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BEFORE THE
CALIFORNIA ENERGY COMMISSION

In the matter of Building Energy) Docket No.12-BSTD-01
Efficiency Standards Revisions)
for Residential Buildings and)
General Requirements) 45-Day Language Hearing

CALIFORNIA ENERGY COMMISSION
HEARING ROOM A
1516 NINTH STREET
SACRAMENTO, CALIFORNIA

TUESDAY, MARCH 13, 2012
9:00 A.M.

Reported by:
Kent Odell

APPEARANCES

Commissioners Present:

Karen Douglas

Staff Present: (* Via WebEx)

Martha Brook
Mazier Shirakh
Gary Flamm
Payam Bozorgchami
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Patrick Saxton
Pippin C. Brehler
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George Nesbitt, Environmental Design Build, CALHERS, Passive House California
John Ferraro, Roof Coating Manufacturers Association
Ken Nittler, Enercomp
Bob Raymer, California Building Industry Association
Mike Gabel, Gabel & Associates
Gary Klein, Affiliated National Management
Deborah Stănescu,ConSol and representing CBIA
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Cathy Chappelle, Heschong Mahone Group
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Jon McHugh, McHugh Energy
Gene Thomas, Ecology Action
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MARCH 13, 2012 9:04 A.M.

COMMISSIONER DOUGLAS: Ready?

MS. BROOK: Yes, we're ready.

COMMISSIONER DOUGLAS: Excellent, well, let's get going, then. We're here for the second day of a two-day series of hearings on the 45-day language for the Title 24 Update for 2013. And today we're covering Revisions for Residential Buildings and other General Requirements. So I'd like to welcome everyone here and turn this over to staff. Thank you.

MS. BROOK: Good morning, I'm Martha Brook --

COMMISSIONER DOUGLAS: And then -- sorry, Martha -- I'll also, sometimes I neglect to do introductions. So I'm Karen Douglas, Lead Commissioner on Efficiency. To my right is Galen Lemei, my Advisor, and to my left my Advisor, Jennifer Nelson. Go ahead.

MS. BROOK: I'm Martha Brook and, before we get started, I just wanted to remind you of the emergency process we have. If we have to exit the building, follow staff out of the building and we'll meet over at Roosevelt Park, have a picnic, and that's about all we have to say about that. The bathrooms are across the way, there's a refreshment area up the stairs if you're interested. And we're ready to get going. Do you want

to introduce yourselves, please?

MR. SHIRAKH: I'm Mazi Shirakh, one of the Project Managers for the 2013 Cycle.

MR. SAXTON: Patrick Saxton.

MR. FLAMM: Gary Flamm.

MR. BREHLER: Pippin Brehler, Staff Counsel at the Energy Commission.

MR. SHIRAKH: So we have an agenda out front and you should have a hard copy, and if you can't read that, it's up there, too. And we have some times allowed for different topics, and it is very likely we're going to deviate from that as we did yesterday is our best estimate, depending on how many questions we get.

So we're here for the 45-day Language and the 15-day Language release will be April 11, 2012. We're going to have ACM Workshops on May 3, 2012. And the 2013 Adoption Hearing will be May 9th, 2012, in this room.

As of yesterday, we're not going to provide detail of all the changes, this is kind of a high level overview; all the details are given in the Express Terms, and in the NOPA that has been posted on our website.

This first section, Part 1, §10-102, are the Definitions and we've made some new definitions, deleted some old ones, and clarified others, added new Definition is the ACM Reference Manual, which is an Alternative

Component Package; Compliance Option; Data Registry, (residential and nonresidential); Documentation Author; Exceptional Method; Proposed Design Building; and Standard Design Buildings. Those are all the new terms that we have defined in §10-102.

§10-103, this is the Administrative Section of the Code. This is where we describe what forms are needed for what type of buildings, and what are the requirements for the forms. And these include the Certificate of Compliance, the Certificate of Installation, the Certificates of Field Verification, Acceptance Requirements, and so forth. We deleted obsolete language, we reorganized and revised these sections for clarity. We introduced an option for enforcement agencies to create a simplified compliance documentation procedure. This was a request by CALBO, to get variance for some small additions and alterations where no HERS features are required. They can at their discretion come up with simplified forms, or no forms at all. So we granted that.

We introduced an option for simple alteration to residential buildings to submit Certificate of Compliance to enforcement agency in conjunction with submittals to the Installation Certificate prior to final inspection. This is offered as a convenience to

situations such as HVAC replacement, applies only to projects that require HERS verification for which the enforcement agency does not require building design plans to submit for the plan check process. Again, this was another accommodation to CALBO.

Number 5 is Update the Reference (Joint) Appendix JA7, a new appendix created to provide specifications for registration of electronic compliance documentation. You know, we are going to expand the electronic filing from Res to Nonres, and JA7 has been created to basically lay out the requirements for the data registries.

Number 6 is to expand documentation author signature requirement to all documents, Certificate of Installation, Certificate of Acceptance, and Certificate of Verification in order to accommodate the administrative assistance that responsible signers of the compliance documentation require for registration procedures. Basically this is an option that would allow an administrative assistant to sign these documentations on behalf of the people that do the testing, while maintaining the proper responsibility for the documentation.

Number 7 is Require registration of all nonresidential compliance documentation by January 1,

2015. There is a one-year delay basically to allow time to prepare the infrastructure for this requirement. In 2008, we required all residential forms that require a HERS verification feature to be registered into a Data registry, a HERS Data Registry. So we are now expanding that to Nonres forms.

Number 8 is Introduce the document repository feature. So this is an extension of the registries when we are going to have multiple registries for res and nonres. The purpose of the repository is to have one central place for where all of this data will reside.

Section 10-106 was edited for clarity.

Section 10-107. We added language here. This is basically authority we already have for compliance options, you know, if there is something in Part 6 or related documents, the Commission can adopt procedures that are equivalent to that, so this language basically clarifies that. But, you know, if there is something in Part 6, an alternative that is roughly equivalent to that, it can be approved by the Executive Director. An example of that might be like, you know, we have for the refrigerator charge, we have a standard charge procedure that is used when the temperatures are about 55 degrees. Then what do you do when the temperatures are below 55? And, you know, we may basically take the standard test

procedure and modify that for lower than 55 degrees. So this language will give us the authority to adopt that alternative procedure.

Section 10-109 is the Compliance Software, Alternative Component Packages. We reorganized and edited for clarity General Requirements, Application, Compliance Software, Alternative Component Packages, Exceptional Methods, Data Registries and Repositories. So we tried to clarify the requirements for these items and inserted a new subsection to address the data registries that we talked about in the previous slide.

Section 10-110, clarified that Executive Director may charge a fee to recover the costs of processing and reviewing applications with the exception of Section 10-106 applications. Basically, we typically charge a fee to -- what is the purpose of that, Martha? Do you know?

MS. BROOK: For the software?

MR. SHIRAKH: Yes.

MS. BROOK: Just to recover the cost of testing, the certification testing.

MR. SHIRAKH: Section 10-111. This is where we describe Certification for Labeling of Fenestration Products and Air Leakage Labeling, clarified the difference between manufactured and site-built

fenestration, manufactured fenestration requires air leakage testing and site-built fenestration does not. We clarified that manufactured fenestration requires a label for each product, whereas site-built does not. It requires at least one label for multiple fenestration products. And NFRC references were updated and language clarified.

Certification Requirements. We added VT language because now it is included in Part 6. VT stands for Visual Transmittance. In the past, we only generally regulated the U-Factor and SHEC, in this cycle of Standards, we're adding VT as another requirement for fenestration products.

We added text to emphasize the Component Modeling Approach software tool, or CMAST, to allow manufacturers and specifiers to use this program to acquire an NFRC certified label. So this was a new program that was instituted with the last round, the existing round of 2008, where people can use the CMAST, a computer software NFRC tool, to simulate the performance of the building that goes into Nonresidential Buildings.

We removed requirements for amending local outdoor ordinances to be consistent with changes made to Section 140.7. Gary, do you want to say something about that?

MR. FLAMM: Okay, Section 10-114 addresses Nonresidential Outdoor Lighting and the requirements are that, if an authority having jurisdiction wants to change an outdoor lighting zone designation, they can do so through a public process and, if they have a local ordinance such as a minimum outdoor lighting level, that they have to certify that to the Energy Commission and those requirements for certifying minimum or outdoor lighting levels have been removed, both from this Section and from Section 140.7.

MR. SHIRAKH: Thank you. So any comments on the Administrative Sections of the Standard in the room, or online?

MR. NESBITT: George Nesbitt, Environmental Design Build, CALHERS, and Passive House California. I just want to kind of mention again, Section 10-111 on the Window Labeling is largely repeated in Section 110.6, so it just seems like there's a lot of redundancy there and I don't quite understand -- is the first section Title 24, Part 1? Or is it actual Title 20, Part -- the ten dash --

MS. BROOK: It's Title 24, Part 1.

MR. NESBITT: Title 24, Part 1, so I guess that's all the Administrative. But there are a number of things that kind of get repeated in multiple sections,

which just leads to things not always them matching up. Then the other thing, when I was reading through that section this morning on Scope, I just want to remind people that the Part 1 says that the Standards apply when you pull a permit, or when a permit would be required to be pulled by law, so the Code applies always, basically, it's just we kind of -- we always think of enforcement with a permit, but whether you pull a permit or not, it applies.

And then, under the Scope of the Code, you know, it talks about what buildings are covered and I think you took out wood heat and talked about buildings that have non-mechanical HVAC, as opposed to wood heat, but then later on in 100.0(E)(2)(d)(ii)(b), there's an exception that says buildings that are wood heated and have non-mechanical HVAC don't use any deplete able resources that are exempt from the Energy Code; yet I would think, regardless of how we -- what source of energy we use on a house, we want it to be efficient first, and wood is not exactly a non-deplete able resource either. When you burn wood, you do lose something, even though in theory it's carbon neutral and, you know, then there's all the particulate and pollution, and so it seems like we shouldn't be making that exception.

MR. SHIRAKH: Thank you, George.

MR. FERRARO: Good morning. John Ferraro representing the Asphalt Roofing Manufacturers Association. In regards to Section 10-113, the Labeling Requirements section indicates that CRRC has an improved accelerated aged solar reflectance; to our knowledge, CRRC has not developed any plans to begin certifying accelerated aging. Can you provide clarification to that?

MR. BOZORGCHAMI: This is Payam with California Energy Commission. The reason we put that in there is because currently the LBNL and, then, the Universities -- excuse me, the Laboratories, LBNL and Oak Ridge National Laboratories, are working on accelerated aged program, and if that does get accepted with CRRC, we want to make sure that we also capture that in the Standards.

MR. SHIRAKH: We're not requiring it, we're trying to basically be proactive in case it becomes available, so we're not shut out for this cycle of Standards, and we don't have to wait until 2017.

MR. FERRARO: Thank you.

MR. SHIRAKH: Thank you. Ken.

MR. NITTLER: Good morning, Ken Nittler with Enercomp. On some of these Administrative Sections, you've done some -- some good work has gone into adding a

few definitions on things like documentation author, and I would recommend that we add a definition for responsible party -- 10-102. And then those definitions can be used later on in 10-103 where we talk about who signs what.

I also have some concern over -- or one of the groups of people that I've worked with and for over the years are really the CABEC sorts of people, the energy consultants. And I think we've extended -- historically, I would say, when you sent documentation off, you were thinking of the person that did the energy calcs, but now with some of the language on the CF6R stuff, there's really sort of a documentation author that is downstream from that point in the process, so I don't have a specific proposal, but I'm a little worried that the definition of a documentation author means different things, depending on which certificate you're talking about. So, for instance, the way that process has at least worked traditionally, I wouldn't want to see the energy consultant have to sign on the CF6R because it now says "Documentation Author," and it's perhaps misconstrued to mean the person doing energy calcs when that step in the process could happen six months later, or a year later, and is really a different person in the process. So I'd like to see if we can work a little bit

on that.

Finally, as I've testified before, I at least think the 300-square-foot exemption being offered here for additions and alterations, I think it's a mistake. I think we, in the past, have learned our lesson and, on the nonres size, there was a 1,000-square-foot limit that said you don't have to have documentation. I don't know, if the world thinks we should provide that sort of exemption, I'd say two things, one is the 300-square-foot limit should align with the brackets of square footages that are in the additions and alterations section in 150.2 now; and secondly, I would say the Commission should provide -- should create forms that specifically show which things are allowed to be skipped, or avoided, especially in this world where duct testing is mandatory, and in the cases where there's fan ventilation and so forth, we have to have HERS features.

MR. SHIRAKH: I can't answer that last question. This would only apply to non-HERS verified features, so this would be water heaters, perhaps windows and some small additions, anything that involves any type of HERS verification is not subject to this exception.

MR. NITTLER: Okay. I understand that, but I still think the idea of saying you can skip compliance documentation has been shown to not work very well, that

I express that concern again, but I understand what you're saying. Thank you.

MR. SHIRAKH: You should probably work with Jeff Miller on the definitions of -- he's the man. Any other comments on that administrative section? Online? Jamy.

MR. BACCHUS: Jamy Bacchus, NRDC. Just looking at what George referenced to, it's the exemption 2 for Section 100(E)(2)(d)(ii)(b), low rise residential buildings that are heated with wood heaters and other non-mechanical heating systems or that don't use deplete able sources for lighting and water heating. It is kind of an oddly worded exemption and would echo some of his concerns. I don't know many non-cabin types of buildings would take that exemption, but it's -- I don't know why it limits electricity to just water heating and lighting only.

MR. SHIRAKH: We'll look at it. Okay, we're going to move on to Section 100.

MR. FLAMM: Okay, this is Gary Flamm. Section 100, a new subsection was created for addressing covered processes. A new exception was added, Exception 2 to Section 100.0(f). Basically, the existing exception states that if you have one Occupancy that constitutes 80 percent of the conditioned floor area of a building, the

entire building envelope -- HVAC, water heating, etc., shall comply with that occupancy. In 2005, the Lighting Standards apply to conditioned and unconditioned spaces, so another exception was added so that, when lighting for both combined conditioned and unconditioned spaces was 90 percent of the floor area, that occupancy shall comply with the lighting requirements for that building type. And the 90 percent is consistent with the requirements in Section 140.6.

The definitions in Section 100 were edited for clarity. When we referenced something in the other documents, we put information in the definitions about those documents incorporated by reference. Some of the existing documents incorporated by reference, we had to update the version numbers. New definitions were added to support other changes of Part 6, definitions that were deleted that were no longer used. There was some sorting of definitions into groups, so fenestration definitions are under a parent definition of fenestration; lighting terms, lighting controls, nonresidential building occupancy types. Previously, we had nonresidential functioned area for the area category and building types for the complete building method into the same definition parent, and those were broken out into two separate parents for clarity.

Outdoor lighting terms, sign lighting, and residential were already groupings.

This is a redundant slide, it seems, added new definitions, replaced definitions cited by other Code, for example, LED definitions were replaced with reference to IES, ANSI, RP1610. So those are the changes to Section 100. Any comments?

MR. RAYMER: Thank you. Bob Raymer with California BIA. With regards to Definitions, and this may get into Section 110.10, the definition for "feasible" as it relates to the 250-square-feet of available space for solar, is that something you're going to define in the ECN? Or will that be defined in Part 6?

MR. SAXENA: I don't think we actually use the word "feasible" in Section 110.10. But if we did, I can understand the desire for a definition. But I don't think it actually appears there.

MR. RAYMER: Okay, when you got rid of the percentage -- and this is kind of jumping ahead -- but you got rid of that percentage requirement earlier on, and I thought that you had then used, well, you did this as feasible, and so I'll look and see how it is specifically worded, but as long as it's clear for the building officials and the designers, when you have to do this and when not. So, thank you.

MR. GABEL: Mike Gabel, Gabel Associates. Just a suggestion. You have the definition of fenestration product repeated in the Joint Appendices, which is fine, but I would also move the definition of fenestration area and repeat it in the Standards, itself, because it's a really key definition and it's buried in Joint Appendices, and it's just not easily found, so….

MR. NESBITT: George Nesbitt, two things. There are a lot of definitions in the Joint Appendices, as well, so it seems like we're doing the same thing in two places.

MS. BROOK: So we're doing that on purpose. We wanted the Joint Appendix definitions to encompass every single definition that's found anywhere else in the Standards.

MR. NESBITT: Okay.

MS. BROOK: So that's -- I guess your comment should be in regards to that, because that's on purpose that we did that.

MR. NESBITT: Okay --

MR. SHIRAKH: Part 6 only includes definitions that are in the Standards.

MR. NESBITT: That are in the Standards, okay.

MR. SHIRAKH: JA1 has definitions that covers everything. That would include ACM Manuals and things

that appear in the Reference Appendices.

MR. NESBITT: Okay. And on the definition of an addition, I think the revision, either it did say, or someone proposed to have an addition be an increase in conditioned floor area, or volume, but I think historically it's always been area and volume, and that's how it's proposed to be; but I think it should be floor area *or* volume. And the situation I'm thinking of is, let's say I have a flat ceiling, R30, and what a lot of people want to do is they want a vaulted ceiling, so they're not doing an addition and adding floor area, so the question is, do they, a) even need to insulate the roof? We're talking 2 X 4s, so they're going to put in R11/R13, so if it's not an addition, they don't have to comply with the Code; you can say they don't even have to insulate the roof, let alone the mandatory minimum. So by defining an addition as an increase in volume, it might make it clearer that you do have to comply with the Code.

MR. SHIRAKH: I don't understand. If you're touching the roof, it's an altered components have to meet other mandatory and prescriptive requirements, and it's all laid out, so it's not like you're scot free if it's not --

MR. NESBITT: No, you're right and, I mean, the

Code does read in Alterations that, if you alter something, it has to meet the Code. But I think -- I don't think most people understand that and, actually, it took me reading through the Code and really looking at it and seeing, oh, yeah, pretty much all the prescriptive and all the mandatory requirements always apply in Alterations and Additions. But whether that's really clear to people in practice?

MR. SHIRAKH: Yeah, maybe we need to communicate that better, but basically if you touch something, it's either a repair, or an alteration. If it's a repair, then there's no requirements. If it's an alteration, a bunch of stuff kicks in.

