CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

Notes from 2019 Title 24 Part 6 Code Cycle Utility-Sponsored Stakeholder Meeting for Residential Envelope Measures

Posted October 28, 2016

Meeting Information

Meeting Date: September 14, 2016

Meeting Time: 10:00 AM – 4:30 PM

Meeting Host: California Statewide Utility Codes and Standards Team

Attendees

First Name	Last Name	Email Address	Organization
Statewide Utility Codes and Standards Team			
Utility Staff			
Marshall	Hunt	mbh9@pge.com	Pacific Gas and Electric Company (PG&E)
Jill	Marver	Jill.Marver@pge.com	Pacific Gas and Electric Company (PG&E)
Stu	Tartaglia	set2@pge.com	Pacific Gas and Electric Company (PG&E)
Chris	Kuch	Christopher.Kuch@sce.com	Southern California Edison (SCE)
Randall	Higa	Randall.Higa@sce.com	Southern California Edison (SCE)
Daniela	Garcia	DGarcia3@semprautilities.com	Southern California Gas (SoCalGas)
Codes and Standards Enhancement (CASE) Team Members			
Bill	Dakin	bldakin@davisenergy.com	Davis Energy Group
Alea	German	agerman@davisenergy.com	Davis Energy Group
Marc	Hoeschele	mhoesch@davisenergy.com	Davis Energy Group
Ken	Nittler	ken@enercomp.net	Enercomp
Heidi	Hauenstein	hhauenstein@energy-solution.com	Energy Solutions
Vanessa	Morelan	vmorelan@energy-solution.com	Energy Solutions
California Energy Commission Participants			
Payam	Bozorgchami	payam.bozorgchami@energy.ca.gov	California Energy Commission (CEC)
Christopher	Meyer	shristopher.Meyer@energy.ca.gov	California Energy Commission (CEC)
Mazi	Shirakh	mshirakh@energy.ca.gov	California Energy Commission (CEC)
Michael	Shewmaker	mshewmaker@energy.ca.gov	California Energy Commission (CEC)
Other Participants			
Bruce	Wilcox		
Lindsay	Stovall		American Chemistry Council
Alese	Ashuckian		APA
Chris	Bradt		BKi
Jeremey	Drucker		Blomberg Window Systems
Nick	Brown		Build Smart Group
Curt	Rich		North American Insulation Manufacturers Association (NAIMA)
Amy	Schmidt		DOW Chemical
Bob	Raymer		California Building Industry Association (CBIA)
Megan	Cordes		ConSol
Mike	Hodgson		ConSol

Tony	Martinez		ConSol
John	Morton		ConSol
George	Nesbitt		Environmental Design/Build
Brandon	DeYoung		De Young Properties
Rosemary	Howley		Gabel Associates
JR	Babineau		Johns Manville
Jim	Robinson		Knauf Insulation North America
David	Ware		Knauf Insulation North America
Noah	Horowitz		Natural Resources Defense Council (NRDC)
Abe	Cubano		Owens Corning
Bryan	Selby		Selby Energy
Roger	LeBrun		VELUX Skylights
Gary	Smith		Wedge-IT Co.

Meeting Agenda

Time	Topic	Presenter
10:00 – 10:30	Introduction	Marshall Hunt (PG&E)
10:30 – 10:45	Compliance Improvement	Jill Marver (PG&E)
10:45 – 11:45	Quality Insulation Installation	Bill Dakin (Davis Energy Group)
11:45 – 12:45	High Performance Walls	Alea German (Davis Energy Group)
12:45 – 1:45	Lunch Break	
1:45 – 2:45	High Performance Attics	Marc Hoeschele (Davis Energy Group)
2:45 – 3:15	Break	
3:15 – 4:15	Improved Windows and Doors	Ken Nittler (Enercomp, Inc.)
4:15 - 4:30	Wrap-up and next steps	Marshall Hunt (PG&E)

Key Takeaways and Action Items

1. Overview
    a. Action Item: The Utility CASE Team will provide clarification on California's requirements to "keep up" with ASHRAE 90.1 and IECC.
        i. This page on DOE's website explains states' requirements to establish building codes that are at least as stringent as model codes: https://www.energycodes.gov/determinations. Note, the website has a tab for both residential and nonresidential building codes.
    b. Action Item: The Utility CASE Team will consider incorporating an area where comments can be shared on Title24Stakhodlers.com.
2. Quality Insulation Installation
    a. Key Takeaway: There needs to be QII procedures for underdeck insulation greater than truss depth.
    b. Key Takeaway: Not much support for "partial credit" QII concept. Too much subjectivity and liability
    c. Key Takeaway: Need for more trades training (WISE, utility-sponsored). On-site trainings may result in better results

   d. QII procedure needs to be simplified and more enforceable to get better compliance
   e. Action Item: The Utility CASE Team get feedback from stakeholders, including David Ware (Knauf Insulation) on specific issues associated with QII in multifamily.
   f. Action Item: Utility CASE Team will follow up with Curt Rich (NAIMA) to get a copy of the study from Building Science Corporation that found typical insulation installations perform at the rated R-value.
   g. Action Item: Utility CASE Team will investigate revising cavity degradation assumptions for specific insulation methods
   h. Action Item: The Utility CASE Team will follow up with Noah Horwitz (NRDC) and Mazi Shirakh (CEC) to discuss NRDC's suggestion to make QII a mandatory requirement.

