would endure.
- ◆ Would there be an exception for retail applications when the door is opening and closing frequently?
 - Jeff Stein (CASE Team): There is already an exception for buildings that have automatic closures. Pretty much all retail stores have automatic closing devices.

HVAC and Water Equipment Efficiencies

- ◆ Scott Bailey (ASWB Engineering, on behalf of the Statewide IOU C&S Team) presented
- ◆ Presentation available here: http://title24stakeholders.com/wp-content/uploads/2014/05/HVAC-Equipment-Efficiencies-Stakeholder-Meeting_May20_2014.pdf



Comments and Feedback:

- ◆ During the stakeholder meeting, a stakeholder requested if CASE Team could provide the marked-up tables of the proposed code language.
- ◆ No other significant comments were provided.

Follow Up Items

- ◆ CASE Team will provide made-up table of proposed code language for this measure.