MR. NESBITT: Right. And I'll touch on it right now. I think you actually changed for Alterations to ceiling, or roof insulation, it used to be you had to go to R30 or R38, and it looks like, in the current language, it's proposed to actually go to the mandatory minimum, which actually I guess is now R30.

MR. SHIRAKH: That's typically true for Alterations and you don't want to go to R38 because there may not be actually a way of doing it, that’s why we make a distinction between Alterations and Additions.

MR. NESBITT: Right. It's just one of those situations and, overall, I don't think it's clear that

the Code applies to a lot of situations.

MR. SHIRAKH: Any other questions on Section 100? Gary.

MS. BROOK: Okay, so this is Section 110.1, Mandatory Requirements for Appliances. This section was just revised for clarity. A new section was added to clarify the allowable sources for appliance efficiency data used for verification and conformance with Part 6. And a new section was added to clarify when the conformance with Part 6-specific appliance efficiency requirements may be demonstrated using the minimum efficiency, or other criteria approved by the Energy Commission.

And the requirements for Space Conditioning Equipment, these tables have been updated to reflect the new Federal Appliance Efficiency Standards, and this is Table 110.2-A and B.

This is you, Mazi.

MR. SHIRAKH: So currently we have language in the 45-day in §110.2, it used to be 112(C), for Upgradable Setback Thermostats. And this is thermostats able to communicate with a utility, or the ISO, in case of a curtailment, or a demand response signal can be sent and the thermostat will respond.

We've had a lot of comments on this section.

Many of them had to do with the intellectual property issues, patents and so forth. And then staff and our attorneys have looked at this, along with the utilities and their attorneys, and we have actually another proposal that we'll be releasing shortly after these hearings, and what I can tell you now, it's going to be probably a substantive change to this section.

MS. BROOK: Mandatory requirements for Space Conditioning Equipment, again, the last item on this substantive change for this section is Low Leakage Air-Handling Units requires manufacturers to certify to the Energy Commission that they're conforming with the qualification requirements in Reference Joint Appendix JA9 in order to qualify for the low leakage air-handling unit performance compliance credit.

Before we get to 110, the slide deck is missing a significant update to 110.3, which is the water heating section, and basically the substantive addition there is we have a new showerhead requirement. Basically, a single showerhead must be installed directly on each pipe that terminates at a shower. Showerheads must be placed no closer than 4-feet from each other, as measured directly from one showerhead to the next. Showerheads must have a rated flow rate of no more than two gallons per minute at 80 pounds per square inch, and each mixing

valve must supply only one showerhead. The pipe connecting the showerhead to the heater or recirculation loop must be no wider than a half inch at any point.

UNIDENTIFIED SPEAKER: There is an exception.

MS. BROOK: There is an exception. Showers that re-circulate hot water from the drain to the showerhead are excepted from that requirement.

MR. RAYMER: Bob Raymer with CBIA. Is that consistent with what HCD has in their Green Building Regs? I don't know off the top of my head.

MS. BROOK: It is. This has a little bit more requirements around the 2GPM. The 2GPM is what's in the HCD.

MR. RAYMER: Thank you.

MR. KLEIN: [Inaudible]

MR. SHIRAKH: You know better, Gary.

MR. KLEIN: I just want to know what the timing is. I've been attending a lot of hearings outside the State of California, they all have a different process, so you've just got to learn to ask.

My name is Gary Klein with Affiliated International Management. I have a couple of questions about the language as written. I think that the purpose is so that there are not more than one showerhead hitting one person at the same time. Is that the intent?

MS. BROOK: I think the intent is to reduce the hot water usage during these shower events, yeah.

MR. KLEIN: Oh -- well, I want to be -- so as currently worded, I could have 4-feet distance around a corner of the showerhead here and a showerhead on that wall, and the distance is 4-feet, and both of them hit the same person. I'm not sure that's what you meant. I don't know, but I'm trying to raise the question. I'm assuming that you want to have a showerhead and then a distance to the next showerhead, and another distance.

MS. BROOK: Uh huh.

MR. KLEIN: Is this applicable to res and nonres? This is everybody?

MR. SHIRAKH: If it's in 110, then it's --

MS. BROOK: Yes, it's everybody.

MR. KLEIN: Okay, so then you run into another issue with gang showers on a tower. They're clearly not 4-feet apart, but they don't hit the same person. They go around a tower, and so they're six or eight inches apart --

MS. BROOK: Right.

MR. KLEIN: -- but they're facing a different person.

MS. BROOK: Yeah. But I don't think that's the intent. I think the intent is the single user shower.

MR. KLEIN: Okay. And then I got the idea that the half-inch -- we can fix the sentence "the piping connecting the showerhead to the heater or recirc loop must be no wider than a half-inch at any point." It probably needs to be that the branch line serving the shower shall be no more than half-inch nominal diameter. It more matches the plumbing code language.

MS. BROOK: Okay.

MR. KLEIN: And then the showers that re-circulate hot water from the drain to the showerhead are very interesting. You were talking about a re-circulating shower, in which case you can have any flow rates you'd like, for as long as you want it, as long as you only dump a certain amount of water down the drain.

MS. BROOK: Uh huh.

MR. KLEIN: Well, if I have one of those showers and don't use it with recirculation, I'm now allowed to have any flow rate I want in the showerhead, and I'm not sure that's what you meant by that. Again, it's a difficultly of the language. The other thing I would observe is that the sumps on some of these re-circulating showerheads are 100 gallons, so if you take a shower using a re-circulating shower, at 10 gallons a minute, you've got a 100 gallon sump that you're working through. When you're done with your shower, guess what

goes down the drain? A hundred gallons. And so I'm not convinced that the language as written is actually getting at what you're aiming for and I'm sorry I hadn't seen it earlier, but that's my comments at the moment.

MS. BROOK: Okay.

MR. KLEIN: I'm working on fixes for it, but I haven't come up with any in the last 30 minutes, so….

MS. BROOK: Okay, let's keep working on that, then. Thanks.

MR. KLEIN: Okay, I just thought you should know. Thank you for your time.

MS. BROOK: Uh huh.

MS. STĂNESCU: Hi, I'm Deborah Stănescu from ConSol. I'm representing International Window Film Association. I think this is the first section because it was section 110.6. IWFA would like to ask that rows be added to Table 110.6-B that used to be 116(B), the Default Solar Heat Gain Coefficient defining a default for window film. And in conversations with staff, there was a concern that an NFRC data on window film uses a different baseline than what's in the default table currently, so we're going to work on getting better data in our written comments, but even a fairly small difference in window film, a solar heat gain coefficient in the table would be acceptable or just wanting to get

into the table.

MS. BROOK: Okay.

MR. SHIRAKH: So work with me and Nelson on this.

MR. PENNINGTTON: I'm going to comment on this, too. Bill Pennington. I've been working on this issue a little bit and we're not sure whether a compliance option or changes to this table are the most appropriate way to go, so we'll be thinking about that.

MR. SHIRAKH: Thank you, Bill. Any other questions? You're on.

MR. SAXTON: Section 110.10, Mandatory Requirements for Solar Ready Buildings, is a new section for this Code Update. The intent is to reserve a portion of the roof for future installation of either solar electric or solar thermal. That area is referred to as a solar zone. They're different requirements for different building occupancies.

For single-family residences in subdivisions with 10 or more homes and a tentative subdivision map deemed to complete on or after January 1st, 2014, the solar zone requirement is 250-square-feet. There is an exception for three-story buildings that have a total floor area of less than or equal to 2,000-square-feet, that solar zone area is reduced to 250-square-feet.

There are also exceptions for additions and alterations, unless the building already has an existing solar zone.

For low-rise multi-family buildings, the requirements are applicable to buildings with eight or more dwelling units, or those with central water heating. The requirement is 15 percent of the roof area minus any skylight areas. There is an exception that allows an alternate space off roof elsewhere on-site, but the area requirement is double what the roof area would have been. Again, there is an exception for additions and alterations.

For hotel and motel occupancies and high-rise multi-family buildings, the intent of the requirement is more oriented to solar thermal, although it could be applicable to a smaller PV system, as well. Buildings that are 10 stories or fewer, the requirement is 15 percent of the roof area minus skylights. And 11 stories or greater, it is essentially 1.5% of the roof area per floor. Again, an exception for an off-roof, but on-site area is two times the required roof area for this occupancy.

A similar exception for additions and alterations, however, if the roof space is actually increased by 20 percent or more, and in addition the solar zone is applicable to the addition only.

For other nonresidential buildings, the requirement is only applicable if there are three stories or fewer. The area requirement is 40 percent of the roof area, again, with the exception for an alternate off-roof, but on-site space, and a similar exception for additions and alterations, unless the roof space is increased 20 percent or more.

Specific to the solar zone, which is on the roof, it can be broken into multiple sections, non-contiguous, each one must be at least 80-square-feet with no dimension in any direction less than five feet.

There is credit, if you will, given for a solar system, again, solar electric or solar thermal, that is actually installed at the time of construction that would reduce the 1:1, the required solar zone area. There is a note to acknowledge the access pathway and ventilation and spacing requirements that are going to be forthcoming in the 2013 Title 24, Part 9, California Fire Code. The solar zone itself must be oriented between 110 degrees and 270 degrees from north, or on a flat roof. That's from true north.

The Shading requirements around the solar zone are that no obstructions can be within the solar zone, themselves; this would be vents, chimneys, dormers, other roof mounted equipment. If an obstruction is present, it

needs to be located at least twice the distance horizontally from the solar zone as the height difference between the obstruction and the solar zone. We will definitely have illustrations of that in the Compliance Manual, it's a little hard to picture with wording.

When obstructions are located completely north of the solar zone, they're completely excepted from this requirement.

Structural integrity is a requirement just to show on the construction documents the as-designed dead load and live loads for the solar zone. There is no requirement to increase or change the load bearing capacity as otherwise designed.

There is also a requirement to indicate on the construction documents a pathway for the future routing of conduit or plumbing back to a point of interconnection with the electrical service or water-heating systems, again, to better facilitate future installation of these systems. There's requirement to leave a copy of the construction documents or comparable document with the building occupant, so that they have access, particularly to that interconnection pathway information.

This requirement is applicable to single-family residential buildings only, it is to better enable the interconnection of a PV system in the future. I think

most homes probably comply already with the minimum busbar rating of 200 amps. There's also a requirement to leave a space for a future circuit breaker that is on the opposite end of the busbar; this is to align with National Electric Code/California Electric Code requirements, and also to mark that breaker space "For Future Solar Electric."

I'm ready for questions on that section.

MR. SHIRAKH: Deborah.

MS. ST

MS. STĂNESCU: Hi. I'm now representing California BIA. And CBIA would just like clarification on how -- what the exceptions are when a house can't meet the 250-square-feet of available roof space and what the definitions are for that.

MR. SHIRAKH: I think we had a brief chat with Bob and -- and Mike and perhaps you last Friday, so we're prepared to come up with a proposal and we'll discuss it with you after these hearings. Thank you. It will be part of the 15-day language.

MR. SHOEMAKER: Lee Shoemaker with the Metal Building Manufacturers Association. I expressed some concern yesterday about the roof area with respect to the skylighting requirements and then this new solar ready, and I've had some conversations with Pat through email

and appreciate it. He shared some case reports that helped to explain some of the reasoning behind this and I'd say we still have some concerns, I can't stand up here and say this won't work, that you can't fit this much of an area reserved for solar panels and the skylight requirements that are there, but we have concerns. And I think what we're going to do is have someone with the expertise in daylighting and skylighting placement, we'll look at that, and if we see that, you know, we do see some problems, we'll share that with you and see if you have the same concerns.

But the concern is it's not just a matter of adding this new solar ready thing, the daylighting requirements have changed quite a bit in this revision. And there's less flexibility on the placement of skylights to achieve the daylighting requirement. The new draft requires that at least 75 percent of the floor area be within a prescribed distance of a skylight; before, it was just more based on the total floor area, daylit, or percentage of the roof area, but now it's much more specific about the skylights have to be distributed in a certain way to meet that new requirement. So that's where we're just concerned about will there be space for the solar ready zone on the roof. So we're going to look at that more, and if we find that we do have some issues

when we look at these layouts, we'll share those with you and you can see if you want to look at that closer.

The other thing is a question on the orientation, that one thing where you said certain angles to true north, yeah. I don't understand what that means, maybe you could explain that a little further, and when you say "flat roof," are you talking totally flat, zero slope? A lot of our buildings have near flat roofs, like a quarter on 12. I didn't know, you know, it just says "flat roof," or do you mean zero slope or --

MR. SHIRAKH: There is actually a definition for what a steep slope and low slope, and I think the low slope doesn't mean zero.

MR. SHOEMAKER: Well, low slope is one thing, this says "flat roof."

MR. SAXTON: Yeah, and I think the intent here really was -- I think it really was true flat, so we can talk about that a little more. The orientation requirement is due to the expected production from solar electric, and also with the time dependent valuation, weighting of energy kind of shifts the most desired spot from solar south to kind of southwest, and so that is what shaped those numbers.

MR. SHOEMAKER: So you could have a building with a gabled roof, or you might lose half of the roof

area that is allowable for the solar zone.

MR. SAXTON: That's true.

MR. SHOEMAKER: So then, would the 40 percent be of the entire roof? Or of the roof that meets this orientation requirement?

MR. SAXTON: Yeah, so we should probably work together and improve the language there. That's a good point.

MR. SHOEMAKER: All right, thanks.

MR. SHIRAKH: Helene.

MS. HARDY PIERCE: Helen Hardy Pierce with GAF. This is in direct to the point that was just made. When we talk about solar ready, and then low slope or flat, first of all, flat isn't allowed by the Building Code because the Building Code requires a quarter and 12 slope, okay? So that's point one, and then point two, depending upon the solar system that's going to be installed, if it's thin film, so directly to the surface, but anything other than that, or building integrated, then you oftentimes get your orientation by the racking system, so why would you put an orientation into the structure where the racking system would provide that orientation? Just a point of clarity. I think Payam understands when, you know, it's either this -- solar zone is oriented this for steep, 110 to 270 degrees, or

it's low slope, a low slope application that would take orientation of the solar into consideration when the actual solar system is designed.

MR. SAXTON: Yeah, I think that is the intent. Certainly the racking changes the slope of the PV system frequently; I think the orientation a lot less frequently, right? It's possible, for sure, but --

MS. HARDY PIERCE: Well, that's -- on low slope roofs, that's how it's done. It's either installed directly on the membrane, or it is the racking system is what provides orientation. And so as a point of clarity, you were saying that, no, no, no, it's either flat or it's under 10 or 270, and I don't think that that's correct.

MR. SAXTON: Okay. Yeah. Maybe you could send me some of the racking systems that commonly change the azimuth -- again, sloped for sure, and it's possible, but I think usually due to wind bloating not done very often to change the azimuth.

MS. HARDY PIERCE: I will send you information. Thank you.

MR. SAXTON: Okay, great. Thank you.

MR. SHIRAKH: Any other questions?

MR. NITTLER: Before we leave mandatory things, can I back up one section I was asleep at the wheel a

minute ago? Somehow the time change, I got confused. Ken Nittler with Enercomp. This is a comment on 110.6 regarding fenestration requirements. Again, as I stressed yesterday, one of my business interests is I operate a lab that does NFRC ratings, and there's some exceptions in this section under Items 2, 3 and 4, that provide an exception for the industry to not get an NFRC rating and, instead of using a traditional default table, they're able to use an equation. And basically this is -- we've heard from others one of the problems is, when you go out and look at the nonresidential marketplace, there are relatively few products rated, and I believe a big part of the reason has to do with this exception. Now, you made a significant improvement, in my view of the world, anyway, because in the old standard, the current standard was a 10,000-square-foot limit, now it's a 1,000-square-foot limit. But I still believe, and I've testified to this before, that that doesn't go far enough.

Let me just tell you a little story. Many of you were here for this back in the early 1990's, we had no window ratings, in fact, all we said was, was it single or dual glazing. We didn't even ask what kind of frame material it was in a lot of those early calculations. Back in the early '90s, the Commission was

one of the first organizations to recognize the value of having more diligent and representative ratings on fenestration products. And in the residential market, it's pretty hard to find a product that's not rated. But in the commercial market, it remains common, I would say, in my opinion. So I'd recommend -- or I'd suggest that part of the reason for that has to do with these separate calculations that allow a pretty good rated value to come out of a system without the product actually being rated. And I don't think it's any surprise. When you look back on where the fenestration market is, on the residential side, since 1993, we have a market that has -- is completely transformed to low conductance frames, to the use of low-e glass, there were some studies done for utility programs, incentive programs, in new construction, they can hardly find a window that isn't low conductance, with a low emissivity coating. And on the nonres world, that's not the case. I mean, there are other changes that are coming here where you're improving the U-Factor and so forth, that would also contribute to this, but I would again recommend that those exceptions in Sections 2, 3, and 4 of 110.6 actually get struck.

MR. SHIRAKH: So the reason we have -- the Commission fully supports the NFRC level in the CMAST. We were kind of key in developing that little procedure.

The reason we have these exceptions is, you know, we're still not very comfortable whether CMAST is ready for prime time and whether it's delivering what it's supposed to, that's why we have kind of this as like a backdrop. Do you feel CMAST is actually ready for the big show?

MR. NITTLER: Well, as a lab, we can offer the nonresidential industry both traditional NFRC ratings and component modeling approach ratings. And the component modeling approach that you're calling CMAST is a piece of software. The modeling approach is what's really discussed here. It has come online during the biggest crash in nonresidential construction in my lifetime, and so the fact that there aren't thousands of ratings out there is no surprise. We're accredited to do those calculations, we've done 20 or 25 of the 100 or so that have been done -- this is in two years -- and it hasn't happened in California and one of those projects were here in California, all of the other projects were in the State of Washington where one of our colleagues has done a very good job of making it stick. But I don't think it's because there's something intrinsically not quite ready for prime time about the component modeling approach; I think it's because of two things, one is there is very little nonresidential construction, and the other is because of exceptions like this have allowed

much of that industry to believe they can go through the process, get their building permits, and build the building without carrying out the process of getting a rating. This exception is applied way more broadly than one would think from the way the language is written.

MR. SHIRAKH: But if we did delete those exceptions, who is going to be upset -- impacted by it?