3. High Performance Walls
   a. Action Item: Utility CASE Team will reach out to Mike Hodgson (ConSol) to get data on wall and roof assemblies from EPIC WISE project.
   b. Action Item: The Utility CASE Team will follow up with David Ware (Knauf Insulation) to collect information on costs of high-performance walls.
   c. Key Takeaway: There are concerns that market adoption for HPW may not occur by 2019. This may be more challenging for small builders with limited resources.
   d. Key Takeaway: Important to consider all cost implications of moving beyond 1" of foam, including costs for integrating draining plane, additional fasteners, and potentially assembly certifications.
4. High Performance Attics
   a. Action Item: Utility CASE Team will reach out to Mike Hodgson (ConSol) to get data on HPA findings (construction techniques & costs) from EPIC WISE project.
   b. Action Item: Collect cost data from multiple real world projects. Develop mature market cost estimates.
   c. Action Item: Make sure that 2019 QII procedures accommodate HPA approaches
   d. Action Item: Explore additional HPA opportunities in the high cooling load climates where benefits are greater (CZ 11, 13, 15)
   e. Key Takeaway: There are concerns that market adoption for HPA may not occur by 2019. This may be more challenging for small builders with limited resources.
   f. Key Takeaway: CBECC-Res needs to accommodate underdeck insulation options and QII.
5. Windows and Doors
   a. Action Item: Utility CASE Team will revisit the SHGC credits/penalties in climate zone 16.
   b. Action Item: Utility CASE Team will follow up with Bob Raymer (CBIA) to get a copy of the Office of the State Fire Marshal interpretation of the sprinkler requirements in attached garages.
   c. Action Item: Utility CASE Team will look at compliance rules in climate zones 1, 3 and 5 to make the standard design use a lower SHGC.
   d. Action Item: Utility CASE team will contact Roger LeBrun to discuss the treatment of skylights.

Meeting Notes

Overview of 2019 Title 24 Development

- Marshall Hunt and Jill Marver (PG&E) presented on behalf of the Statewide Utility Codes and Standards Team
- Presentation available here.

Comments and Feedback

1. Mike Hodgson (ConSol): Is it possible to get presentations 5-7 days before the meeting?
    a. Marshall (PG&E): Then you for the feedback. We will do our best to provide presentations in advance.
2. Bob Raymer (CBIA): When is the stakeholder meeting on solar topics?
    a. Mazi Shirakh (CEC): CASE teams are not leading efforts to evaluate the sizing solar to meeting ZNE. CEC will be presenting information in staff workshop next year. In the meantime, we will talk about assumptions and visions.
3. Bob Raymer (CBIA): Can you explain the second bullet on the last slide? (slide 19)
    a. Mike Hodgson (ConSol): The state has a mandate to ensure they match the recently adopted code, it would be nice to clarify.
    b. Bob Raymer: I was not sure California had mandate to look at IECC.
    c. Action Item: The Utility CASE Team will provide clarification on California's requirements to "keep up" with ASHRAE 90.1 and IECC.
        i. This page on DOE's website explains states' requirements to establish building codes that are at least as stringent as model codes: https://www.energycodes.gov/determinations. Note, the website has a tab for both residential and nonresidential building codes.
4. Noah Horowitz (NRDC): I think code-readiness is great in getting ready for future Title 24 requirements. It would be helpful to compile a list of questions that need to be answered to help inform decisions on code-readiness projects/activities.
    a. Marshall Hunt (PG&E): Great idea. I will work with my team to get this started.
5. Bob Raymer (CBIA): CEC has a robust docket system. They post all public comments on their website. If you have indicated you're are interested in particular rulemaking, they provide give notice when someone has filed comments. Is there some central point where written comments and notes can be housed so everyone can access them? It will help make the process better.
    a. Marshall Hunt (PG&E): The utility team does not have a formal docket system, but the feedback we receive is considered when we develop code change proposals.
        i. Bob Raymer (CBIA): I am not suggesting a formal rulemaking, but HCD and building commission put together a place where written comments are housed.
        ii. Action Item: The Utility CASE Team will consider incorporating an area where comments can be shared on Title24Stakhodlers.com.
6. Mazi Shirakh (CEC): When will the Central Valley research study be ready?
    a. Marshall: It is in many stages, we just finalized a report for ETTC website. Work is ongoing this summer, and will continue into the winter season. There will be a number of reports available on the ETTC website.

Follow Up Items

1. The utility team will provide clarification on California's requirements to "keep up" with ASHRAE 90.1 and IECC.
2. The utility team will consider incorporating an area where comments can be shared on Title24Stakhodlers.com.

Measure 1 – Quality Insulation Installation

- Bill Dakin (Davis Energy Group, Utility CASE Team) presented
- Presentation available here.