MR. NITTLER: Oh, well, I think the obvious ones -- there's no surprise here, obviously it takes time and it costs money to get a rating, the question is whether the benefit of those costs in time outweigh the -- or are higher than not having it done, and we could spend a lot of time arguing that. I obviously believe that the costs were worth incurring, will encourage the market to use the right product for California. One of the things we see on some of the commercial work is, and it absolutely stuns me to see in California, where we should be using a low solar gain, low emissivity glass, that we see projects with high solar gain, low-e in our marketplace in nonresidential. And it's, again, partly because a rating system creates an environment where there's more competition to provide product that has improved performance and that's where I think it would really help things to get rid of this.

MR. SHIRAKH: Okay. Thank you, Ken.

MR. GABEL: Mike Gabel, speaking on behalf of the CABEC Standards Committee. Ken and I have talked about this and we've talked with staff about this. I think, Mazi, your point is the right one, which is we're on an onramp to get to all these products getting labeled and I think we just -- there's two reasons not to do it so quickly, one is as you pointed out, I think CMAST, the CMA method is not ready for prime time, as we discovered in the research we did; the other is the Standards are very stringent, so the truth is the Standards themselves are going to push buildings and people to get rating, even if they're less than 1,000-square-feet of glass. But I think the point is, for 2014, I think we have to have a position where people can use an alternative method.

Also, you know, the center glass is a conservative calculation, if people really want the full credit for a good performance from a fenestration product, even if it's less than 1,000-square-feet, they'll go out and get a certification. So I'm thinking the industry, the standards, and the whole process will push the industry further towards this goal. Thanks.

MR. SHIRAKH: Thank you, Mr. Gabel. George.

MR. NESBITT: George Nesbitt. While we're on windows, in the default table for solar heat gain

coefficient, there's values for windows that are tinted, but we don't have a definition of what is a tinted window. Is a low-e window tinted? And also, it would be nice to have a default for triple-pane window. In Passive House, a lot of the projects are going to triple-pane windows, yet we're talking about either imported products, or potentially small manufacturers who may be willing to step into the market with a triple-pane product, yet can't afford to go through the NFRC yet. Yes, the default table is a bad value, but a double-pane default value for a triple-pane window is even worse. So having a little bit more ability, plus I guess I need to look at that equation to see if we can use that as a way to get a better value without having to go through the rating. And then, just a couple other comments on mandatory in 110.8(iii) on insulating ceilings or roofs, there's an exception for allowing, I think, up to 2,000 square feet of insulation to be placed on the top of ceiling tiles. And it seems like a practice that we know is not very good to put insulation in very air-leaky assemblies like that, and it seems like maybe that's something we should eliminate.

And then a comment on slab edge insulation. In -- it's in both 110.0-8(g), and then it's also in the Residential Mandatory 150.0(L), the 150 sections for

heated slabs, and it repeats most of the requirements in 110, but in 150, it says you need essentially a termite barrier that penetrates into the concrete footing, but that's not a requirement in 110 for just slab insulation if it's not a heated slab. So I would kind of recommend adding something to 110, or mostly -- either referring 110 to 150, or adding the termite barrier and eliminating some of what's in 150.

And then on the Solar Ready, I think you were saying pre-wiring was required for single-family?

MR. SAXTON: No.

MR. NESBITT: Or having a --

MR. SAXTON: No, just a busbar rating on the surface panel.

MR. NESBITT: Okay.

MR. SAXTON: No pre-wiring.

MR. NESBITT: Okay. Although, certainly for my house, 200 amps is overkill. PV doesn't add a load to the bus, per se, or --

MR. SAXTON: Yeah, so I can send you the requirements from Article 690 of the Electrical Code, George. It has to do with the size of the over-current protection that you can have for the inverter. But I can send you that --

MR. NESBITT: Okay.

MR. SAXTON: -- if you'd like.

MR. NESBITT: Okay, because I need to upgrade my service. And I guess I want to do the right thing.

MR. SHIRAKH: Any other comments on this section?

MR. YASNY: There's a Charles Cottrell online.

MR. SHIRAKH: Okay. Go ahead, Charles.

MR. COTTRELL: Yes. Charles Cottrell representing NAIMA. I just wanted to make sure that when any changes were made to the language about insulation above a drop ceiling, that it still be permitted for acoustic purposes so that whatever language is put in, it's clear that it not be given credit for thermal performance, or whatever, but it's pretty common practice for commercial buildings to have insulation above drop ceilings to keep the cross talk from room to room.

MR. SHIRAKH: So you can have all the insulation you want on the drop ceilings, we're just not going to consider insulation for the building envelope. There's no prohibition against --

MR. COTTRELL: Right, okay --

MS. BROOK: The way it's written, it sounds like a prohibition, the way that it's written in the Code. It says it shall not be placed -- it doesn't say it shall not be placed and taken credit for in the energy

calcs, it just says it shouldn't be there.

MR. SHIRAKH: Okay, maybe we can clarify.

MR. COTTRELL: That's my concern. All right, thank you.

MR. SHIRAKH: Sorry for the delay, I have to take notes and do this at the same time. Any other questions on this? Online? So we're at Section 150.0. These are the Mandatory Requirements for Newly Constructed Buildings. These are Residential. And so there's been numerous changes and clarifications throughout this section. And these are some of the major highlights: 150.0(d) increased the mandatory minimum requirements for insulation; raised floor from R-13 to R-19, the current level is R=13, but we're proposing the mandatory level to be increased to R-19. Now, proposed for the 15-day Language in red is the Ceiling and Rafter Roofs from the mandatory minimum be raised from R-19 to R30, and we will provide an exception for Rafter roofs, in addition, alterations where the current minimum R-19 will be maintained.

Section 150.0(h), Space Conditioning Equipment, Outdoor Condensing Units clearance requirements for 5 ft clearance from dryer vent outlets, so that way you don't suck in the lint back into the Condenser. Central Forced Air Heating Furnaces, maximum temperature rise,

requirement to configure installed systems to operate within the manufacturer's specified minimum temperature rise.

Subsection (g) Vapor Barriers in Climate Zones 14 and 16, a Class II vapor barrier shall be installed on the conditioned side of the insulation in all the exterior walls; and then, in Climate Zones 1-16 with unvented crawl spaces. The earth floor of the crawl space shall be covered with Class I or Class II vapor retarders.

Subsection (f) Hotel and Motel Guest rooms. This is a new requirement in adding captive card key controls, occupant sensors, or automatic controls to control lighting and space conditioning equipment in hotels and motels. This is very common in Europe and Asia, and if you leave your room, you know, you move your card from a captive key in terms of -- basically bringing the same concept here. In addition to that, one half of the 120 volt receptacles in each guestroom shall be controlled. There is additional information on this in Section 130.5(d). And then mechanical equipments are also supposed to be controlled in the same fashion, you know, when the room is not occupied, and those requirements are in 120.2(c).

Subsection (j), Water Systems and Piping

Insulation, all Nonresidential -- I'm sorry, nonrecirculating hot water piping of nominal diameter three-quarter-inch or 19 mm, or larger, must be insulated. This is a new requirement. So anything -- any piping that is three-quarter-inch and larger now shall be insulated. It includes the one-inch pipes, definitely, too. The maximum length of the one-inch, or the 25 mm piping in non-recirculating domestic hot water shall be limited to a length of 15 feet. There is an exception for dedicated for tubs. So the one-inch pipe that is proposed to be limited to 15-feet and it shall be insulated. The intent here is to encourage minimum (inaudible) with the three-quarter-inch pipe that are insulated.

And duct leakage is now a mandatory requirement in Section 150.0(m)(11). Under the current Standards, duct leakage is a prescriptive requirement. You know, we feel like this is ready to be moved into the Mandatory Requirement, there is no point in having ducts that are leaking 30-40 percent in our attics. We'll finish this section and then we'll take comments.

Mr. Flamm, you're on.

MR. FLAMM: The next few slides address residential lighting. This section has been edited for clarity. Currently, there is a requirement to calculate

luminaire efficacy -- 30, 40, 50, 60 lumens per watt -- based on a table, and that requirement has been replaced with a default list; basically it says incandescent luminaires are low efficacy and fluorescent are high efficacy, and LED certified to the Energy Commission as high efficacy are high efficacy, so it will not require builders to calculate the efficacy anymore.

Lighting in bathrooms: A minimum of one high efficacy luminaire in each bathroom, and all other high efficacy -- all other luminaires have to be high efficacy or controlled by a vacancy sensor.

Lighting in Garages, Laundry, Utility rooms shall be high efficacy with no alternative options.

For low-rise residential buildings, this whole construct of outdoor lighting, currently it just says the outdoor lighting attached to a building shall be high efficacy or controlled by some kind of automatic control, and this differentiates apartment complex lighting and site lighting for some of these larger multi-family buildings, and basically states that when a outdoor lighting residential shall meet the current residential standards, and when they shall meet the nonresidential outdoor lighting standards, so if you have a low rise residential building with four or more dwelling units, the site lighting shall comply with the nonresidential

outdoor lighting Standards. And if you have low-rise multi-family residential building where 20 % or less of the common areas, of the areas common, then they shall meet the current residential lighting Standards for those applications. Basically high efficacy are controlled by an occupant sensor. However, some buildings are greater than 20 % of the common area, such as a clubhouse in an office, and those buildings in which greater than 20 % of the space, the floor area is common area, those common areas shall meet the nonresidential lighting standards.

Lighting installed in multi-family corridors and stairwells need to be controlled by an occupant sensor to reduce the lighting power by 50 % or more.

The Appendix JA8, these are the requirements for how to classify an LED Luminaire as high efficacy for purposes of the Residential Lighting Standards. It has been edited for clarity. It now references IES LM-79, which was not adopted during the last Rulemaking Proceeding. It clarifies that the certification only applies to residential applications. LED luminaires must be certified to the Energy Commission to be classified as high efficacy, or they will be classified as low efficacy, regardless of their actual performance.

There is the Minimum efficacy in Table JA-8-A. There are requirements for Minimum Correlated Color

Temperature (CCT) for indoor vs. outdoor. There is a Minimum Color Rendering Index (CRI) of 90. Such luminaires shall contain no incandescent sockets of any type. There are Minimum requirements for testing labs. And there are Labeling requirements. So these are required to classify an LED as high efficacy. Those are the lighting changes.

MR. SHIRAKH: Okay, continuing with the Mandatory Requirements for Newly Constructed Buildings, Section 150.0(m)1 is the Updated duct construction standards to meet ANSI/SMACMA-006-2006 HVAC Duct Construction Standards.

New requirement for ducts claiming exemption from mandatory insulation requirements when located in directly conditioned space to be confirmed by HERS verification that the leakage to the outside equals or less than 25 cfm. So even if your ducts are claimed to be in a conditioned space, they still have requirements and it needs to be HERS verified.

Section 150.0(m)(ll), Duct System Leakage, I think this is a repeat, that the HERS verification of duct leakage is now a mandatory requirement in all climate zones.

Section 150.0(m)12 is Air Filtrations. There's a -- staff, I think Jeff Miller and Martha Brook --

worked with industry to come up with labeling requirements for grills and filters, and it is summarized on this slide. Labeling of air filter grills specifies requirements for labeling of filter grills for design airflow rate and design pressure drop to assist homeowner in selection of correct replacement air filter products. And if you've been to Home Depot or Lowe's, now days, if you want a replacement filter, you'll find a very confusing situation; some air filters actually do have MERV ratings, others don't and, so, how does the homeowner know which one to select? And the other problem is that, when people go and guy these things, they tend to think the higher the MERV number, the better. So instead of MERV 12, they buy MERV 20, but that would basically throw your whole system out of balance because you're producing a lot of -- installing resistance in your duct system. So this has all been an attempt to basically correct these deficiencies.

Air filter efficiency specifies minimum MERV 6 efficiency, consistent with ASHRAE 62.2. And also, there has been a requirement for pressure drop for these filters; that is summarized in the third bullet.

And labeling of air filter products requires air filter products to be labeled by the manufacturer to disclose the AHRI Standard 680 performance rating. This

will enable the homeowner to select an air filter that works properly for their systems. So, again, you know, if you select the wrong filter, your system is not going to work to an optimum level, or it's not going to filter properly.

Subsection 150.0(m)13 - Duct System Sizing and Air Filter Grille Sizing. This was -- or still is -- a prescriptive requirement under the existing 2008 Standards for an air-conditioning system to work, you know, you have to have certain features that all have to work together, and one of them you have to have tight ducts, you have to have the proper refrigerant charge, and the other one is you have to have the right duct sizing, otherwise you're not going to have the proper airflows and it's going to compromise efficiency and comfort. So this subsection 13 deals with that airflow issue. This is a new mandatory requirement for HERS verified air distribution system, it complies with the fan efficacy requirements of 0.58 Watt/cfm at a cooling coil airflow rate of 350 cfm/ton. So you have to meet both of these requirements at the same time, or you can actually go to a table that you provided and make sure that your return duct size and the grill meets the requirements that are on that table. So it's the choice of the builder which one they want to pursue. And this

requirement does not apply to HVAC alterations.

Subsections 150.0(m)14 and 15, these are the Bypass Duct and Zonal Controls. New mandatory requirement for zonally controlled central forced air systems must be HERS verified in every zonal control mode of the air distribution system and complies with the fan efficacy requirements of 0.58 Watt/cfm and an airflow requirement of 350 cfm/ton. So, you know, if you have zonal control, in every mode they have to meet these two requirements. And under this proposal, the bypass ducts will no longer be allowed in California.

Subsection N, Water Heating Systems, 120 Volt Electrical Receptacle within three feet of the water heater must be provided. This electrical receptacle shall be accessible to the water heater with no obstructions and a Category III or IV vent, or a Type B vent with straight pipe between the outside termination and space where the water heater is current, or it will be installed.

Section 150.0(0) - Ventilation for indoor air quality. This was introduced into the Standards with the 2008 Standards and since then, well, actually we adopted ASHRAE 62.2 that was in effect at the time, and since then, ASHRA has actually gone through some revisions and they've adopted a bunch of addenda, so we are adopting

those by reference. It requires all installation and performance of mechanical ventilation systems for whole house -- whole building ventilation to be verified by HERS raters. Procedures for HERS raters and ventilation systems are new protocols in Reference Joint Appendix RA3.7.

It adds requirements that continuous operation of central forced air system fans used in central fan integrated (CFI) ventilation systems is not a permissible method of providing a whole-house/building ventilation required in Section 4 of ASHRAE. So we can get CFI to meet the requirements of this section.

Section 150.0(q) - Fenestration Products Mandatory Requirements. Fenestration products including skylights must have a maximum U-factor of 0.58. This is a new requirement for 2013. An exception is that up to 10 square feet of fenestration area, or 0.5% of the Conditioned Floor Area, whichever is greater, is exempt from this U-factor requirement.

Now we'll take comments, Mr. Klein.

MR. KLEIN: Gary Klein, Affiliated International Management. Before I go into hot water, I have a comment on the 62.2 ventilation stuff. I have recently joined a test that LBNL is running to look at indoor air quality in homes and we put in really good

fans of the manufacturers types that we like, with the right zones, and all that stuff, I'm glad -- they're too loud, way too loud. And if for something that is going to run 24/7, which it could, it's got to be a lot lot quieter.

MR. SHIRAKH: What was the rating on that? Do you know?

MR. KLEIN: I don't know off the top of my head, but I know that we measured decibels the other day and it's over 50 db as you walk through the bathroom door.

MR. SHIRAKH: I have one that's .8 --

MR. KLEIN: I'm not disputing it, whatever is in my house is wrong. And if we're going to make people do that -- no, it's not the first time, it's true, I collect houses in order to fix them. Anyway, if we're going to do something, we need to make sure we also include a decibel requirement.

MR. SHIRAKH: We have. The requirement is that these bathroom fans shall have a rating of 1 or less.

MR. KLEIN: Fair enough. Whatever has been installed in retrofit in my house, which is a good fan with good zones, is not quiet. That's the observation I would make. And if we have to keep it 24/7, I won't. I promise to disregard the Standards in that respect, and I

suspect I may not be alone.

So back to hot water, Section 150(j). I have some very specific language suggestions to fix things, and I'll give those to you, but I want to cover a few questions I have. I would propose that the title of the section actually be changed to say "Heating, Cooling, and Water System Pipe and Tank Insulation," rather than what's currently worded. I think it more broadly covers the issue. I'm confused about what the purpose of the tank insulation requirement is in Storage Tank Insulation 1A. It used to say "gas storage water heaters with an energy factor equal to or less than the Federal Minimum Standard," well, clearly you shouldn't be allowed to put in anything with less than the Federal Minimum Standard except that there are certain tanks that are not covered by the Minimum Standard; 20-gallon storage water heaters are not covered, so if someone installed those, you would want to insulate them better. Those that meet the Federal minimums today probably already have R-12 in them, so we're adding an R-12 jacket to those that are meeting the Federal Standard; I'm confused what the intent is. I think this is language from 20 years ago that we've been updating periodically, but water heaters have overtaken us at some level. I'd recommend we figure out what to do to fix that.

I'm just as confused about some of the requirements in the unfired tanks. If you -- hot water storage tanks shall be externally wrapped with insulation having an installed thermal assistance of R-12 or more, or have an internal insulation of at least R-16 and a label to that effect. Why don't we just make them R-16? Either internal or external, don't care, but make it the same, would just be my recommendation.

Then on J2, great job on all this stuff trying to incorporate it; it appears that we are referring people to Table 120.3(A) which we discussed briefly yesterday, and it looks to me like we should always refer people to that table, which is I think the intent, but I'm not certain that we've got it quite right in this section, so I've got language to propose to fix that, that question -- great -- all piping -- this is A3 in this subsection, "All piping associated with a domestic hot water research system, regardless of the pipe diameter, shall be insulated." So that could be interpreted to mean the recirc loop, which is the supply side all the way out to the last fixture, and then a return back to the water heater or boiler, or it could be interpreted to mean the branches, as well, to the fixtures, I don't know what "all" means, I think we want to be clear. Personally, I'd like to see it all

insulated and, in fact, much of it will be, certainly the path to the kitchen will be, that's required elsewhere. So a recirc loop all the way to the kitchen would be insulated, but the branches won't necessarily be insulated. You go to the trouble of insulating, over 80 years it's going to pay out. In my opinion, they all ought to be, although I know that BIA will be upset with that additional cost, so we have to think about that carefully. I just don't know what it means at the moment. Piping from -- the next item is number 4 -- "piping from the heating source to storage tank or between tanks," I'm thinking that means for indirect storage tanks with a separate -- like a boiler system, boilers and tanks? That's what I think it means, and type. That would apply whether it's domestic hot water, or it's space heating. I actually don't think manufacturers require insulation for them when it's space heating either, so I think we want to be clear about that. Yes, they should be insulated. And I'm just not clear what the case is. And then domestic hot water pipes that are buried below grade, it says they shall be insulated. I wonder if that actually applies to all heating and cooling and water heating pipes below grade should be insulated. Again, I think we should be clear on that, I think that's our intent, but it's showing up

as a special item under this one subsection. Then the last number (c) -- (2)(c) -- the language in there currently separates out steam and hydronics and hot water systems with pressures above 15 PSIG, and then cooling systems shall meet the requirements in the incorrectly referenced table -- I propose fixing the reference -- but I would observe that, quite frankly, that would be more simply worded saying, "Piping for heating and cooling systems shall meet the requirements in Table 123.A" because they've all got to meet it, regardless of where they go, and whatever they do, they've got to do that. That would be a simpler way of handling that.

I'm on to the Exceptions, Exception 4 to this subsection, refers people for -- it says piping installed in interior or exterior walls shall not be required to have pipe insulation if it meets the QII requirements referenced in the Appendix for insulation that is not pipe insulation where the pipe is wrapped with something else, it's buried in the wall insulation. Great. That's a reference, I like the reference, it's fine, although I will have comments on fixing that one when we get to the Appendices. But that's good. The next section, this is Section 5, which says piping installed in attics with a minimum of four inches of attic insulation on top of the piping shall not be required in pipe insulation. Well,

that's exactly the same as putting it in the wall; we might just want to refer everybody to the Appendix and put the clarity in the Appendix for both cases, right? Piping which is buried in some other insulation should be done in accordance with QII; otherwise, you have to wrap it -- put pipe insulation on it.

And then my last question is related to putting pipes in an attic. What if you put them in the floor insulation? Wouldn't the same rules qualify there to have four inches to the outside? I would think so. And then there's a note currently in the text which says "where the Executive Director approves a water heater calculation method for a particular water heating research system, piping insulation requirements are those specified in the approved calculation method." I think I joined the Commission a year before this rule went into effect and I know what it was for, and now that's built into the Standards, I suspect we could take this out. We could remove the note. That would be my recommendation.

MS. BROOK: Only if you tell us what it's about.

MR. KLEIN: It was there in the first place because someone came up with a new way of circulating hot water on demand.

MS. BROOK: Oh, okay.

MR. KLEIN: And there was no way to handle it and we didn't know what to do, so we made them do an approved calculation, and now it's built into the Standards as part of the requirements, and I just don't think we need it anymore. Sure. And then number 4 in this section talks about the maximum length of one-inch pipe. What is it's one and a half inch pipe? I think we have to add in the language that says one inch or larger nominal diameter piping. Somebody is going to go around this one, Mazi, right?

MR. SHIRAKH: Put in two inches, it's better.

MR. KLEIN: Yes, you'll get more flow. It'll take six years to get the hot water, but it will work. And in the Exception 1 to that, I think we also have to -- a dedicated one-inch or larger nominal diameter branch pipe feeding a high flow tub fixture or tub fixtures. Do you mean those without showers? Because that's covered elsewhere and I think we actually mean that if it's a standalone tub and you need a big pipe, you can have one?

MR. SHIRAKH: That's what it means.

MR. KLEIN: Okay, so we think -- we don't yet say that, so I think we have to fix it to be absolutely parallel with the other language in the Standard. That's it for now. Thank you.

MR. SHIRAKH: Can you email me these comments?

MR. KLEIN: Oh, yeah, you don't have to write them all down, I'm taking notes, I'll give them to you, and then I'll spend time going over them when we're confused. So I promise to help get this right. Thank you.

MR. SHIRAKH: Bob Raymer is not here, he has submitted a bunch of comments in writing and rather than me reading it, I'm going to ask Deborah to do it.

MS. STĂNESCU: Deborah Stănescu representing CBIA. I was also going to talk about the one-inch pipe length. We have some questions. How common an occurrence is this plumbing design? So, in our experience with CEC staff, it shows that typical homes can have 30 to 60 feet of one-inch pipe, so this is a new building technique and, as such, CBIA doesn't believe it should be included in the Standards, but it should instead be a compliance credit first to develop the technique and show that it saves energy.

And another question, what is the impact on flow of the smaller pipes? How is it going to affect customer satisfaction? Will there be enough hot water during simultaneous usage?

I also have comments about Section M, the return duct sizing table, Table 150.0(C) or (D). We would like to see, can the CEC provide an example showing

how these duct sizes will fit, where they can be located? For example, like a single-family home with two HVAC systems and plans, an example of how this works, multi-family with an HVAC system which is typically a hydronics furnace and a drop-down ceiling, can we see examples of how these return duct sizes can be --

MR. SHIRAKH: You think he's asking for like examples in the Compliance Manual? Because we can certainly do that, can't we, Bruce?

MS. STĂNESCU: Oh, I think he'd like to see them during this process, just to know that it works --

MR. SHIRAKH: He wants to know if it's actually feasible to do this, rather --

MS. STĂNESCU: Correct.

MR. SHIRAKH: And we can demonstrate that? So it would be Bruce Wilcox, our contractor, he's nodding yes, we can provide these examples.

MR. WILCOX: Bruce Wilcox. Just to clarify, we do not have those examples in hand, so it's not instantaneous, but we can certainly make examples that would show.

MS. STĂNESCU: Thank you, that would help. I think the rest of my comments are in the next group of sections, .1.

MR. SHIRAKH: Okay. Thank you. You only get

two appearances at the podium per section, so….

MR. KLEIN: I'm commenting on a comment. Is that allowed? If you'd like additional information. We have done a lot of research funded by the Energy Commission over the last decade related to hot water distribution. Mostly, we see one-inch diameter pipe when there is a big house with lots of hot water fixtures in it and there's one trunk line serving the whole house -- that happens. We see it also in home run manifold systems where the pipe from the water heater to the manifold ends up being, because of either low pressure in your city, or because it's a large house with lots of fixtures, you end up with a one-inch pipe. And so that happens. And the plumbing code governs this and we're treading on dangerous water heater if we're not careful how we do this because the plumbing code has rules that, quite frankly, building inspectors like to enforce more than they like the Energy Code -- but they don't like either of them much, to be honest. But you understand. So the one-inch pipe, we find in home run systems when you've got, oh, 15 or 20 individual hot water uses, or cold water uses, coming out of the manifold. Now, do we need one-inch pipe? That's a good question. It turns out that simultaneous flow rates in single-family houses rarely ever go above five gallons a minute. Once in a

while they go above eight gallons a minute for all flows -- hot or cold. So it's not likely that we're going to see the need for really big diameter pipe; however, the local interpretation of the Plumbing Code in your jurisdiction governs the perception of what diameters gets installed for what types of buildings, whether it's the facts or not doesn't matter much, it's that they use the Code calcs and they say, "This is what we're going to do," that's what it is. If the Engineer does it and says a different number, that's great. Most single-family homes don't get plumbing engineers; someone walks out and says, "That's on the truck, we'll use it today, it looks like it will pass." So the process is a different process.

Those of us working in this field from the research point of view are pretty clear that three-quarter-inch pipe is all we should ever need in a typical single-family home, certainly U.S. median size and smaller, they just don't have enough fixtures in them, and we are requiring lower flow fixtures. And, sorry, three-quarter-inch pipe is more than capable to handle up to 10 or 15 gallons a minute. There should not be any pressure issues.

The 15-foot limitation is an interesting -- what if I need 16-feet? What? Pass it or fail it?

Because that's where you should put the manifold. It's an interesting oddity, I understand the reasons for picking some number. I've gone out and looked at thousands of houses across the country, most of them in California, and I've seen home run manifolds that are as little as five-feet and as much as fifty-feet of plumbing. By the way, the one that was fifty-feet, the distance between the water heater and the manifold was the distance between you and your Advisor, sitting in the garage. And the pipe went all the way to the attic and came back down again, fifty-feet. They must have forgotten the cutters that day, I don't know. It should have been 10-feet of pipe, up, over, and down. Okay? But it wasn't. So I think that having some restriction in length to manifolds matters because you have the big lever, big diameter pipe makes a difference. Do I think we're going to have flow issues in homes with modern faucets and showers? Not likely. Is it possible? Yeah, we could do really dumb stuff. We could have lots of things flowing simultaneously, and if that happens too often, people yell at each other and somebody fixes their schedule. I think that what we're really doing is we're treading on the Plumbing Code and I think that we will get some push-back in the first cycle in terms of its implementation. Thank you.

MR. SHIRAKH: So, I kind of missed it, what was your recommendation? Not have the 15-foot limitation?

MR. KLEIN: I think that the solution is better handled by having a maximum volume from the source to the use, and let the plumbing companies figure out what diameter pipes to use. Quite frankly, that gets us out of the business in terms of what diameters are required, but it does put us in the business of limiting the energy consequence because, if we set a maximum volume, then if they want to meet it with three-quarter-inch pipe, they can meet it; if they want to meet it with someone and some three-quarter, and some half, they can meet that too, we don't have to be in the middle of that debate. The dilemma is how tight do you make that limitation. And I think that, fundamentally, this Commission is going to be charged at some point because we're now responsible for covering water, right? Water use efficiency? Well, we're going to have to make a decision as to how much water we're willing to waste while we wait. When you make that decision, we've now made a plumbing decision, we can back calculate volume into diameters and volumes in pipes in diameters, and we can come up with an answer. So if we say we want to waste -- well, would you like to wait a minute for hot water to show up at your shower? Does anybody vote for that? Because most of us have

that. And I would say that's a long time, particularly if we're concerned about water. Well, a minute means you've got somewhere between 50 and 75 feet of three-quarter-inch pipe -- half that in line -- by the way, no branches, just total feet of pipe is about that much. If you say you want to waste a gallon, well, you back calculate that and it's a bit less. Imagine you say "a half a gallon," how about a quarter? How about a cup? I mean, once you start going down this path, we've got to decide what the volume is. Well, consumers don't see volume, they actually see time. That's what they experience. So two gallons per minute, that 15 seconds until hot water gets there is a half a gallon that just ran down the drain -- forget the pipe for a minute, it's a half a gallon. I don't know about most of us in this room, I suspect we're microwave society folks now, we don't like to wait much, and I think that we need to give signals to consumers that make it easy for them to adopt best practices. So there's structural waste, that's what we're building into the buildings, and there's behavioral waste, is what we do with it; if you wait a long time to get hot water, sometimes at this fixture, and short at other times of the day because you're the second user, your brain tells you, "I don't know, I'll come back when I'm ready." If you give consistent signals, it always

shows up in five to 10 seconds everywhere in the house, people will eventually learn that whether we teach them or not. And I think that's where we need to be headed long term for this. I think that our strategy should be to implement those kinds of rules right now in the Green Code, perhaps, and in the next cycle we put them into base Code, but we should be focused on this volume. And that's the ultimate answer. If we want to pick a volume for this Code, for Title 24 right now, I would say that we could do what we just did at the National Green Buildings Standard and pick the gallon of being the maximum length from the water heater to the fixture in any building, regardless of diameter. That limits our exposure on volume in pipe -- rather dramatically, quite frankly, compared to what it is now which is unlimited. And we get out of the diameter case.

MR. SHIRAKH: So, Deborah, which one is your least favorite option, the 15-foot, or the volume?

MS. STĂNESCU: It's like politics.

MR. FELKE: Gary is a hard act to follow. He was here 20 years ago when I started coming to the Commission and he's been picking on me ever since. And I do run the hot water when I brush my teeth now, so I save a lot, Gary, you'd be proud of me. I'm Rob Felke --

MR. HURLEY: Excuse me, this is Kurt Hurley,

I'm with Passive House California --

MS. BROOK: Hold on, we need to get you in order and we have somebody at the dais already speaking, so can you hold on, please?

MR. HURLEY: Sure, sorry.

MR. FALKE: I'm Rob Falke, President of National Comfort Institute. We train and certify air-conditioning contractors and other energy professionals in how to measure the live operating performance of an HVAC system, and I'm here to speak for a minute about the filtration duct sizing and return grill sizing issues. While we applaud and honor what the move to genericize an improvement in duct systems and in air flow, these, what's been proposed, are good temporary steps, but long term the real answer is to measure and to have a HERS Rater and a contractor measure the live operating static pressure of an air-conditioning and heating system. This can be done very easily, it takes less than a few minutes, it could be documented. Each manufacturer publishes a fan table with each piece of equipment that species the maximum pressure that fan can handle. As we look at return real sizing, or duct sizing, or filter type, although these moves are improvements, they're not a solution and you'll still get systems that operate far below their rated capacity using these methods. I

believe they're positive moves, but long term we need to look at the live measurement of total external static pressure.

Also, on the duct ceiling side, the outcome of that normally in California is seriously elevated static pressure. The average we find in the state on a half-inch fan is well over eight-tenths of an inch which result in air flows well under 300 cfm with most fans. Those things can be measured live, the manufacturers require it, they provide the engineering data with each unit that can do that. And we would encourage in the future looking towards not these generic solutions, which are good and a valiant effort, but they will not deliver performing systems and long term solution as to measure live total external static pressure.

MS. BROOK: Thank you. So, yeah, we do have the requirement for air flow measurement and we are using the return sizing as an option for if people don't want to measure their systems, but we agree with you, we think that's the optimal approach. Jamy.

MR. BACCHUS: Jamy Bacchus, NRDC. Following up on that same comment, on Tables 150.0(c) and (d), it's always unfortunate when we have to take a performance approach and kind of dumb it down into a table, but I'm not sure I agree with the assumptions, some of them

aren't listed in this table, but if you just do some back of envelope calculations for -- pick one for the 1.5 ton unit at 350 cfm per ton -- and the air flow rates required and listed in the minimum duct sizes, you get air velocities 200 to 300 feet per minute, depending upon what you assume is the open -- the table only lists gross area, so a decorative grill might have 50 percent free area. So we really aren't telling them what the pressure drop is across the grill, you're listing what pressure drop can be on the filter, but even if you just look up some -- take three or four different filter manufacturers, you'll find that the clean air filter for those velocities are greater than .1 inches. So I'm not sure how many products there are that meet that clean air pressure drop that you're listing. And then, if you're only telling them how big the diameter is on the back of the filter return air grill assembly, you could design a box of -- a plenum box -- on the back of that grill which would have a horrible pressure drop worse than the filter itself. So I'm not sure, we're not really getting at the whole system return air path, you're just kind of telling them this kind of piecemeal what the grill is and this big sized duct behind it. But, again, you could have horrible transitions and elbows behind that that exceed that. So I'm not sure what some of the assumptions were

that created this table. But I would just encourage you to look at them.

MR. SHIRAKH: Bruce Wilcox and maybe Jeff Miller can respond.

MR. WILCOX: Bruce Wilcox. I'm not sure this is the right venue to talk about all the detailed assumptions behind that, but one of the things about that table is that it makes much more conservative assumptions than are normally made. And that's based on the experience that people who -- there were a number of people who worked on developing that table -- but the general experience is that the standard design assumptions are often very optimistic compared to how flex duct is really installed and works in the field. So the idea here is that, in almost every case if you follow those rules, you'll end up with a system where the return static pressure is low enough to make the system work. And you know, for people that want to do the performance approach, you might be able to do better than that table if you're willing to make sure that things get installed right. So there's a tradeoff there in terms of simplicity vs. doing a more careful performance job. And I think there's -- one of the things that this does is it offers people a simple -- it offers the contractor a simple approach to put in a system that we're pretty sure

is going to solve the biggest problems. And they still have the option of doing it the right way, as Rob said, if they want to do that. And I think that's a good simplification and gives everybody an option to make a good system. And Jamy, we'll be happy to talk to you about the details if you'd like to do that offline.

MR. SHIRAKH: Bruce, you may want to sit next to (inaudible) because we're getting into area where we'll probably need you.

MR. DEVITO: Eric DeVito, Cardinal Glass Industries, commenting on the fenestration maximum U-Factor. We have commented on this before, we certainly support staff putting this provision in there, we think it's a good move. The ICC has both a maximum U-Factor and SHGC, and of all the comments that we've put forth, that was really our comment. I know what's to include in SHGC maximum, as well, I think we had some reasons before, the passive solar angle. We had proposed some options to deal with that in our written comments. I see that you kept it as is, I just, you know, long term goal possibly in the next Standard, we'd like to see that get into the California Standards to match the ICC, it's been found as a valuable provision there and has stayed in there for a number of years now. So I guess curious if, you know, the reasons why the SHGC didn't make it in this

time.

MR. SHIRAKH: Mike Gabel, or Ken, is there any issues related to having an SHGC requirement, mandatory minimum?

MR. GABEL: Mike Gabel. Yeah, I think California has a long coastal mild climate and there are a lot of places in the state where I think a low SHGC is not necessarily an advantage, and I think trying to impose passive solar requirements associated with an exception gets very complicated, so I think the quick fix is to do what you've done, and if the CEC wants to do more research on sort of mild climate zone, passive solar issues, then maybe for the next Code cycle you guys could think about something like that.

MR. SHIRAKH: Okay.

MR. DEVITO: I guess one follow-up comment was, you know, obviously the maximum would only apply in zones where there is an SHGC requirement, where it's been found to be beneficial, so obviously a max would work, as well. But I guess I would just offer and hope that in future years we can revisit this issue when it comes back.

MR. SHIRAKH: Thank you.

MR. DEVITO: Thank you.

MR. NESBITT: George Nesbitt. 150 is such a big section. I do subscribe to the Gary Klein method of

plumbing systems and I'm installing them at, you know, one cup of waste. I want to agree pretty much with most of Gary's comments. I also found the insulation requirements for the indirect and storage tanks to be quite confusing, plus that exception is handled under the exceptional method, if you really need it, anyway.

On the, well, let me hit on windows. I find in a lot of projects higher solar heat gain coefficients would save more real energy than low solar heat gain coefficient windows may or may not in Zone 3 or 4 save more TDV, but when you don't have air-conditioning, you're always taking a hit on your heating. And California through all the climate zones are still heating dominated, you know, it's 30 percent of the energy use rather than six for cooling.

On the prescriptive duct sizing, I install larger ducts than what you have in those tables and I've seen some of my home performance colleagues size even smaller than that table, which is shocking.