Comments and Feedback

1. Curt Rich (NAIMA): Insulation inspection is somewhat subjective. When developing QII requirements, how do you consider the subjective manner of inspections? It is not as easy to do an accurate inspection of spray foam.
    a. Bill Dakin (DEG): There is a specific procedure for spray foam. We are looking at current issues of inspection and addressing subjectivity is something we will look at.
    b. Chris Meyer (CEC): Are there more qualitative ways of inspecting?
    c. Curt Rich (NAIMA): We do not have a method right now.
    d. Bill Dakin: We are in the process of doing a survey of HERS raters on their experience with QII. We would like to share the results when they are available.
2. David Ware (Knauf Insulation): Are you going to have separate QII for multifamily? Some of the envelope issues and construction techniques are unique in multifamily, and QII doesn't currently address unique challenges associated with multifamily.
    a. Action Item: The Utility CASE Team get feedback from stakeholders, including David Ware (Knauf Insulation) on specific issues associated with QII in multifamily.
3. Bob Raymer (CBIA): This proposal is moving a compliance option into a prescriptive requirement. Over last three updates of standards, particularly the last, a lot of compliance options have been moved to prescriptive requirements. As a result, it is becoming extremely difficult to use the performance approach. There are fewer compliance options to use in the performance approach. As we hit ZNE we are approaching having to comply with prescriptively. For those that want to do design, that is hard. We hope CEC considers adding more compliance options, maybe looking at plug load strategies.
    a. Mazi Shirakh (CEC): Any ideas on what the new compliance options should be?
    b. Bob Raymer (CBIA): CBIA and CONSOL will send CEC compliance option ideas before October.
4. Mike Hodgson (ConSol): There are standards for spray foam already. You going to modify what is already in the Standards, not starting fresh?
    a. Bill Dakin: We will modify existing requirements.
5. Mike Hodgson (ConSol): QII is the most important HERS rating. In the past 2-3 years we have been working with CEC, CBIA, and RESNET to unify the inspection approaches used in California and nationally. One major difference between California and the national approach is California looks at how construction actually occurs, and penalizes the baseline based on typical practices. It encourages quality construction by allowing people to use HERS inspections to confirm the quality of construction. People can receive a credit if they pass the HERS inspection. The national standards assume everything is perfect in the baseline. The inspections result in penalties if they do not pass. From Jill's compliance comment, you also want to encourage

contractors to do the right thing. We want people to always do a good job, not just if they get the inspection. Let think about how the credit/penalties are applied for third-party inspection with the goal of encouraging quality construction.

   a. Bill Dakin: One reason we are working on this measure is is because we want the area of QII compliance to improve.

6. Payam Bozorgchami (CEC): There are QII requirements for spray foam applications, but there are no QII requirements for hybrid systems. The CASE Team will be looking at this issue.
7. George Nesbitt (Environmental Design/Build): I think QII should be mandatory. As a HERS rater, I know that QII fails often. Every material fails. It does not matter if an installer claims they install QII, they always/often fail. There are a lot of HERS raters not doing their job, or passing QII when it should fail.
   a. Bill Dakin: We will be talking about the results of HERS surveys later today, and we will be using these surveys to inform revisions to QII requirements.
   b. George Nesbitt (Environmental Design/Build): The first thing to do to make a building efficient, is the envelope. Insulation needs to be done well. Structural steel is more common, especially in multifamily homes. You say there is no procedure for inspection, it has to be part of it.
   c. Bill Dakin: I think we will talk more about continuous when we talk about walls down the line.
8. Noah Horowitz (NRDC): Can you speak about who is qualified to complete the inspection?
   a. Bill Dakin: The HERS rater is responsible for completing the inspection and signing off on it. We are not proposing changes to who is responsible for completing and signing off on QII.
9. David Ware (Knauf Insulation): To increase those performance trends, which is the desire, the process needs to improve itself. George mentioned failure, it really depends what concept is success and failure. A lot of time has to be spent with the verification industry and HERS raters to help streamline the process and document trends through the registries.
10. Mike Hodgson (ConSol): You are saying the costs include labor to install correctly and the cost for the HERS rater to come out?
    a. Bill Dakin: Yes. Costs include both additional labor cost to insulation correctly and HERS rater costs.
11. Payam Bozorgchami (CEC): What do you mean by HERS raters are losing work? Does this mean "good" HERS raters are losing work to HERS raters that are cutting corners?
    a. Bill Dakin: In some cases, it has gone to another HERS raters. It can lead to tension between building owners and HERS rater. One HERS rater said she is no longer doing QII because it leads to too much trouble. An energy consultant also said they no longer use QII because QII fails and they keep having to go back and make revisions to CF-1R.
    b. George Nesbitt (Environmental Design/Build): Anytime a HERS rater fails someone; it is a problem. I do not get paid if I fail tests. HERS raters get yelled at, threatened, no pay, loose work. CalCERTS will not even let us issue a CF3R that says "fail", the only option is pass. I cannot create a document that says an installer failed, they can get another rater that says they passed. It is difficult as a HERS Rater because the person who hires us is also the person we might have to fail, and our clients don't want to pay us if we fail them. HERS Raters are left in a difficult position because we went to stay in business, but we also want to be inspecting buildings appropriately.

c. Curt Rich (NAIMA): I do not want to defend subpar installation jobs, but the Building Science Corporation issued a study last year showing that typical installation jobs performed to R-value. Don't set the bar too high on QII. If the installation achieves the rated R-value that is sufficient.
    i. Action Item: Utility CASE Team will follow up with Curt Rich (NAIMA) to get a copy of the study from Building Science Corporation that found typical insulation installations perform at the rated R-value.
d. Amy Schmidt (Dow Chemical): In light of making things easier for raters, there needs to be a mechanism for contacting providers, as well as RESNET with pushback from builders. RESENT needs to know conflict of interest between parties.
    i. Payam Bozorgchami (CEC): RESNET has no value in California per say. We have our own QII procedures in the Title 24 reference appendices. We review the RESNET procedures when we develop the Title 24 QII requirements.