On bathroom lighting, I would suggest -- the proposed requirement is at least one high efficacy light an all other lights have to be on a sensor -- I would suggest that we use the same 50 percent watt rule as we have in kitchens. Call it a stupid tax, if you will, but I have installed, I think, probably 500 or 1,000 watts of

halogen next to the mirror, so what we'll end up with is the 26 watt cfl on the proverbial fart fan and then we'll end up with 500 or 1,000 watts of low efficacy, which is what is going to be used. And the reason I call 50 percent watts a "stupid tax," I see a lot of projects -- I've seen projects that have 1,000 watts of high efficacy in order to get a low efficacy -- 500 watts, 1,000 watts. I've seen architects throw in a 200 watt high efficacy fixture so that they could put in their low efficacy. So that rule, at least, you know, fine if you want a lot of low efficacy, you're just going to have to pay more to put in more high efficacy.

On the ASHRAE 62.2, so in Section 150.0 -- I guess it's (o), you cannot use a central fan integrated ventilation system to meet your whole house ventilation requirement. In Section 150.1, as well as in the prescriptive tables, 150.1 and then 10, we have a section whereon central fan integrated ventilation system, saying you have to meet airflow or at least the watt draw, but you can't use it. So it's still in the prescriptive tables saying, if you install it, it actually has to be HERS rated for the watt draw, but you can't use it for your ventilation. So we probably need to strike out 150.1, as well as --

MR. SHIRAKH: Do you want to respond to that?

MR. MILLER: Jeff Miller, Energy Commission. What 150.0 says is you can't run your central fan continuously to meet the whole building.

MR. NESBITT: But Section 150.0(o) says you cannot use it for your whole house mechanical ventilation, so -- let me pull it up.

MS. BROOK: Here it is. It says "continuous operation of central forced air system air handlers used in central fan integrated ventilation systems is not a permissible method of providing the whole building ventilation air flow required in Section 4 of ASHRAE standard 62.2.

MR. SHIRAKH: It does say continuous.

MR. NESBITT: Okay, so you could use it intermittent. Okay. Which is, then, why you would have it, okay. All right. I got up too early this morning, that's my excuse. Time change, and then I slept in yesterday.

Several -- in various places, we refer to the residential joint appendices, most places we don't say HERS Rater verify according to that section, and just I'd say, in general, it should also say it as a HERS verified measure when it is, and reference that section just as a way to reinforce so people don't forget. And I'd say in the Perf one forms, the HERS verification is not as clear

as it is on a CF1R, so you don't get that big message at the top that says "HERS Verification Required" that they may ignore anyway.

On multifamily distribution systems, so Section 150.1-8(c), is where I guess eight units or more are required to have essentially two demand loops plus there's the requirement for solar hot water fraction of .2 to .35. Although multi-family water heating is usually the largest budget, it's not totally for energy saving. I think especially when we get to high-rise multi-family, the thing is you have so little ability to generate credits otherwise, you don't have QII, you don't have basically all the HERS measures except for duct testing. And it's relatively hard to get to, say, 15 percent above Code. So unfortunately, making this the basis of your standard budget is going to make high-rise multi-family, I think, very hard. We may find that hitting 15 percent is virtually impossible.

MS. BROOK: George, you're jumping out of order, so it's hard for --

MR. NESBITT: Yeah, sorry.

MS. BROOK: -- so we're just talking about the mandatory sections now.

MR. NESBITT: Yeah, no, I am.

MS. BROOK: So I thought you were talking about

a prescriptive -- where are you --

MR. NESBITT: No, it's in the mandatory.

MS. BROOK: What section?

MR. NESBITT: It's Section 150.1-8(c).

MS. BROOK: 150.1 is the prescriptive requirements.

MR. NESBITT: Okay, sorry. They're in the same chapter, sorry.

MS. BROOK: Yeah, we're not ready to talk about that, then.

MR. NESBITT: Sorry, okay. So the mandatory -- so Section 150.0, the mandatory insulation levels, my understanding has always been you either install the minimum R value in a wood wall, but a non-wood wall has to have an equivalent U-Value. And that language has changed, so now -- several things -- you've changed the exception to the wood frame R-Value to be a continuous, if you have a continuous insulation that then meets an average --

MS. BROOK: Uh huh.

MR. NESBITT: -- but what about non-continuous under deck? So you've kind of, you know, the intent is you either install the minimum R-Value, or an equivalent assembly U-Value. And so by adding the language "continuous," you've messed that up a little bit. And

then the -- so then there's like -- so (a)(2), it then says the weighted average U-Factor shall not exceed the value of a wood framed insulated assembly. What I think is not necessarily clear is that you would be talking about a non-wood framed assembly has to meet -- that's always been my understanding and I'm wondering -- because you pretty much can't meet that without continuous in a metal-framed wall. And I'm just not sure if that is something that is being enforced. I've seen some metal buildings go up that certainly don't -- residential -- that wouldn't seem to meet this.

And then the ceiling insulation and wall insulation are basically the same, but the floor insulation section does not have sort of the exact same format and rules. So, for some reason for floor we don't have the exact same language.

MS. BROOK: Okay.

MR. NESBITT: And then, actually, it's also been my understanding that currently, when we get to attic knee walls and skylight wells, we're supposed to have minimum or 19? Is that correct? I'm not sure. It doesn't say that in the Standards, so is that then buried in the residential manual? Or somewhere -- or in the ACM at the moment?

MR. SHIRAKH: Repeat the question.

MR. NESBITT: My understanding has been that, under 2008, you're supposed to have a minimum of R-19 on an attic and knee wall, or skylight well. It doesn't say that in the Standards. Okay, that's under the QII, okay.

MR. SHIRAKH: So, the response was that's part of the QII protocols. Thank you. John.

MR. ARENT: Hi, my name is John Arent with AEC. So I had just a general comment regarding the hotel/motel guestroom controls and, just to qualify it, I didn't work on this particular measure and I'm not familiar with the intimate details of the report, but I guess I'm just a little bit concerned that it's a mandatory feature. I understand the controls typically fall under the domain of mandatory measures, but I just feel like it's something that's pretty aggressive, given how often it's currently implemented and given maybe the needs of certain types of hotels, that they might just defeat the controls anyway if it's kind of made a required feature as opposed to, say, a prescriptive option. So that's just a general comment, I'm not necessarily opposing it, but I just think it's a little bit aggressive. I'm not saying -- I've done testing myself of three hotels in the San Francisco area of these systems, some field work and so I can vouch for the energy savings, but there are significant costs to it. And I'm not going to say it's

not cost-effective, either, I'm just saying it's a fairly aggressive approach given the extent to which it's currently implemented. Thanks.

MR. SHIRAKH: So the HMG did the case report for this and they found it to be cost-effective using the same methodology that we use for everything else, TDV --

MR. ARENT: Yeah, I'm not disputing its cost-effect --

MR. SHIRAKH: -- and as far as being mandatory and prescriptive, yeah, controls are typically, you know, you either do it or you don't, and it's a lot easier to enforce and implement than if you want to make it prescriptive, then you have to come up with some -- with a budget associated with it for trade-offs and so forth. I don't know, Cathy, if you have anything you want to add to that?

MS. CHAPPELLE: Cathy Chappelle, Heschong Mahone Group. Yes, in the case report we actually use the AEC data from the analysis that -- their test data from the sites. So, yeah, I think we did, you know, our analysis showed that it was cost-effective.

MS. BROOK: Did we have any stakeholders participating in our work from the hotel/motel industry?

MS. CHAPPELLE: Yes. I can get the list and the names of the contacts of who we discussed that with.

MR. ARENT: All right, thank you.

MR. KLEIN: Gary Klein, Affiliated International Management. 150(n), we've added a new section here, which I think is very valuable, having to do with providing the power outlets near gas and propane water heaters for upgrades to higher efficiency equipment at some future date.

MS. BROOK: Uh huh.

MR. KLEIN: A couple of things I'd recommend changing. First, 1(a) says 120-volt electrical receptacle within three feet of the water heater. I bet the NEC has something to say, the National Electric Code, has something to say about what pipe and quality and where that ought to be placed because of water being nearby. It wouldn't surprise me if it requires being GFI or some such thing. We don't have to say it, but I would observe that. And then the next sentence says the electrical receptacle shall be accessible to the water heater with no obstructions. I actually think, again, the NEC will have something to say about that. What we should be saying is the electrical receptacle shall be readily accessible after the water heater is installed. You can't put it behind the water heater and pull the water heater out in order to disconnect the power. It's much more important to worry about its access after the

water heater is installed than being accessible from the water heater, per se. But I bet there are rules, and so I'm not sure how far we want to go on that, but the key words are "readily accessible," in my opinion key, "readily accessible after the installation of the water heater." Again, I'll provide language so you don't --

MS. BROOK: Yeah, I mean, "readily" is not a good vocabulary word for --

MR. KLEIN: It's actually a defined term in the plumbing code.

MS. BROOK: Okay, that would be --

MR. KLEIN: -- accessible vs. readily accessible means something.

MS. BROOK: Okay, so provide that definition, too, and that would be great. Because the reason -- the only reason we added "with no obstructions" was because someone brought up the example it could be three-feet on the other side of the wall.

MR. KLEIN: Yes, it has to be within three-feet in the same space, or something like that, would be the way to handle it.

MS. BROOK: So if your readily accessible definition covers that, that would be --

MR. KLEIN: No, it doesn't actually. It's a different problem, but a good one to raise. And then I

would also suggest that there needs to be adequate height where this water heater is going to be installed and adequate width. You've all heard stories about "I need to replace my water heater, it's 40-years old," or 30-years old, "and my closet is too small." And all new water heaters have more insulation on them. So we're going to have a problem with that, as well. We see nooks and corners that are hard to fit other things in, I think we need to think about that briefly. I'm not trying to raise costs for construction significantly, Bob, but I do understand we need to allow space; think about the cost for remodeling if we don't get it right.

And then -- so height and width needs to be addressed in here. And then under (N)(b), it says "a Category III or IV vent, or a Type B vent with straight pipe between the outside termination and the space where the water heater is installed." Water heaters are installed most often in California in a garage, and mostly people pick the straightest path to get out of the building. But it is often not straight, okay? And so requiring that all future vents be straight is actually an interesting limitation on how we're going to be able to place water heaters, and may cause other problems in construction. But I think that the issue is that there needs to be an accessible pathway to install the new vent

so that, whether it follows the path of the old vent, which is what this sort of words like, or the new vent is able to be installed -- there has to be a place to install a new vent that is safe from the health point of view, and so I think an accessible pathway may solve that problem, I'm not positive here, but as it reads to me now, it says I have to have straight pipe.

MS. BROOK: I think we put that in there -- and this is a consultant recommendation, so I'm not sure -- but I thought my understanding of that requirement was that it was needed to actually get the vent to work right, that you can't have a bunch of keecks [ph] in the -- is that correct?

MR. KLEIN: You are allowed a few, and each company that sells condensing water heaters tells you how many feet and how many elbows. Each elbow costs you. Each 45 costs you less. But you're allowed a few of them and most of the limitations are sort of up to 50-feet. You can install an awful lot of stuff with a 50-foot pipe, and that ought to cover most single-family residential applications, in fact, most applications we're likely to see. Ideally, you want straight vents. You want that for b-vent, too, the shorter, straighter it is, the easier it works. But fairly often it comes up out of the water heater and curves 45 degrees, and then

goes up into the wall. Okay, why? Because that's the easiest way to get through the roof. And that was the right place to put the water heater. And so --

MS. BROOK: And that doesn't change the way that that water heater vents?

MR. KLEIN: It does a little, but the designs for venting that are allowed by the fuel gas codes allow that application.

MS. BROOK: Okay, I'm just surprised because HRI didn't comment on that and I would have thought their members would have had an issue with that.

MR. KLEIN: Yeah, I would have thought they would have said something, too.

MS. BROOK: Okay.

MR. KLEIN: I think that it puts limitations on the builders that we don't want to put for locations of water heaters. And I think that we need to be careful how we word that.

MS. BROOK: Okay.

MR. SHIRAKH: Gary has got suggestions for us.

MR. KLEIN: I'll do my best on suggestions for those. Right now, I've got questions and I didn't have any great answers yet, but I'm working through the language.

MR. SHIRAKH: Okay.

MR. KLEIN: We've still got an hour or two, right? Thanks.

MR. SHIRAKH: Jon.

MR. MCHUGH: Jon McHugh. Gary, I'd recommend that you talk with Yanda Zang in -- because I think he's the person that developed this --

MS. BROOK: Uh huh, uh huh.

MR. MCHUGH: And, Yanda, I don't know if you're online, if you are this would be probably a good time to reply. My understanding of this is that the idea is that you either have a vent that is capable of addressing the assets that are available in the condensing water heater exhaust, or you have a straight shot so that it's easy to replace. So that's my understanding, but if you can talk with -- so I don't think it has to do with pressure, it has to do with ease of replacement.

The other reason I'm up here is to talk in support of the car key control. We live in a global environment, or a global marketplace; as Mazi was mentioning earlier, these card key controls have been in -- when I used to live overseas in New Zealand and Australia, these are commonly found, so, yeah, the U.S. market is behind the international market in some things, very common to find in hotels and motels. Same thing in Europe. So this is not a new technology and, in

addition, the case study I think actually under-estimates the savings, so whenever you look at the actual measured information, the calculations are extremely conservative, and so there's been a number of studies including the one that AEC did, that actually found higher savings than what we used for the case study.

MS. BROOK: Do you happen to know, Jon, if this requirement is in the International Energy Code?

MR. MCHUGH: You know, I'm actually closer to ASHRAE. I do know that ASHRAE 189 has a similar requirement.

MS. BROOK: Okay.

MR. SHIRAKH: As prescriptive or mandatory requirement?

MR. MCHUGH: It's a prescriptive requirement. Well, no, I'll have to check, I'm not positive on that.

MS. BROOK: I don't want it to be mandatory, I mean, I just can't see how you'd have to figure out a tradeoff for this in the performance approach.

MR. MCHUGH: Yeah, I'll verify that.

MR. SHIRAKH: All right, thank you. Any other questions on Mandatory Requirements?

MR. YASNY: Aniruddh Roy has a question from online, a comment.

MR. SHIRAKH: Go ahead.

MR. ROY: Yes, good afternoon. Can everyone hear?

MR. SHIRAKH: Yes, we can. Go ahead.

MR. ROY: Okay, I have one comment, I guess, on the air filters, the air filtration with respect to the air filter product labeling that is item 12(D), and I think -- we submitted comments earlier with respect to the labeling requirements. Now, Mazi, I'd like one clarification. Do you require these labeling instructions to be on the filter, itself? Or on the cardboard box?

MR. SHIRAKH: Jeff Miller is going to respond.

MR. MILLER: This is Jeff Miller. There's a label requirement for the grill, itself, and also there's a requirement for the product to have a label on it.

MS. BROOK: So we -- I guess my interpretation of what Jeff just said is that it would be okay for the filter product to be labeled on the cardboard box, but because we have a permanent label on the grill, the consumer would be able to look at that and know what replacement filter he needs.

MR. ROY: Okay.

MR. MILLER: I should add it's proposed to have an air filter labeling requirement -- it's proposed to be included in the rulemaking for appliance efficiency.

MS. BROOK: Yeah, so, Mr. Roy, I guess we're encouraging you to pay attention to our Title 20 Appliance Rulemaking where we'll be actually developing the details of the product labeling for the filter.

MR. ROY: Okay.

MS. BROOK: And so the thing that will stick here in Title 24 is the grill labeling. Is that correct? The permanent labeling on the grill? That's not -- I'm just trying to clarify it -- that's not going to be part of Title 20, it will be part of -- Title 20 is the filter product labeling.

MR. MILLER: Yes, that's true.

MS. BROOK: Okay.

MR. SHIRAKH: But the grill labeling is part of Title 24.

MR. MILLER: Yes. But I think Title 24 is requiring that you use a product that is labeled and that the information on the label meets the criteria that the label on the filtered grill requires.

MR. WILCOX: This is Bruce Wilcox. One of the issues is that, if this is an item that needs to be inspected for the final inspection, that the box won't be there, but the filter will be. And so the label may need to be on the filter.

MR. MILLER: And that's the type of thing that

would be decided in the Title 20 rulemaking.

MS. BROOK: Okay. Did you hear that, Mr. Roy?

MR. ROY: Yes, I did get that. We did vet this to our member manufacturers who use these and one of the concerns was with respect to, you know, the labeling requirement, there are quite a few in that item D and, although they don't mind showing that information, that's available on their websites anyway. The recommendation was, in order for the label to be of value to the consumer, and make it legible, it's easier for, let's say, a manufacturer to reference their website and maybe provide a link on the label to the consumer so that they can at least see the ratings out there because, obviously, you are looking for different ranges of particle size and, you know, that's something which is difficult to print on a label and make it legible and readable for the consumer. And also, one other concern was right now, of course, California has these labeling requirements, but they might be subject to -- manufacturers might be subject to other requirements elsewhere, and so now you have to, you know, specifically make labels for every state, or every country that you might sell in. So I think the suggestion from our side was just to maybe reference the manufacturer website from that label, and then let the consumer go to the

manufacturer's website and see all the ratings out there.

MR. MILLER: I believe it's very uncommon for a manufacturer to give the kind of pressure drop information that designers require and it's also difficult to find a MERV rating for many of the manufacturers, and this requirement is intended to make that information more available. The AHRI680 rating example really is a pretty good looking label, I was thinking. Are you familiar with that?

MR. ROY: Yes.

MR. MILLER: Okay.

MS. BROOK: So the details about where and how that labeling gets done, again, will be decided in the Title 20 Appliance Rulemaking that Jeff mentioned.

MR. ROY: Okay.

MR. SHIRAKH: So stay tuned. Any other questions or comments?

MR. ROY: Yes. I had one more question and this was for Ms. Martha Brook. With respect to the letter that California Energy Commission gave us on December 2nd of 2011, and this was on the Residential Zoning, I know in that letter you had mentioned that you have reviewed some documentation that was supplied by Mr. Dick Foster on Zone Installation in Sacramento. You also performed a site visit to check a zone system in

Sacramento that was suggested by him. And I was just wondering if there was any data, or what data was collected during that site visit and if you could share that with our industry so that, you know, we could --

MS. BROOK: Oh, certainly. Yeah, I'm sorry, I thought that we did share that with you as part of that letter. So, yeah, we have a site visit report from our contractors and we can share that with you.