12. Noah Horowitz (NRDC): Can you help me understand the first bullet (slide 10)?
    a. Bill Dakin: Basically builders have QII credit included in Title 24 and they struggle with insulation installers correctly installing, and HERS inspectors passing it. It ends up being challenging for builders in the field.
    b. Noah Horowitz (NRDC): A decent portion that apply for credit, end up failing? They know they will be inspected and fail, should we make this mandatory?
    c. Bill Dakin: You do not see the quality unless someone follows up.
    d. Mazi Shirakh (CEC): Why would making the measure mandatory be better than prescriptive?
        i. Noah Horwitz (NRDC): it is a complicated issue, so it will be better to talk about it off-line.
        ii. Action Item: The Utility CASE Team will follow up with Noah Horwitz (NRDC) and Mazi Shirakh (CEC) to discuss NRDC's suggestion to make QII a mandatory requirement.
13. Tony Martinez (ConSol): How would you model partial credit QII in software (Slide 16)?
    a. Bill Dakin: There are degradation assumptions that exist and get removed with QII, so the partial will have something in between. We would be leveraging residential quality construction projects that dealt with these kind of issues and determine what penalties would be.
14. George Nesbitt (Environmental Design/Build): There is a certain amount of subjectivity about half-pass and half-fail, it is harder to say you get full, partial, or no credit.
    a. Bill Dakin: That is why we are asking for feedback. From a rater's standpoint it could be challenging. For a builder, they could start with partial and use it as stepping stone to get there. QII is the most failed HERS inspection.
15. Amy Schmidt (Dow Chemical): Would partial QII credit open more liability for a rater doing a QII inspection, because they would be allowing something required by code to get a pass. I am a little concerned about that.
16. Noah Horowitz (NRDC): I appreciate the creativity; I do not know how this would be implemented or practical. If you don't get the full QII, then you have to make up for it some other way, but you have probably already ordered your windows and HVAC equipment.
17. Rosemary Howley (Gabel Associates): As an energy analyst, QII is the last option to select because it is complex and the difficulty to implement. I agree it is the way things should be done. The process currently is so onerous to implement. Do you have something that cuts back on

things that are particularly troublesome? Also, if there is something like a partial credit, it is not quite as hard to meet and get some of the benefits.

18. Brandon De Yong (De Young Properties): The partial credit adds to subjectivity. If it's a prescriptive requirement, then if you do not want to do QII, you can make up for it in some other way.
19. Bruce Wilcox: The prescriptive requirement (baseline) is a bad insulation job. Maybe there is a way to change the baseline assumption so it uses different assumptions for the baseline and the QII case so that QII does not fail as much.
    a. Curt Rich (NAIMA): I would support the previous comment, and urge CEC to make criteria performance based.
    b. Action Item: Utility CASE Team will investigate revising cavity degradation assumptions for specific insulation methods
20. Marshall Hunt (PG&E): What happens if every house has a good R-value, what impact does that have on the base?
    a. Bill Dakin: It does have a lesser effect. These assume high performance walls with exterior insulation. If you go from 1 to 2 inches, that benefit will be less.
21. George Nesbitt (Environmental Design/Build): We could back off on QII when there is continuous insulation on walls and where the cavity insulation is not as important. QII belongs in non-residential. I have failed plenty of insulations that are not QII. I see a lot of bad insulation installation. Until we see installations improve, all insulation should be inspected. It should be a mandatory measure.
    a. Mazi Shirakh (CEC): You are saying builders aren't doing what they say they will do? What is presented in the registries?
    b. George Nesbitt (Environmental Design/Build): There is the issue of what the installer did and what the installer writes on the form, that does not reflect what they did. We know what they did because we inspected it. One of the problems now, 2x6 wall you have to fill it, what about 2x10, what about that?
22. Mike Hodgson (ConSol): It is a useful discussion to figure out what should be done in the degradation assumptions. Do the gaps of 1/8 inch really giving that degradation? I am sure NAIMA has data to put in the conversation. But this points to a bigger issue: we have very complicated code and raters are not using it for one reason, builders are not for another. If we can make QII simpler and more enforceable, we will all be better off. My concern with QII is if you do it carefully, and still do not pass, that is the issue.
    a. Bruce Wilcox: The 70% degradation only applies to cavity insulation.
23. Bryan Selby (Selby Energy): I have always been skeptical, QII is very subjective. There is no assurance that after the rater leaves, the insulation is in the same condition from when he/she left. One of the important things, there is no functional, practical test after dry wall is installed. An air leakage test is a very practical test to ensure an air barrier was done right. A practical performance test may ensure a better assembly quality. What about allowing some degradation, but requiring blower door?
    a. Bill Dakin: Thank you. Air leakage will be addressed in the IAQ presentation in another Stakeholder meeting.
24. Payam Bozorgchami (CEC): Add spray foam manufacturers to market actors.
25. Brandon DeYoung: For the builder task list, we want to make sure that all parties understand what needs to be done related to QII early in the process. Purchasing department and drafting department should also be involved.

26. Marc Hoeschele (Davis Energy Group): I am wondering if a pre-construction meeting with HERS raters should be required?
    a. George Nesbitt (Environmental Design/Build): It is great when we can meet early in the process. Some projects you get called in way beyond a pre-meeting.
27. Bill Dakin: Energy Code Ace has a sheet for QII information, but I do not see a lot of trainings out there. The question is how to engage contractors?
    a. John Morton (ConSol): The WISE program, which is funded from a CEC EPIC grant, offers training specific to HPA and HPW. We are finding is they are fully open to training and working with the HERS industry to make sure training is there while installers are actually installing, and bringing them out of the field. There is a challenge because turnover in the industry. The resources are there, but needs to be utilized properly.
    b. Bill Dakin: We have seen manufacturers be more involved in installation. There is not a lot of in the field training, and I would like to know more about what is available.

Measure 2 – High-Performance Walls

- Alea German (Davis Energy Group, Utility CASE Team) presented
- Presentation available here.

Comments and Feedback

1. George Nesbitt (Environmental Design/Build): In the San Francisco Bay Area, I mostly see 2x4 and 3x4 for structural reasons. Multifamily is a lot of 2x6 for structural reasons. I say we are underestimating the amount of 2x6 multifamily. Three-story is 2x6.
2. Nick Brown (Building Smart Group): 2x4 without foam is quite common in Southern California.
3. Mike Hodgson (ConSol): The EPIC WISE program did a survey of the 5 major metropolitan areas in California. We have data on walls and roofs that could help inform the CASE analysis.
    a. Action Item: Utility CASE Team will reach out to Mike Hodgson (ConSol) to get data on wall and roof assemblies from EPIC WISE project.
4. Bob Raymer (CBIA): We recently learned that Edison is revising their program proposal for CAHP and may not be offering the same incentives for HPA and HPW in 2017.
5. David Ware (Knauf Insulation): I would suggest adding insulation manufacturers that have distribution network to your list of sources for cost data. Working with those are a lot different than big box stores.
    a. Action Item: The Utility CASE Team will follow up with David Ware (Knauf Insulation) to collect information on costs of high-performance walls.
6. Bob Raymer (CBIA): We are working with CEC on an early adoption program. We have well over a dozen projects, mostly in Northern California. We will be going public with membership, and the action items for the buildings. One of our concerns is that you are using costs from the 2016 analysis. That is a problem because there is not a long track record with compliance with the 2016 Standards. We will see if the new costs are similar to the cost estimates used in the 2016 analysis
    a. Alea German: A lot of these costs on the screen align with 2016 CASE Report. Certainly our expectation is to get better cost estimates. If anyone has data to share, please do.
7. Brian Selby (Selby Energy): I assume the walls assembly is based on stucco. Is there consideration for other walls assemblies that do not have stucco? I would think there would be a cost difference.

   a. Alea German: We tried to approach material neutral. We take into account additional window framing costs to integrate windows with the drainage plane. We tried to go agnostic to material.

8. Jeremy Drucker (Blomberg Windows): One issue is going outside the wall. The slide shows four foam thicknesses. From the window manufacturers' side, you cannot pick one (can't revise window manufacturing for multiple wall thicknesses). You may not have captured the 10-year liability chain for third-party framing and flashing due to future water leakage. This is often the largest portion of the cost for multifamily. That is more of a concern than the upfront cost usually.
   a. Mazi Shirakh (CEC): The goal is to go to thicker, continuous insulation without changing windows.
9. Payam Bozorgchami (CEC): When we were developing the 2016 Standards, we were originally aiming for thicker sheathing for walls, but we did pull back. There is a how-to document on how to add more rigid insulation, mainly how to frame around an opening so you can add rigid insulation from 2-2.5 inches while still meeting the siding requirements. The WISE project has identified a number of products that are available like Thermal Buck that can be used for window openings to allow more continuous insulation without changing windows and not worrying about water intrusion.
10. JR Babineau (Johns Manville): Are these costs to builders?
   a. Alea German: These costs include 30% markups, so they are costs presented to the buyer.
11. Mazi Shirakh (CEC): The R21 + R5 assembly and the R15 +R10 assembly have nearly identical savings even though the U-Factor is quite different. Why?
   a. Alea German: The biggest impact is with the walls between the house and garage which in the R15 + R10 case are 2x4 without foam. Looking at results for multifamily, you see a lot more similar savings because there are no walls between conditioned and unconditioned spaces.
12. Payam Bozorgchami (CEC): Is the wall between the garage and house usually 2x6 because electrical and plumbing? If its 2x6 for just one wall and 2x6 everywhere else, why the difference?
   a. Alea German: Is there justification to say that should be applied uniformly in the protocol?
   b. Rosemary Howley (Gable Energy): If the house is 2x4, then the garage is 2x4. If the house is 2x6, then the wall between the garage and the home will be 2x6.
   c. John Morton (ConSol): The wall assembly depends on the drain line pipe size. If pipes are 3½-inches or larger, it will be 2x6.
   d. Mazi Shirakh (CEC): Could data from CalCERTS help answer this question?
      i. Alea German: We have looked at CalCERTS data, but it is difficult to know if the data was modeled correctly.
13. Alea German: The multifamily prototype for the calculations is just shy of 7,000 ft. total.
   a. Participant: Seems small for multifamily.
14. Mazi Shirakh (CEC): When you model the wall in the garage, do you assume you can use continuous insulation in the wall between the garage and the house?
   a. Bob Raymer (CBIA): That could be a fire concern.
   b. Ken Nittler (Utility CASE Team): On the standard design, the sheathing is taken off in the baseline run. We did this due to concerns about drywall. Does anybody hang drywall on the outside of continuous foam?
      i. You can do it.