MR. ROY: Okay, great. Thank you.

MR. SHIRAKH: Any other questions or comments on the Mandatory Requirements, Section 150.0? Online? All right, we're going to move to the next section which is -- these are the Prescriptive Requirements.

Currently, Section 151 -- now it is called 150.1 -- these are Prescriptive Requirements for Newly Constructed Buildings. Numerous changes here, a lot of them clarifications, but also some changes to the requirements.

Subsection 150.1(b) – Performance Standards. As we talked yesterday, this has been a source of confusion over the years and we think, with the help of the CABEC members, we've actually come up with the language that at least I can understand, which is a new improvement over what we had. And we think it's more concise, it simplifies the rules for additions plus

alterations and in existing buildings. And so that language is in there.

Subsection 150.1(c) is Insulation requirements, it's a new requirement for above roof deck insulation, R-4 is required, or R-13 below deck, in Climate Zones 9-15.

New requirements for walls is R-21+4 in Climate Zones 1, 11-16; and R15+4 in Climate Zones 2-10.

Subsection 150.1(c)1 – QII, or Quality Insulation Installation, now that has become a prescriptive requirement in Climate Zones 1-5 and 11-16. This was a compliance option under the existing Standards, and now it's becoming a prescriptive requirement.

Subsection 150.1(c) again continuing Fenestration. U-factor of 0.32 in all Climate Zones, and SHGC of 0.25 in Climate Zones 2, 4, and 6-16.

Skylights also will have a maximum U-factor of 0.55 and SHGC of 0.30 in all climate zones.

For Fenestration containing dynamic glazing, it's the lowest-rated U-factor and SGHC, and you cannot do a weighted averaged for this. You know, we heard comments yesterday that, you know, this may not be the best thing to do and we can talk about that.

For dwelling units containing unrated site-built fenestration, only use Nonresidential Reference Appendix

NA6 to calculate U-factors and SHGC. So this is for products that are non-site built fenestration, there is an alternate procedure to calculate the SHGC.

Section 150.1(c)7 - Space heating and cooling. We clarified refrigerant charge requirements applied to ducted "air-cooled" air conditioned and ducted split systems and "air-source" heat pumps.

It eliminates the Saturation Temperature Measurement Sensor (STMS). This was a measure we put in the 2008 Standards and Alternatives for refrigerant charge verification, but we found through -- in field experience and comments we received from the public, that this is really not a workable option, it's really difficult to estimate where the saturation region is within the outdoor court and where that sensor should go. So we're abandoning this and we're proposing an alternative to it.

We added requirements for increased efficiency in weighing refrigerant charge insulation certificate documentation for air-conditioning and heat pumps equipment that cannot meet the Standard charge verification procedures in RA 3.2, where an alternative special case procedures in RA-1, the higher minimum efficiency is not required if the system is a ductless system. Basically these are systems that are not your standard split system with a central duct system, and the

procedures for doing a refrigerant charge is different, so those procedures are explained in the Sections that are mentioned here.

And it goes on to say that Packaged systems are exempt from the weigh-in requirement if refrigerant charge is done by the manufacturers.

Section 150.1(c)8 – Domestic water Heating System. For systems serving multiple dwelling units, a central water-heating system shall be installed with a solar water-heating system that provides a minimum of solar fraction of 0.20 in Climate Zones 1 through 9 and a minimum solar saving fraction of 0.35 in Climate Zones 10 through 16.

And for systems serving individual dwelling units in electric-resistance water heating, the main water source, only if the natural gas is unavailable, the water heater is located within the building envelope, and a solar water-heating system that provides a minimum solar fraction of 0.50. So if you're using basically electric electric-resistance water heating, you need to have a solar fraction of .50.

Section 150.1(c)9 - Space Conditioning Ducts. Ducts must have R-8 in Climate Zones 1-5, and Climate Zones 9-16 is R-6; So there is no more R-4.2, so the whole state will have only two insulation requirements in the R-8 and

R-6.

Section 150.1(c)10 - Central Fan Integrated Ventilation Systems. Clarified that the prescriptive requirements for verification of fan Watt draw shall be verified by a HERS rater.

Section 150.1(c)11A – Roofing Products - Low-rise steep-sloped, all roofing products must have reflectance of 0.20 and emittance of 0.75 or an SRI of 16. I don't think this is any different than what we have in the existing standards. There may be a difference in the Climate Zones.

Section 150.1(c)11B – Roofing Products again. Low-sloped in Climate Zone 13 and 15 shall have a reflectance of 0.65 and emittance of 0.75 or SRI of 78. Again, this is consistent with what we proposed yesterday for low-sloped roof, that the reflectance shall be increased from 0.55 to 0.65.

Section 150.1(c)12 – Ventilation Cooling. The whole house fan is required now in Climate Zones 4 and 8-14.

Any comments on the prescriptive? Bob.

MR. RAYMER: Thank you. Bob Raymer representing the California Building Industry Association. With regards to roof deck insulation, 150.1(c)(1)(a), of the five or six technical issues that CBI will be providing to staff, and we'll get that to you probably early next week, the

entire array of comments, both economic and technical, this is definitely CBI's number one technical issue. This does represent a major change to production style building design and we believe it should not be included in the Mandatory Package portion of the Standards. Instead, this should be first incorporated as a compliance option --

MR. SHIRAKH: Bob, may I -- this is not a Mandatory Requirement, it is a prescriptive requirement.

MR. RAYMER: -- a prescriptive requirement in the package?

MR. SHIRAKH: It is a prescriptive, it is not mandatory. You can try that this way --

MR. RAYMER: And that's getting to the point that I meant to make, I'm sorry I didn't articulate that well, it's in the package, and the problem here is that this should be something that is simply a compliance option as opposed to a provision in the budget calculator simply because this is such a very new type of design style for production housing, we kind of need some time here to work the bugs out. Some of the questions that we're going to be very interested in -- can insulation on the exterior of the roof be done without a second layer of sheathing? We believe the answer is no, which certainly raises the cost. We're very interested in hearing ARMA's

response to all of this and other roofing associations with regards to adding a top layer of insulation on the exterior side of the roof deck. I suspect we're going to be effectively installing that second sheath to where we've got sort of a structurally insulated panel.

Some technical questions, what if any is the impact on structural integrity of this new system during a moderate to severe seismic event? We're moving away from wall systems and we'll now have effectively in the steep slope roof areas effectively two sheets with a level of insulation between that. The question here is, you know, how does a seismic event impact the connections where these individual sheets come together? You've got vertical and horizontal loads from the seismic event. We're completely unfamiliar with how this is going to respond in even a moderate seismic event. It may not be a problem. Maybe there is enough resilience, as with the rest of the wood-type construction that we've got, this won't be an issue; but it's certainly something that, you know, begs the question. More importantly, though, what is the impact of moisture within the sandwich, that's within the insulation portion of the two sheaths, at the connection along particularly the long sides of the sheathes, and under the roof deck? Craig Druckenmiller from an HB Research Center, when Mike Hodgson, who

unfortunately could not be here today, when Mike discussed this with Craig, Craig found it very odd that we would be proposing this, simply because of issues on both the exterior and the underside, that there are significant moisture issues on the underside.

And a personal problem I'm having is I'm having difficulty explaining this to our membership. Once they get beyond the economic impact, the scope of the economic impact of the Standards in their totality, it raises -- they want to know what are some of the more outstanding changes that are going to be happening here. And I explained this to them and, first off, their quickest response is they think we're just adding insulation on top of the ceiling assembly; that's not the case, we're talking about the roof deck, either on the outside or the inside of the roof deck. It's like a deer in headlights. This is something that is completely new to them in terms of production style housing. I'm not saying it can't be done, it most certainly can be done, but the question here is are we going to shift from something that is probably less than one percent of the market right now to 100 percent?

And that sort of gets to the big point here -- this shouldn't be part of the prescriptive package. What's going to happen here, since industry is so unfamiliar

with this, and it will take a learning curve, this simply adds to the efficiency level that must be generated by the budget, the building industry at least for the short term, probably 2014-2015 at a minimum, will go to other features to make up for the compliance credit that gets lost here, probably a 15 seer air-conditioner, or some other combination of items. And so this seems to be at serious odds with the Energy Commission's commitment to the Building Standards Commission during the 2010 Standards Update where the Building Standards Commission, CALBO, and CBIA, although we supported these Standards, the CEC made it very clear that they were going to be seeking simplification via buildable and marketable packages, and compliance documentation. By putting an item into, I would say, about six or seven of the compliance zone budget generating packages, we're creating an instance here where you will be using the performance system, you will not be complying with the package, per se, which means you're now going to have to have all the related compliance documentation with that, and once again that gets into the exact opposite direction where CBIA and CALBO wanted to be going, where finally we could have access to buildable packages that get you your 25 or whatever percentage that you are really seeking. But you don't necessarily need an energy

consultant, per se, to do the number crunch. That really helps out the Building officials and it certainly would us. By putting this in the package, the CEC is effectively requiring compliance with the performance package. We love the performance package, it provides flexibility, but as time has gone on, the fact that 98-99 percent of all compliance in California is done through the performance package, it also means that, in general, the site superintendents and the builders, in general, and the designers are becoming sort of removed from compliance with the Regulation, and it's now turned over completely to the energy consultant. And that's had some negative drawbacks over the year. The industry needs to get more familiar with what's actually required with each update of the Standards.

Another curious thing is, why are we getting rid of radiant barriers? This has been an item where we're getting a big bang for the buck and we're about to remove that in a number of Climate Zones in place of the insulation on the exterior of the inside of the roof deck. And it just seems to have worked so well, there hadn't been a whole lot of problems in terms of compliance and installation, something that has got a great track record like that, and quite frankly it took quite a while to get it into the Regulations back in the

'80s and '90s, we're doing well with it, and it just seemed like something that gave a lot of credit, was easy to do, at a limited cost.

So in conclusion, we've got three significant concerns regarding this proposal, liability, there is clearly an issue of construction defect potential here, maybe this will be resolved over time, but early on we've got concerns with mold and water intrusion, roof system failure, and then there's the design flexibility since this is a major change in practice and potentially in conflict with other CEC ventilation requirements, you know, that we're going to get to in a minute with the whole house fan requirement. And then, lastly, there's a need for our contractors to get up to speed on this, there's going to have to be a whole lot of education for the contractors, for building departments, installers. This is huge, this is a major change, and once again, I would implore the commission to consider taking this out of the package generator, out of the budget generator, and putting it in as a compliance option so that, between 2014 and 2017, we can get familiar with this and learn how to do it right, and make sure that if there are problems, we address those before it becomes a mandatory feature of the budget generator. Thank you.

MR. SHIRAKH: Just a couple of items. Under the

moisture issue, I think we actually did commission a study. Bruce, can you articulate that?

MR. WILCOX: Yeah, we commissioned a study by one of the leading building science corporations and one of the leading consultants on the issues of moisture in buildings, and their conclusion was that there wouldn't be moisture issues in California climates for this system. Now, that's not necessarily true in Washington, D.C., where NHP research is located.

MR. RAYMER: No, they're in Colorado. Well, go on.

MR. WILCOX: But anyway, they -- so in all the California climates except Climate Zone 16, their conclusion was that we wouldn't have moisture problems with a ventilated attic that had insulation on the roof deck. So --

MR. RAYMER: I guess in response to that, there were some changes in wall assemblies relative to the windows back in the early '90s and I recall massive numbers of construction defect litigation that kind of spawned out of that because of water intrusion. We worked the bugs out; it took us about three years to get everything corrected, but it was pretty nasty, particularly for multi-family dwellings for the longest time in the early 1990's.

MR. SHIRAKH: And the question of the radiant

barrier, we haven't really eliminated that requirement, except for if you do use below deck insulation, then it doesn't make sense to have that. But for every other instance, there is actually radiant barrier requirement still in the Standards.

MR. WILCOX: But radiant barrier, you think of it, Bob, that radiant barrier is just an R-1 insulation below deck, and we're upping that to something more substantial so that we can take this solar oven that you guys were putting on all your houses and cool it down to where it's no hotter than outside. That's the very simple impact of this roof deck insulation.

MR. RAYMER: I certainly understand the goal. And I think, given enough time, industry can incorporate this and learn to do it well. But once again, we're being asked in very short order, given the adoption schedule of the Building Standards Commission, I would assume this is either going to come up at the January 7th meeting, or in 2013, or the October meeting probably at the earliest. That means that ICC will publish all this Part 6 on July 1st of 2013, so at a minimum, industry is going to have six months to try to learn this; we're certainly going to get out doing education before that, but this is really huge. I can't impress upon you enough that the goals here are very good, it's just some things are so

different from how we've been constructing for decades and decades, we've got -- there's got to be a learning curve here. We want to do a good job of this, but it's going to be very difficult to pull this off quickly. And I'm thinking of the short term impact. Thank you.

MS. BROOK: So this is Martha, I just wanted to remind everyone that, when we started thinking about the Residential Prescriptive Packages back in May, something like that, you know, we have proposals that are proven to be cost-effective in every Climate Zone, that are significantly higher than where we have landed, so we know there's plenty, numerous options for builders to actually meet the level of the energy budget that results from our current prescriptive package. So again, it is just a prescriptive requirement and builders have every option available to them to meet that energy budget, they don't have to do roof deck insulation if they don't want to, there's lots of other cost-effective measures they could do instead.

MR. RAYMER: I agree with what Martha just said, there certainly are other options we can go to, and unfortunately we will be going to those other options, at least for the short term. And I suspect, like a 15 seer air-conditioner would probably be a quick one to do. But in generating a prescriptive package, we should try to

endeavor, at least we would hope, and I know CALBO would hope if they were here, that we would come up with a prescriptive package that indeed is something that may well see a lot of application without the performance budget. That's my comment. Thank you.

MR. SHIRAKH: Thank you, Bob.

MR. PENNINGTON: Bill Pennington. One thing that we definitely want to be clear about is that the Energy Efficiency Division is strongly behind the notion of working with the building industry and with the utilities to provide training on those aspects of the Standards that are going to result in a change in construction practices, and we have been actively working with both CBIA, and the utilities, and the PUC, to encourage that that happens. So we would fully intend to do that, and we would intend to start work on that well before this six-month window that Bob had mentioned. Also, I'm a little concerned about the notion that the issues with moisture and walls in the past is somehow related to this issue. There were major window flashing issues that created those moisture problems, that became a super important issue for construction defects for the building industry, and there's no similar flashing issue here. So it seems really like apples and oranges.

MR. SHIRAKH: Thank you, Bill. Bob.

MR. RAYMER: I'm sorry, I didn't mean to give the impression that the window issue was directly analogous to this, I simply wanted to indicate that HCD, in this case, had adopted a set of requirements in, I believe, the 91 UBC that, inadvertently, without further workmanship guideline clarification, which we did with Contractors State License Board and the Department of Housing, we were able to correct the problem. But at the time that HCD was adopting this, they said, "Oh, don't worry, everything is fine." We learned how to fix it, but it took us a couple of years, that's all I was trying to tell you.

MR. SHIRAKH: Thank you, Mr. Raymer.

MR. FERRARO: Hi, John Ferraro with the Asphalt Roofing Manufacturers Association. ARMA would just like to offer our support to Bob and the CBIA as it relates to the roof deck insulation comments that he just made, and we are in support of the top layer of insulation over the exterior side of the roof deck. I also would like to echo his concerns as it relates to the ventilation issue and making sure contractors get the appropriate amount of education. Thank you.

MS. BROOK: So, I'm sorry, I was confused by your statement. You said you supported Bob, but then you also said you supported the roof deck insulation measure?

MR. SHIRAKH: Yeah, I heard that, too.

MR. FERRARO: As he says, we're okay with adding a top layer of insulation to the exterior side of the roof deck, and we are.

MS. BROOK: Okay, great. Thank you, that's good to know.

MR. DEVITO: Eric DeVito, Cardinal Glass again. One specific section, I guess it's 150.1(c)(4), which is the shading section, there is a number of items listed under 4, actually five in all, about how you can comply with the SHGC requirements, one of them is obviously you get the label value. Exception D is for south facing glazing, the permanent overhang, which we certainly understand, but then under (D) there is another exception for dynamic glazing, which appears to be just for (D). That seems, 1) out of place, or 2) I'm really not quite sure how to implement it, and maybe we can talk online, but you know, my first point is that you probably -- the two probably don't relate, I mean, the overhang is a permanent feature of the house, it's going to be there forever, the glazing may get replaced at some point in time, or not, and it may be replaced without dynamic glazing. And that's one point how I don't think it's appropriate to tie it to the overhang, or allow you out of the overhang for that situation. The second point

being, you know, you've already accounted for dynamic glazing in the Standard, you know, it has a rating, it's going to be counted, you know, as other typical fenestration would be. So, again, I question whether this exception is necessary.

MS. BROOK: Okay, thank you.

MR. SHIRAKH: Thank you. Any other questions on 151? Mr. Gabel.

MR. GABEL: Mike Gabel. On 150.1(c)(7), space heating and cooling, just curious about the new language referring to a HERS verification. If the prescriptive requirements are minimum efficiencies, I'm not sure why it's referencing efficiencies that exceed the minimum having a HERS verification.

MR. SHIRAKH: Jeff.

MR. MILLER: Jeff Miller. There are instances where verification of seer requires finding the rating information in a location other than the appliance efficiency database. So that would require examining the -- make a model of both indoor and outdoor unit.

MR. GABEL: Okay, thanks.

MR. SHIRAKH: Thank you, Jeff. Bob.

MR. RAYMER: Is it appropriate to comment on the whole house fan?

MR. SHIRAKH: Sure.

MR. RAYMER: Okay. Bob Raymer with CBIA. On the issue of whole house fan requirement in 150.1(c)(12), we'll be providing an example of how this effectively doubles roof penetrations, which does cause us some concern over the additional potential for roof leaks. When we add the ventilation ducts, as we discussed in the workshops, how does this impact the ability to provide the solar access required? You know, there's some issues relative to the 1 vs. 150 and 1 vs. 300, ventilation rate. And has the CEC staff demonstrated that these additional roof penetrations are compatible with the solar ready roof requirement? I am fully aware of the potential answer here, and that is we've got to be careful where we locate this, but once again, this is going to be a learning curve that industry is going to have to get up to speed with, I understand with some ACM changes, that there may be an ability to reduce the amount of solar ready roof requirement.