15. Brian Selby (Selby Energy): Is it true that the standard for walls between home and garage is mandatory minimum insulation?
    a. Ken Nittler (Utility CASE Team): The software uses the same R-value as prescriptive design for the applicable climate zone. It does not apply the sheathing.
16. Payam Bozorgchami (CEC): Distributor and manufacturer should be identified as market actors
    a. George Nesbitt (Environmental Design/Build): HERS raters.
        i. Alea German: I did not include the HERS rater because a HERS inspection is not required for code compliance. You will need a HERS inspection for incentive programs.
    b. Brandon De Young (De Young Properties): Structural engineers should be involved
    c. JR Babineau (Johns Manville): Include insulation manufacturers.
17. Jeremy Drucker (Blomberg Windows): Why are you trying to be nuanced, instead of starting with a single rigid baseline. Having a wide variety of exterior conditions will influence this.
    a. Alea German: When you said looking at different details, level of thickness, under code now there are walls with 1 inch. We are looking to go to 1.5-2 inches of foam. Is there a specific challenge that should be addressed?
        i. Jeremy Drucker (Blomberg Windows): If there is a single target, from a manufacturer's perspective, I can work with that. We mostly do high-end. There is a wide variety of finish dimensions, which means there is also an infinite possibility of foam dimensions and overall opening dimensions.
18. Payam Bozorgchami (CEC): One thing we did is base prescriptive on U-factor. We are not telling the builder what thickness rigid insulation to install. They can build a 2x8 and maximize cavity insulation. What Alea is trying to show is the baseline of her study is R-4 continuous, but the norm could be anything. If the builder goes with 2x4 and spray foam and do away with rigid, they are welcome to if they meet prescriptive U-factor. If they cannot, then do the performance option and make up the energy savings with other measures.
    a. Jeremy Drucker (Blomberg Windows): Was spray foam modeled?
        i. Alea German: No.
19. George Nesbitt (Environmental Design/Build): Adding exterior continuous insulation, is possibly an additional inspection from a building department. It might not be a big deal, but it adds a step. The prescriptive compliance method is essentially dead. If we lower U-values, it will make the prescriptive approach used even less. We should think of what we want to allow to be traded in the performance method. In Passive Homes, you have to do all the envelope requirements; they cannot be traded off. We should not trade off envelope measures. It is more expensive to upgrade envelope down the road.
20. Brian Selby (Selby Energy): The CF1R lists cavity insulation requirement in a column (prominent location), but the continuous insulation requirements are buried in the form. It would be great if you could list the cavity and continuous requirement side-by-side on the compliance form to simplify compliance.
    a. Payam Bozorgchami (CEC): Thank you. We have made a note of this and will look into making this change.
21. Nick Brown (Build Smart Group): I was in the stucco manufacturing industry for 14 years. Assuming continuous insulation systems are accomplished with stucco, they are governed by ICC reports, which typically test assemblies with up to 1.5-inch thickness of insulation. Not to say manufacturers cannot retest and prove systems that are 2-inches or more, but retesting is a $100,000 hurdle. We can accomplish R-6 with 1.5 inch of EPS. R-8 is harder, but we could use graphite

impregnated foam or XPS. I hope you considered the higher priced foam. You also need to consider the cost of fasteners on thicker assemblies.

22. George Nesbitt (Environmental Design/Build): On the additions where you are extending walls and not required to meet U-value for continuous insulation, does CBECC let you model the wall as it is, or does the software always model the baseline.
    a. Ken Nittler: I would have to look.
    b. George Nesbitt (Environmental Design/Build): You may get compared to continuous insulation even though continuous insulation
    c. Mazi Shirakh (CEC): Prescriptively, if extending walls, then you can extend it with the same framing (2x4 if existing wall is 2x4) and without continuous insulation.
    d. Rosemary Howley (Gable Associates): With the performance approach, there isn't a way to indicate the wall is an extension, so the software must be using the standard design not the existing conditions.
    e. Brian Selby (Selby Energy): If you had a 2x6 wall, you cannot model it without trying to fool the software that something else is going on. It would be nice to have more flexibility.

Measure 3 – High-Performance Attics

- Marc Hoeschele (Davis Energy Group, Utility CASE Team)
- Presentation available here.

Comments and Feedback

1. David Ware (Knauf Insulation): Why are you calling out tiles roofs specifically in Slide 3?
    a. Marc Hoeschele: Software assumes that tile and metal roofs have a 2-inch air space. Performance varies based on the existence of the air space.
    b. David Ware (Knauf Insulation): You are not anticipating any change in that? A different combination of A, B, C?
    c. Marc Hoeschele: We aren't sure what exactly we are going to propose for Options A and C, but the idea is that we want to identify options that result in equivalent performance.
2. JR Babineau (Johns Manville): The 2018 IECC will contain a buried ducts provision that considers deeply buried and tight ducts to be in conditioned space. Thus getting the credit for ducts in conditioned space in modeling programs.
    a. Mazi Shirakh (CEC): Do we have buried duct credits?
    b. Bruce Wilcox: The buried ducts credit was developed in 2010, and I am not sure if it has been used. They get you R-25. It is challenging to verify and requires a duct design.
3. Participant: How much leakage was assumed?
    a. Bruce Wilcox: Duct leakage has multiple targets, the standard leakage is 5%, and you can get down to 0% with post construction inspection.
2. Abe Cubano (Owens Corning): There is talk of the PV credit going away, how sure are we that the PV credit is going away?
    a. Mazi Shirakh (CEC): For certain, in its present form, the PV credit will be revised. Whether we bring it back in a modified version, that may be considered depending on how industry is progressing in meeting the high performance walls and high performance attics requirements.
3. Mazi Shirakh (CEC): Did you assume a radiant barrier with R-8?

   a. Marc Hoeschele: We assumed the same radiant barrier requirements that currently exist. So, generally yes, but they vary by climate zone.