Now, as we go to multi-family, can the staff --over the course of time -- show an example of a three-story apartment complex, the very common style that we have where you've got individual stacked flats, you know, one layer of apartments on top of another layer on top of a third layer. Can staff show an example of this three-story apartment complex that complies with this

ventilation requirement? In essence, has HVAC systems on the roof, bathroom ventilation, and still allows for the required solar access area? And for whatever it's worth, more than 50 percent of the homes that were dwellings that we're going to be building in 2012, actually significantly more than 50 percent are going to be multi-family. For the first time in my memory, we're going to be building a lot more multi-family than single-family next year.

MR. SHIRAKH: I don't think we meant for this to be for multi-family.

MR. RAYMER: This is a comment that I got from Mike, I didn't think so either, but this is -- so this is not a multi- -- thank you.

MR. SAXTON: That's not correct. There are solar ready requirements for multi-family --

MR. RAYMER: No, the ventilation.

MR. WILCOX: Well, it's supposed to be a single-family requirement.

MR. RAYMER: Thank you, that really -- got a great answer, that's perfect. Lastly, while I'm on the issue of solar ready, I realize I had to go over to the Capitol for a short time, but the State Fire Marshal, as you well know, is working on the perimeter requirements needed for PV design, and there's a real good chance that would,

since we're now putting sprinklers in all the homes, not something that we're all that thrilled about, but now that we've got a statewide sprinkler standard, we'll be petitioning the State Fire Marshal to eliminate any required area. The idea of having sprinklers in the home contains the fire to a single room, albeit does so very expensively. The problem here is, the reason why the Fire Departments need to bore down through the roofing assembly is when there's a major conflagration that's underway within the house. By having fully sprinklered buildings as we will now have, there's no need to be boring through the roof, and so hopefully within probably a year, we should have access to 100 percent of the roof. So with that, thank you.

MR. SHIRAKH: That's good news. Thank you. Bill.

MR. PENNINGTON: So a comment on that subject. I think it would be very useful if the Energy Commission would consider supporting the State Fire Marshal's consideration of relaxation of these fire requirements, given the sprinkler requirements. And I think both the Renewables Committee Lead and this Committee Lead should consider that.

MR. SHIRAKH: Thank you.

MR. RAY: Good late morning, I guess. My name is Bruce Ray. I'm Director of Governmental and Regulatory

Affairs for Johns Manville in Denver, Colorado. And I appreciate the chance to appear here today. I want to make some general comments on behalf of our trade associations and also some particular comments on behalf of my company. Here representing, first, two trade associations, NAIMA and PIMA. NAIMA is the association for North American Insulation Manufacturers Association, which is the trade association for North American Manufacturers of fiberglass, rock wall and slide wall products. And NAIMA represents all the major fiberglass manufacturers in the United States, including all the foreign major manufacturers who have substantial manufacturing plants here in California. Fiberglass is the most common form of insulation certainly in residential buildings, but it's also specified for nonresidential use, including commercial, industrial, mechanical, pipe, and HVAC uses.

The other trade association I'm representing today is PIMA, which is the Polyisocyanurate Insulation Manufacturers Association, and PIMA is the National Trade Association that represents Polyiso insulation manufacturers, as well as suppliers, to the Polyiso industry. And PIMA is one of the nation's foremost industry advocates for energy efficient practices and policies, and PIMA is widely recognized for its advocacy,

as well as its products, that both contribute to not only this state's, but the entire country's efforts to promote energy efficiency and combat global warming. Polyiso is ubiquitous in commercial construction, its present in over 70 percent of the nation's commercial building stock, but it has a significant, and I would say, an increasing presence in residential construction, as well. There are five companies that manufacturer Polyiso insulation, and I think there are over 30 plants in the United States making Polyiso insulation. There is none in California, but there are two just over the hill in Fernley, Nevada, actually, just outside of Reno.

These are just preliminary comments because I think, of course, we're still looking at everything and digesting it, and talking to my trade association members, and so we may have some more detailed written comments. NAIMA and PIMA both very strongly support energy efficiency Code advancement, we supported the National effort in 2011 to increase energy efficiency requirements by 30 percent, generally, and we also support the State's ultimate goals of zero net energy both in residential, as well as commercial construction.

I know I'm preaching to the choir when, you know, I tell you we understand that efficiency is just a generally superior source of energy, it's typically the

cheapest, fastest method to make more energy available, and in fact, we say its efficiency is cheaper and faster than not only conventional generation, but also renewables, as well. And unlike renewables, which sometimes have side impacts, efficiency has instead some side benefits, some of which are related to public health, increased comfort, as well as decreasing home ownership through decreasing heating and cooling homes. And, of course, that's why California has energy efficiency at the top of the loading order.

And I think it's important, too, because it works hand in hand with the State's new 33 percent RPS because, you know, unless you maximize your energy efficiency deployment, you tend to be wasting or increasing the amount or the cost of energy that you're wasting, potentially.

We believe, more stringent to R-Values and in the higher levels of energy efficiency envelope performance in new construction are achievable at reasonable cost, and if you look at the R-Values and the U-Values in the proposed Table 150.1-A, we believe these can be met with literally off-the-shelf technology and that the real issue is choosing the right combination of products to meet the performance required for the specific Climate Zone, along with the right type of framing. And

certainly with a focus on combinations, or hybrids of products that preserve 2 X 4 wood framing.

The combinations of product that you see will likely entail maximizing the insulation capability of the framing cavity, within the framing cavity, but with it of course with additional insulation on the exterior, just as noted in Table 150.1(A). Really hoping that the Commission recognize that it's not so much the R-Value, it's really the U-Value, it's the performance that matters, not the amount of insulation that you put in the cavity vs. outside of the building, and hoping that the Commission can continue to allow builders and contractors to have the greatest flexibility to work with manufacturers to identify innovative and the most cost-effective solutions to achieve the performance that is necessary.

And I would say, finally, and very importantly, if we are going to require new homes to be significantly more energy efficient, we need to make sure that the builders get credit for these enhanced energy efficiency features, and one great way to do that is by taking the efficiency features into account when appraising the property, as well as when underwriting the mortgage. To this end, NAIMA strongly supports a bill in Congress to do this, it's called the "SAVE Act," which stands for

Sensible Accounting to Value Energy, and it is proposed and sponsored by our home Colorado Senator, Michael Bennett because it's not fair potentially to put new highly energy efficient buildings at a competitive disadvantage to existing homes that are less energy efficient. We really need to all work together to make sure that these efficiency gains -- that the gains in efficiency performance are taken into account when you're doing the real estate appraisal, they really need to get credit for it.

And then switching hats here a little bit, I want to make some kind of particular comments on behalf of my company, Johns Manville. I don't know if anyone knows all that much about Johns Manville, I hope people are learning more about us, we're a Berkshire Hathaway company, we have two of our major business divisions manufacturing here in California, roofing, but especially insulation. We have one of our flagship formaldehyde free fiberglass building insulation plants located in Willows in Glen County, which is about an hour north of here, and maybe I'll just pass this around so folks can see it. Up at our Willows plant, we make faced and unfaced fiberglass batts and rolls, and I mean, essentially, I think, to see a product like that, it's made mostly of post-consumer recycled bottle glass. That

one up in Willows is about 55 percent post-consumer recycled content, and the rest of it is mostly sand. The reason why it's white in color, there's no bleach or anything, that's just what glass fibers look like when you see the light bend through them, because we do have a formaldehyde-free binder on that.

In terms of -- it's also important to note that fiberglass is no longer in the Prop. 65 list, this insulation and fiberglass is no longer listed as a potential hazard in the NTP Report on Carcinogens, all of that has gone away. In terms of the more stringent R-Values and U-Value performance levels, again, we think that those can be met with existing products. And Johns Manville, in fact, has developed techniques to help optimize envelope energy efficiency by maximizing the R-Value or minimizing the U-Value performance, while also minimizing the labor and materials cost based on framing type. And just a couple of examples, just as an example to achieve, say, a total of an R-25 or a U.05 in a 2 X 4 wall assembly where the studs are 16-inch on center, one possible combination would be interior fiberglass insulation. We have a product called Spider, it's a dense pack spray applied loose fill fiberglass insulation. That would go in the cavity wink at about an R-15 for that, and then on the exterior, you can do two-

inches of the Isofoam Board which is about, I don't know, an R-12.5 or so. And I have a couple of samples --

MR. SHIRAKH: Can I ask you a question about that because I walked around with ConSol, some job sites, and I asked them specific questions about having two-inches of foam in the exterior rather than the one-inch that is the common practice, and what I heard, you know, that introduces all kinds of problems related to the way doors and windows are currently installed, and the shear. So is that a valid concern, you know, when you're going from one-inch to two-inches of exterior continuous insulation? Do you have any opinion about that?

MR. RAY: I can't address that right now, but I will take that issue back and we will get you some information on that.

MS. BROOK: Great. That would be great to know.

MR. SHIRAKH: Because, what our understanding is that the windows and the doors are basically designed for the one-inch, and if you go beyond that, then you have some loading issues related to the framing in the windowsill, so I was just wondering if you had any opinion about that.

MR. RAY: Maybe the BIA Rep can address that, as well. A lot of it is training and, you know, frankly, as a manufacturer, you know, we see that our responsibility

is to make products that can be installed in the field, by people of reasonable intelligence, training, and education. It doesn't do us any good to make products that can only be installed by PhDs in the lab somewhere, that's not what we're about. So part of it is to design in some ease of installation in the manufacturing. But there's a big educational component with it, as well.

MR. SHIRAKH: Bob, did you say framing or training?

MR. RAY: Training. I'll just give one other example of something that we could do. We also make a closed cell spray polyurethane foam insulation called Corebond and this is something, you know, over the past -- that is something where we could, say, in a 2 X 4 wall where you have three-inches of closed cell spray foam, you could get an R-18 plus, and then you could, with an exterior isofoam sheathing, say two-inches, you could get an additional R-12, and you can even have an R-30 wall. And in fact, we have done that at the demonstration home outside of Pittsburgh, it was an IBECOS zero net energy home where we had partnered with a lot of other manufacturers and a builder, to build what from all appearances is a typical tract home in a suburban setting that is zero net energy, and using primarily the spray foam in the cavity, we got an R-40 in the wall, and then we also got an R-60 in the attic. For the under roof

deck insulation, because that's an issue that I know is big here, you know, there's a couple of different ways that you could meet that. Again, you could apply the closed cell spray foam in there, and you could possibly even make the attic a conditioned space at that point. You could do the spider which is the dense pack spray applied foam, that's from underneath. Or on top, you could have your iso board, foam board, and we actually make one that has -- it's called AP and it's actually got a foil (inaudible) at the radiant barrier to it.

MR. SHIRAKH: Could the selection itself serve as a nail base for roofing products? Or do you need another --

MR. RAY: Yeah, you can.

MR. SHIRAKH: So nail directly into this, through this and to the stud?

MR. RAY: We also make a product called nail board. We have invented nail board, which has the exterior board sheathing basically sandwiched with the insulation on it, as well. So appreciate the chance to be here and, again, we'll continue to look at the proposal and file detailed comments as necessary.

MR. SHIRAKH: Bill has a question.

MR. RAY: Please.

MR. PENNINGTON: I'd just like to ask you a

question, sir. Relating to the above deck insulation, or below deck insulation issue, I'm wondering if you have any views of the feasibility of installing products satisfactorily without moisture problems. And also potentially the issue of -- or the idea of maybe needing top sheathing above the insulation to sandwich that product? Do you have any views on whether that would be necessary?

MR. RAY: You know, I don't have any views on that today, but the comments that have been made, it sounds like that's something we need to look in, and as a manufacturer we need to provide some comments on that. I know that, you know, Johns Manville is the largest manufacturers of low slope roofing systems in North America, so that we do an awful lot of combined insulation and membrane installation in commercial roofs, and you know, we really don't see it as an issue in commercial roofing. But it is a bit different, of course, than residential roofing.

MS. BROOK: If you could include that in your comments, it would be very helpful.

MR. RAY: Sure, absolutely.

MS. BROOK: Thanks.

MR. RAY: Thank you.

MR. SHIRAKH: Thank you. George, or is it Bob?

MR. RAYMER: With regards to the insulation on the exterior of the roof deck, what we've been told in very clear terms from roofing contractors and manufacturers is that there needs to be a very solid surface to put the top part of the roof, you know, the roof covering, to adhere that to the assembly. And that can't be done through the hard board insulation. I mean, if somebody could come up with a self-contained product, that would be great, but we're talking about short term and right now we're told that we have to have that second layer of sheathing to have something firm to adhere --

MR. SHIRAKH: (Inaudible).

MR. RAYMER: Right, absolutely.

MR. RAY: Right. It's just like an IP, sort of like.

MR. WILCOX: And what I should point out, Bob, this is Bruce Wilcox, that when we analyzed that measure, we assumed there was going to be a layer on the top, and that was part of the cost.

MR. NESBITT: It's called an IP when it only has one sheathing on one side -- George Nesbitt. Because it's not a structurally insulated panel. That's two.

So 150.1, Section 8, the domestic hot water, prescriptively it's saying that you have to install -- or you can install a storage gas water heater of less than

75,000 Btus in no research system. So that's -- so if you're just doing a water heater change out, I'm thinking partly -- mostly -- about alterations, it's not uncommon for people to install commercial water heaters, so burners, over 75,000 Btus, I think, you know, Gary and I, I've installed a number of AO Smith Vertex, it's also a 75,000 and above water heater, so prescriptively, you actually can't install that. So that and a recirc system is not uncommon for people to install, so prescriptively you can't do that, which would require the performance method. And certainly from -- I'm sure a lot of people, myself included, if I was just replacing my water heater, I'd rather not have to go through the whole calculation. So it seems like we need an exception for a large --

MS. BROOK: What section, again, are you --

MR. NESBITT: It's 150.1, Section 8, Domestic Water Heating Systems, so it's page 265.

MS. BROOK: Okay, I got it. Okay.

MR. NESBITT: And, I mean, it's referring you back to Section 110.1 and 110.3, which probably you'll just tell us that they have to be rated, and it has to have an energy factor, so if it's less than 75,000 BTUs, it has an energy factor.

MS. BROOK: Right.

MR. NESBITT: But if it's larger, it doesn't.

MS. BROOK: I don't think this is prohibiting larger systems, it just doesn't -- it's silent about them. I mean, because it says for systems 75,000 Btus or less, and then it goes on to list requirements, so I'm still confused about your comment.

MR. NESBITT: So my comment would be that it's not -- if you do the performance path, you don't have a problem.

MS. BROOK: Right.

MR. NESBITT: But if you're prescriptively complying, let's say whether it's a new house, this would say you can't put in something like the AO Smith Vertex.

MS. BROOK: No, it doesn't say that, it doesn't have any requirements for large systems, and when I read this section, it just says that the requirement is stated for systems that are 75,000 dollars or less -- or, I said dollars -- Btus or less. It doesn't say anything about larger systems. It doesn't prohibit them, it just is silent about them. Would you -- I'm not, I'm just trying to understand the comment and I don't know how to address it when I don't see the issue that you're raising in the language.

MR. NESBITT: I would see this as -- it's prescriptive, you either meet it or not. So if I want to put in a 75,000 Btu water heater, I can't comply

prescriptively.

MS. BROOK: Yes, you can. That one requirement wouldn't apply because the requirement is only for systems 75,000 or less. So if you install the larger system, it's not that you can't do it, it's just that that requirement doesn't apply to that --

MR. NESBITT: So if I install a regular water heater with an energy factor, you're saying I can put in a recirc -- no, I can't put in a recirc system, but if I put in a larger water heater, I can put in a recirc system prescriptively.

MS. BROOK: I think that's really what your comment ought to be, that's the problem right there. So it's not that you can't do it, it's just that we have constrained the larger systems.

MR. NESBITT: Right, which would seem you're allowing me to put in a potentially more energy using system.

MS. BROOK: Uh huh, uh huh, now I understand.

MR. NESBITT: And I would say it really doesn't allow me to do that, but that --

MS. BROOK: It does, and that's the problem.

MR. NESBITT: Yes.

MS. BROOK: Okay, I got it.

MR. NITTLER: Good afternoon, now. Ken Nittler with

Enercomp. I have a couple things that are sort of big picture things that I'd just like to bring up and I'll have some other comments on little stuff in writing. In Section 150.1(B) where it describes the performance standards, I have two things there. One is the energy budget definition now includes lighting.

MS. BROOK: Oh, that was a mistake. Thank you for that. We realized that, so apologize, yeah.

MR. NITTLER: Great. I would like to express some concern. I know we've moved a bunch of the following language in there that is struck out that is supposed to end up somewhere else, but there's one definition, the multiple orientation alternative.

MS. BROOK: Uh huh.

MR. NITTLER: There's something like that, a number of times in the past we've used that to trigger things like when you have to rollover or do calculations over again, you know, as of a certain date. And we applied it on things like document registration and so forth, and I think if there was some way to keep that sort of definition in the Standards, rather than pushing it down to the ACM --

MS. BROOK: Would that be more appropriate, to be in the Administrative section?

MR. NITTLER: In what?

MS. BROOK: In the Administrative section.

MR. NITTLER: It might be, but I'm just looking for it to be in there somewhere.

MS. BROOK: Okay. So you're just talking about the Multiple Orientation Alternative?

MR. NITTLER: Right.

MS. BROOK: Under -- I can't even tell what it -- okay, I see the heading, I just don't see it labeled, or numbered, okay.

MR. NITTLER: I have a couple comments on some fenestration issues, as well. In this draft, it's now -- we're now in Section 150.1(c)(3), there were an existing exception for certain types of doors and tubular skylights, and then there was a new one added to allow certain types of skylight products, and in this draft a new sentence was added to the end that, in addition to saying that you have to meet certain performance requirements, now it says that those areas are exempted from the total glass area calculation, and the west facing glass calculation, and I don't think that was the intent that those of us that worked on that on behalf of the case project, so I'd like to see those two sentences on Exception 1 and 2, the last clause, stricken.