4. Mazi Shirakh (CEC): In slide 12, what was the assumed percent leakage for very low leakage ducts?
   a. Marc Hoeschele: CBECC-Res assumes zero, if you specify very low leakage ducts. The HERS rater has to measure less than 25 CFM leakage to outside, but the model assumes zero.
5. Gary Smith: Does the R-8 tile include the air space?
   a. Marc Hoeschele: It does not include the R-2 air space.
   b. Gary Smith: So, technically R-10?
   c. Marc Hoeschele: the requirement is for the R-value increment you will be adding to the roof deck.
6. George Nesbitt (Environmental Design/Build): For the 2013 Standards are we assuming vented space between roof and insulation?
   a. Ken Nittler: It is function of roofing material. So if you have tile or metal roofs, you get R-2 for air space, if you have other materials it does not.
   b. Bruce Wilcox: The primary benefit is the R-value of the airspace, not any ventilation impact.
   c. George Nesbitt (Environmental Design/Build): My point is the airspace is independent of roofing type, we should keep it generic as opposed to based on product type.
7. Bill Dakin: Another market actor could be other subcontractors, like plumbers. The subcontractors have to be aware of what is going on because other contractors sometimes pull insulation out after the inspection.
8. Marc Hoeschele: We are looking at options to increase the stringency of the requirements in or the more extreme climate zones (11, 13, 15 are primary cooling zones) where there is a higher value associated with savings. The interest is looking at how far we can go in these zones and the NPV benefit. This will assist in reducing PV sizing.
9. Mike Hodgson (ConSol): We are going to R-19. Most of our roof decks are 2x4 trusses. How do you get R-19 under deck? Is it compressed, stapled?
   a. Marc Hoeschele: On the code-readiness project we are working on, the builder is aware of the challenges of attaching R-19 below deck. It hasn't been built but we will see.
   b. Mike Hodgson (ConSol): Is the truss bottom covered with insulation?
   c. Marc Hoeschele: It's assumed covered in the existing model.
   d. Mike Hodgson (ConSol): In-field installation we are typically seeing wire. I do not know if that agrees with the model.
   e. Brandon De Young (De Young Properties): Some of our projects, we are doing R-38. It is installed with wiring and the batt expands as it goes beyond 2x4 and pushes beyond each side to encapsulate the entire truss. I am not sure if that is possible with R-19, with a truss chord depth of 3.5 inches.
10. Mike Hodgson (ConSol): Costs need to be modeled right because this is where we determine yes or no on the measure.
11. Payam Bozorgchami (CEC): There are a couple systems that can do it, for example Owens Corning box netting system, spray foam, even batts installed properly with rods could fit the criteria. We need proper QII to verify the correct R-values and ensure compression to make sure we actually get R-19.

12. Noah Horowitz (NRDC): You mentioned you would like to look at going farther in CZs 11, 13, 15. Do you know how you are going to do that? Are you considering eliminating the exception for alterations in these zones and requiring HPA in smaller alterations?
    a. Marc: We haven't evaluated the details of going further in these zones, but we think below deck may be the most cost effective option. There is room to look at how the combination of measures might perform and be cost-effective.
13. Abe Cubano (Owens Corning): We are looking forward to things that will be happening at the end of the 2016 cycle. How important is market adoption when you're considering new requirements for the 2019 cycle?
    a. Mazi Shirakh (CEC): Looking at market adoption is critical. The assumption is at the end of the 2016 cycle HPA and HPW will be common practice in the state and 2019 will improve on that by adding more insulation. That is the reason why we're taking PV credit out.
14. Bob Raymer (CBIA): We are hoping over the next nine months, we can garner cost and implementation data, and understand the design issues for walls and attics. My concern is when we get to 2020, and R-13 is not doing well, and then we will have an additional requirement for more insulation. We are trying to urge the industry forward; given they just came out of economic downturn. We have some of the biggest home builders (e.g., KB Homes) pursuing these materials and measures. But, we also have smaller companies that may not have access to this and may be fumbling around come 2020. We need to do a whole lot of work now to ensure that does not happen.

Measure 4 – Improved Windows and Doors

- Ken Nittler (Enercomp, Utility CASE Team)
- Presentation available here.

Comments and Feedback

Windows

1. Mazi Shirakh (CEC): Could you have something other than glass in the middle pane of a triple-pane window?
    a. Ken: Yes, you could use something other than glass, but it is not common. It is hard to manufacture, and costlier.
2. Brian Selby (Selby Energy): Can you clarify why climate zone 16 has a low SHGC requirements? Solar heat gain could be beneficial in some areas with high heating loads. We should not penalize climate zone 16 for using high SHGC.
    a. Ken: High SHGC is typically a custom order. In 2005 code climate zone 16 flipped from being a climate zone with high SHGC to low SHGC with the introduction of TDV metric that showed energy savings with lower SHGC. It is possible it is something to be looked at.
    b. Ken: There is a benefit in having the same low SHGC minimum for all climate zones. If you go to a Home Depot in San Francisco, you will find the same glass with the same SHGC in Sacramento. You can get high solar gain glass, but those tend to be custom ordered and high cost.

   c. Brian Selby (Selby Energy): I agree with the benefits of standardizing the baseline in all climate zones, but there is not a lot of construction in climate zone 16, and we shouldn't penalize them for using higher SHGC windows.
   d. Ken: We can look into this.
   e. Action Item: Utility CASE Team will revisit the SHGC credits/penalties in climate zone 16.
3. Jeremy Drucker (Blomberg Windows): The costs on slide 12 seem low. Four-surface coating cost $8-$10/SF. It will be much more expensive than $0.15/SF
4. Noah Horowitz (NRDC): Should we apply the same requirements to high-rise residential? There is a lot of construction that is 4 to 10 stories. Do we need to do something for fenestration in these buildings?
   a. Ken: It is a tough question. A lot of those buildings have punched opening windows, which are made in the same factory as windows for low-rise residential buildings.
   b. Payam Bozorgchami (CEC): Are most windows for those buildings site-built fenestration?
   c. Ken: Punched opening would be residential windows, maybe accent windows. If it is all glass, maybe San Francisco in a higher-rise building, a curtain wall or window wall product is typically used.

Doors

1. Bob Raymer (CBIA): State Fire Marshal just came out with interpretation that fire sprinklers are required in all attached garages not just attached garages that have living space above them. I have a copy of the interpretation if you'd like a copy.
   a. Action Item: Utility CASE Team will follow up with Bob Raymer (CBIA) to get a copy of the Office of the State Fire Marshal interpretation of the sprinkler requirements in attached garages.
2. Jeremy Drucker (Blomberg Windows): What about sliding doors, other doors?
   a. Ken: Sliding doors and French doors are treated like fenestration products.
   b. Jeremy Drucker (Blomberg Windows): 0.3 and 0.2? I do not think a U-factor of 0.3 is possible.
   c. Ken: I think it is possible. Let's talk about it some more.
3. Brian Selby (Selby Energy): Question regarding door manufacturers, if the proposal goes through a label requirement, is there a possibility of a simplified approach? similar to CMA?
   a. Ken: NFRC ratings for door blanks can be passed on to all final products that use the door blank.
4. Mike Hodgson (ConSol): You mentioned something about a thermally broken threshold?
   a. Ken: if we go back to the Energy Star requirements, you would have seen an opaque door you see 0.17. We chose higher than that. If it is NFRC procedure, you add 0.02. We added 0.17 and 0.02 then rounded it up to a simple 0.2.
   b. Mike Hodgson (ConSol): Is there a profile to that, or is it within the existing profile?
   c. Ken: It would be more like poor and debridge thermal break. It is on the metal sill.
   d. Bob Raymer (CBIA): Which is good for multifamily where you have ADA requirements. As long as you are avoiding it, it's a good thing.
5. Jeremy Drucker (Blomberg Windows): Why do we have to nudge builder inspectors, why cannot they check for NFRC labels on all windows and doors like they are supposed to?

   a. Ken: It has been in the code. NFRC was first brought in in 1993, largely language for residential and commercial is the same. NFRC has been the only way to go for a long time. If you read the fenestration chapter, the requirements go to windows and doors and does not exempt anything. Production builders are careful because legal requirements, but the custom home market is less compliant.

6. George Nesbitt (Environmental Design/Build): French doors and sliding doors are treated as windows, is that right?
   a. Ken: Yes
7. George Nesbitt (Environmental Design/Build): I like the idea of reevaluating the credit/penalty for using higher SHGC in climate 16 so you get credit instead of penalty. I have alternation projects where plans are supposed to show savings in windows. We could use the default tables for triple pane, and clarity on tinted windows. If I am looking at existing two-pane but do not know NFRC values, I have to treat it like clear glass. Lower U-value is almost always better, so as long as someone puts lower U-value than Title 24, that is good. We need some tolerance level for solar heat gain, for some zones lower is better, for some higher is better. So at what point is the solar heat gain efficient value not valid?
   a. Ken: I think we can look at some of those things. I have not heard anyone say make revisions to the default table. The table is not made to be real advantageous. W would need manufacturers for that. We can look at climate zones 1, 3, 5 to change the solar heat gain for credit.
   b. Action Item: Utility CASE Team will look at compliance rules in climate zones 1, 3 and 5 to make the standard design use a lower SHGC.
8. Rosemary Howley (Gabel Associates): Are there many opaque doors with NFRC ratings?
   a. Ken: Yes. You can see the doors with labels at big box stores or door websites.
9. Mazi Shirakh (CEC): You said savings are about 2.5% on single family? And that is almost on par with HPA?
   a. Ken: That is what runs show.
   b. Mazi Shirakh (CEC): We made runs, and 40-50% heat gain is through windows.
10. Roger LeBrun (VELUX Skylights): We would ask the CEC to take a new look at skylight prescriptive requirements. Current U-factor max. is 70% below the lowest ENERGY STAR level. I don't believe this is cost justified, if the products are even available.
   a. Ken: We are not proposing changes to skylight requirements. There is already a prescriptive exemption of 16ft2 with U-factor 0.55 and SHGC 0.30. ENERGY STAR has skylight U-factors of 0.50 to 0.60.
   b. Mazi Shirakh (CEC): Thank you for this comment. We will look into it.
   c. Action Item: Utility CASE team will contact Roger LeBrun to discuss the treatment of skylights.