Let's see, what else is there? Yesterday, I talked a little bit about dynamic glazing, and I basically won't

repeat it, but I remain concerned about choosing -- allowing an exception for dynamic glass that sets the properties at the very best they can be, and dynamic glass is only as good as the control system. And at the risk of sounding like Gary, you guys have a great example here of a dynamic glazing system that doesn't work, all the side fins out here in this building, to my knowledge, does anybody know when they last worked? Okay, so the point being that you've got to have the right controls, and if we don't have that language, I think it's a great possibility for the performance system.

I would also point out on the res side, that it took us 20 years to get sort of strange credits for interior shades, which would be another type of dynamic glazing, kind of out of there instead of in there, because it's very hard to justify or prove that they are or are not used. But I would urge some caution there.

MS. BROOK: So, Ken, would you support Eric's suggestion that we remove that exception for dynamic glazing in the shading section?

MR. NITTLER: Oh, yeah, I don't understand that exception at all. Both dynamic glazing questions. Then there's something that I think maybe we missed a little bit, and this is really -- you could either argue it's about Table 150.1(A), or perhaps it really belongs in the

insulation section, 150(C)(1). It has to do with the R-4 additional requirement we've added on walls; I don't think we intended it to be added on the walls between the house and the garage, as an example, that we don't have -- at least I don't see it in here, that I know that the calculations that are behind all the numbers didn't include R4 between the house and the garage, so there are certain places where the finished systems basically -- I guess you could do it, but I've never seen a case where they --

MR. WILCOX: I don't know if you can. I mean, the idea is that the R-4 typically is a synthetic stucco system that is on the outside of the building, and that's why it all works.

MS. BROOK: Ah, okay, sure.

MR. WILCOX: But you don't put that on the inside of the garage partly because of fire reasons. You can't have that in a garage.

MR. NITTLER: Anyway, so we need to figure out something that gets that clarified, whether it's in the table, or in Section 1, I'm not certain right at this moment. And when I was thinking about that and reading about that earlier, it also occurred to me one of the longstanding awkwardness things that happens in the Standards, as well, is in the attic where there are a

preponderance -- whether this is smart or not -- but the air handlers and the furnaces are often installed on a platform up there --

MS. BROOK: Uh huh.

MR. NITTLER: And so it might be nice if we figured out a way -- and basically to model that correctly, what you need to do -- should do -- is so the rest of the attic maybe, say, is R-38, and maybe you've got this 10-square-foot platform that is R-19, maybe, maybe we should see if we could formalize a little bit of language that would address what to do with platforms for mechanical systems inside attics so that the criteria, instead of being R-38, maybe should be R-19, as an example in that case. That was it. Thank you.

MR. SHIRAKH: Thank you.

MR. KLEIN: I see a need for lunch. Do you want me to hold my comments until after lunch?

COMMISSIONER DOUGLAS: No, why don't you go ahead?

MR. SHIRAKH: How long are you going to talk?

MR. KLEIN: I don't know, it depends on you. I've only got a few minutes.

MS. BROOK: I would say talk for one cup.

MR. KLEIN: Cool. What's in it? I have a comment related -- following up on Ken's. I was recently in another state that required lifting the platform high

enough so that you could insulate properly underneath it. I'm reasonably sure that the 2 X 6 additional height is somewhat cost-effective as opposed to jerry rigging around it. Maybe we ought to be thinking about requiring it. Another observation is that one of my friends who teaches on this subject out of Atlanta observes that, if you actually followed all the proper rules to insulate all the things we do when we have obstructions in the attic decking insulation, it would actually be less if you did all of those and costed it, to do it properly it would be cheaper to insulate the roof and have everything in the conditioned space inside the roof, inside the attic space, and that looks to be something we ought to spend some time properly costing, doing it correctly vs. what we do now, compared to those options. Having had one of those roofs that Bruce was able to study, where we did insulate the roof deck, was very valuable. The temperature difference was felt in the house and it was clear that the temperature in the attic never went above outdoor ambient with a two hour delay, compared to outside. There was a huge wind with only one-inch of insulation, so it made a big difference. My current house doesn't have it and I can feel the difference.

So moving on to hot water, 150.1, Section 8. It appears that (F) was eliminated, I think it was (F), it

was the kitchen pipe insulation, the requirements for insulating hot water in the kitchen has been eliminated, it's become the standard reference in the Appendix. I'm just surprised. So I didn't find it. I've been looking. I'm confused, okay?

MS. BROOK: All right, so you're looking for insulation to the kitchen and you're not finding it?

MR. KLEIN: Not anywhere in the document at the moment. But had its references in the Standard Appendix.

MR. SHIRAKH: 150 --

MR. KLEIN: I didn't see it. I've been looking again, but it appears to be missing and I don't think that was the intent.

MS. BROOK: So find insulation, okay.

MR. SHIRAKH: It does really belong in 151.

MR. KLEIN: I agree with you that it belongs in the requirements for all insulation, and there's one missing in the footnotes there on that list.

MS. BROOK: Okay.

MR. KLEIN: Then it appears that -- what do we do about heat pump water heaters? I'm on 8A where it says systems serving individual dwelling units, prescriptively you install a single gas or propane storage type water heater with a certain input. Why not a single heat pump water heater?

MS. BROOK: Okay, so that's similar to George's questions in regards to what about larger systems. You're saying, what, about heat pump water heaters?

MR. KLEIN: Yes.

MS. BROOK: Okay.

MR. KLEIN: And to follow on to George's comments, is that it seems to me what we care about more than the capacity of the water heater is the efficiency of the water heater, so (A) talks about equipment with typical efficiencies of under 0.67, right? Energy factor efficiencies are close enough. For (B), it talks about tankless water heaters which typically have efficiencies of 0.8 or higher, and we say you can install one of those, you can install a 0.67, well, we're comparing apples and grapefruit and I think we ought to be more clear about what the purpose is. I think it's about the efficiencies of the equipment we're installing. So that's one point. I'm not quite sure how to deal with that, yet, but I think that's an observation about how to solve some of this.

Then, the way the language in (A) and (B) are worded, I think we need to separate out "and no recirc pumps" from the language regarding the heater and the insulation requirements of the heater that make a period after -- take out the "no recirc pumps" from the middle

of the sentence and make a new sentence that says "the standard condition is no recirculation," or any other -- I don't know what the others are, but we've called out recirc, but if we take out the middle of the sentence, it will make it much more clear as to what our intent is. Okay, and it doesn't -- should we -- anyway, it's unclear to me what that "and no recirculation" means, it's out of context in the middle of the sentence, it does need to be moved.

MS. BROOK: Okay.

MR. KLEIN: And then I'm on (C), and if I'm reading (C) correctly, you have to have a gas or propane water heater, or boiler, or other things that meet some requirements, and it has to have a recirc loop, and it has to have a solar thermal system. Am I reading that paragraph correctly? Multi-family, yes, for multiple dwelling units.

MR. SAXTON: I think that's correct, but I can't say with --

MR. KLEIN: Okay, I just want to be sure I understood what it was reading. So -- okay, and so under (C)(ii) or ii, it says "shall be equipped with an automatic control system that controls the recirculation pump operation based on measurement of hot water demand and hot water return temperature?" Does that mean demand

controls? Because that's the only place I see it mentioned at the moment, so --

MS. BROOK: Yeah, I think that's what it means. Is that an inappropriate way to describe it?

MR. KLEIN: Well, I think so, but whatever we choose should be the same as what we use anywhere else in the document, like in the Appendices where we talk about the different control strategies. So we need --

MS. BROOK: Oh, okay, so make this language consistent with 110.3(C)(ii), okay.

MR. KLEIN: And conceivably the Appendices for Residential just because there's comments on the technology types and we ought to use common language so people don't get confused as to what we mean.

MS. BROOK: Uh huh.

MR. KLEIN: And then we've decided arbitrarily that, no matter how big the building is, it gets two recirc loops -- above eight units, and I actually think that sometimes buildings need 10, and so I think that the issue is two or more recirculation --

MS. BROOK: Oh, I see what you're saying.

MR. KLEIN: -- each serving separate sections of the building.

MS. BROOK: Yeah, at least two, okay.

MR. KLEIN: At least two, something like that.

And that follows in the exception, as well.

MS. BROOK: Uh huh.

MR. KLEIN: And I could make the case that, if you've got eight dwelling units, each of 4,000 square feet, and they happen to be multi-families, they probably want separate ones for each apartment. But I could make a case that eight isn't the right numbers, it's a distance and volume problem that we're trying to solve, so perhaps the exception is sort of the outbound length of supply side feet, something like that, might be a better rule; I'm not sure what the exact answer is off the top of my head, but that's the kind of thing that we're trying to resolve. Eight units is sort of a stipulation of size of building, and that's why we --

MS. BROOK: Yeah, it's a proxy for all those things you mention in the absence of having the work done that replaces that proxy.

MR. KLEIN: Okay, great. And I think that that covers it for now.

MS. BROOK: Okay.

MR. KLEIN: Thank you.

MS. BROOK: So just before, in case some people don't return from lunch, we are going to remind you of the final filing, the final comment period date, we think it's around April 9th, but we want to confirm on our

calendar and report that out to you when we get back.

MR. YASNY: Martha.

MS. BROOK: Yeah.

MR. YASNY: There's a Charles Cottrell on the line.

MS. BROOK: Okay --

MR. PENNINGTON: So just on that comment, I would encourage comments to come in as soon as possible, rather than waiting for the end of the 45-day language period.

MS. BROOK: No, absolutely. We will have less and less opportunities to actually respond to the comments if they don't come in until the end, and so to the extent we can actually respond and improve the 45-day language, we'd love those comments early. And we have one comment on the phone and it looks like the gentleman here in the room.

MR. SHIRAKH: And Yanda, are you on the line, too?

MS. BROOK: Okay, so Mr. Cottrell, we're ready for you. Do we have anybody online?

MR. YASNY: Cottrell is on the line, and Yanda after that.

MS. BROOK: Okay, first Mr. Cottrell, if I'm saying your name right? Cottrell?

MR. YASNY: Let's move to Yanda. Yanda?

MR. ZANG: This is Yanda.

MS. BROOK: Okay, Yanda.

MR. ZANG: Oh, I don't have any comment. I thought --

MS. BROOK: There was a question in regards to the venting requirements that we put into the section for Residential Water Heating and why it needed to be a straight pipe connection between the water heater and the outside.

MR. ZANG: Can you hear me now?

MS. BROOK: Yeah. Did you hear my question?

MR. ZANG: Okay, yes, yes. That requirement was based on feedback from the stakeholder meetings and discussion with contractors that, basically, when we have a straight type pipe that you can easily insert like, for example, PVC pipe, to convert it into Type 3 or Type 4 --

MS. BROOK: Oh, okay, so the whole idea is that you're facilitating the future insulation of a condensing water heater by enabling that pipe to be straight so that you can insert another pipe inside to convert it to the right type of event for the condensing water heater? Okay. Thank you.

MR. ZANG: Well, the initial proposal was to have a plan for installing a type 3 or 4 plan, but it was

considered not practical because it can be in the plan, but if you have adjacent home built right next to it, and you have a slight wind, it's not going to work. And this is a better solution.

MS. BROOK: Okay, all right. I think that's all we have for now, Yanda. Thank you very much for calling in. Do we have anybody else on the line?

MR. BOWER: Robert Bower on the line.

MS. BROOK: Could you hold on, Robert? We just had somebody come up to the podium to speak, and then we'll get to you.

MR. LEBRUN: This could take a little while, depending on questions. But if you want to proceed, I'll go ahead. I'm Roger LeBrun, Senior Product Certification Engineer for Velux America and I'm here to speak about skylights, a little change of subject matter, if you're ready for that, on their behalf. I'm also a registered professional engineer. This is my first visit here and I thank you for allowing us to come. I hope I can help educate and inspire a little bit. But I'm kind of new to this game, anyway, six years ago I left heavy industry to come into the fenestration industry, so I had a little bit of a learning curve. That's why I missed the 2008. I'm relatively sure you've heard of Velux; if not, that's fine. Hundreds of thousands of California homeowners

enjoy the fruits of our organization, the benefits of the daylight they bring to their lives through our products.

We'll be probably the only skylight representative you'll see -- that may change in the future, I'm willing to bet, but you haven't heard of anybody else yet on this particular Code development process, but there's a reason for that and the biggest reason is Velux is the only nationwide skylight distributor. In fact, we do distribute internationally, as well, with products made in the U.S. No one else really has anymore than Regional, and even though there have been a lot of skylights installed in California over the last three to four decades, a lot of them are made by various small companies who weren't subject to very many rules of the good old days. The manufacturers that do compete with us, even regionally, can't afford to come here, it's just they're not that big, period. So it's kind of the burden that we've accepted over the years. As the biggest, we'd like to think the best, so hear me out, please, and accept that I'm trying to speak for the whole category.

These folks have also recognized that we participate in all of the trade organizations, standards development organizations, and usually alone, and they come to rely on us as being reasonable, and I'm here

representing more than just Velux, but particularly Velux.

A little bit of history. I think it's in order. One of the reasons we haven't been involved before, not just because I'm new to the company, but because there's enough to do on a national level for one person, and that's all the resources they can afford in this whole effort. The business is good, but not good enough, and we don't compete with the window people who sell millions of units a year. But we're here and we'd like to let you know that we feel like the State of California in this particular Code development has backed skylights into a dark corner. It really started in the 2008 Code, which we did not participate in, shame on us, but it did catch us by surprise when we started to be called when the enforcement of those standards started to make us realize there's no product that we can offer to satisfy the requirements, particularly our replacements. Yes, you always have the performance option, but the bar is set pretty high for us to overcome with other expensive improvements on new construction and additions.

We are selling glass glazed skylights for residential use that are *Energy Star* qualified. All of our *Energy Star* products do not meet the 2008 Standards. *Energy Star* is going to tighten up the reins, we will not

be able to say that our current product line is 100 percent *Energy Star*, but we're probably still going to be 60 or 70 percent *Energy Star* qualified, and none of those products will meet the 2013 Standard as is currently written, except for the 10-square-foot exception.

MR. SHIRAKH: Are you talking about Residential Standards or Nonresidential?

MR. LEBRUN: I'm here to talk about Residential.

MR. SHIRAKH: So what is that? Is it a U-Factor problem? Or SHGC? What is that?

MR. LEBRUN: Really, it's both. It's both. The U-Factor is probably the hardest one to deal with. SHGC is one that we don't --

MR. SHIRAKH: (Inaudible) was 0.58 was the U-Factor requirement.

MR. LEBRUN: Well, that's the Mandatory Section. In the Prescriptive Section, it's 0.32, except for 10-square-foot, and you can go up to 0.55. Now, we have diverted our resources in this development of 2013 Standards, we make contact with CEC staff through acquaintances at NFRC meetings, and began to work with them to explain what our concerns were with 2008 Standard, which obviously morphed into what are we going to do this time around? We want to help you bring

reasonable language forward, we're not there yet.

We are kind of feeling ambushed, and maybe that's a strong term, but that is the feeling and I guess feelings are okay. The 45-day language is different from some earlier language that we were shown in the draft phase during the lead up to the 45-day language, and the real strong need is for the prescriptive table, 150.1(A), to include the 0.55 U-Factor and the .30 Solar heat gain that was there in that draft I alluded to. It disappeared in the 45-day language and I don't know why, no one has ever explained it to me, I don't know if it's technically justified, or cost justified, or just someone's preference.

MS. BROOK: So as far as our fenestration requirements? Is that what you're asking about? Yeah, they're actually one of our most cost-effective measures in the prescriptive package.

MR. SHIRAKH: But I think what he is saying is, in an earlier version there was an exception for skylights.

MS. BROOK: Oh, okay.

MR. SHIRAKH: It was 0.55 U-Factor --

MR. LEBRUN: No, it was actually in the table.

MR. SHIRAKH: In the table, so --

MR. LEBRUN: You had skylight U-factor and

skylight solar heat gain requirements in the table with not being treated as an exception, just like the other Codes do, it's --

MR. SHIRAKH: And the U-Factor was 0.55. What was SHGC?

MS. BROOK: 0.3.

MR. LEBRUN: 0.30, just what you showed on the slide.

MS. BROOK: Okay.

MR. LEBRUN: I don't know if that indicates that there's a certain bias in the --

MR. SHIRAKH: No, there's no bias.

MR. LEBRUN: -- in the Code writers against residential skylights --

MR. SHIRAKH: Nelson, can you come up?

MR. LEBRUN: I really don't want to pin Nelson or go up against Nelson, he and I have been working cooperatively in the past few months.

MS. BROOK: No, we're going to --

MR. SHIRAKH: There is no bias.

MR. LEBRUN: Okay, well --

MR. PEÑA: Good afternoon, Commissioner. My name is Nelson Peña, CEC staff. Roger is mentioning the issue that we have initially put skylights as similar to fenestration in the Table 150.1(A), and initially the

thought was, sure, that makes sense. But the U-Factor and solar heat gain coefficient is similar to the other fenestration products also listed there now. What was brought up at that time was the reason why we should take it out was because the initial base case study for the base case residential home does not include skylights, it does not promote skylights in the base case, therefore the prescriptive package usually lists all of the items that is included in the base case home. So I was forced to remove that requirement in the prescriptive package, only because the base case does not include that, and that's the main reason why we removed it, and we brought it back into Section 150.

MR. SHIRAKH: But in Section 150, what is the SHGC and U-Factor required for --

MR. PEÑA: I believe it's 0.55 and 0.32.

MR. SHIRAKH: But why is that a problem?

MR. LEBRUN: I'm sorry, what was the question you asked --

MR. SHIRAKH: What he's saying is he's taken the requirement out of the table, but he's included it in the text, and the U-Factor that he is telling me is 0.55 and the SHGC is 0.32, so why is that a problem?

MR. LEBRUN: The text that I read, it indicated that it was an exception for 10-square-feet, for 0.55 and

0.30.

MR. PEÑA: We have an exception for the smaller windows, but the alternative would be that they could go ahead and install skylights at any other values with a maximum of U-Factor of .58. So it's treated very much just like fenestration at this time.

MR. LEBRUN: I guess my question would be, if we wanted to use the performance path, or someone wanted to use a performance path, what would they use for the default with a base case fenestration U-Value for -- and I'm not really sure how your ACM works, I've got to admit, I'm not sure of the details on that, I don't know if you have to put the same area of skylights you want to use in your proposed building into the Standard building, and use the type tabulated values, and then offset what you really can put in with products that are really available with other improvements.

MS. BROOK: So I'm not sure either in that specific example; my guess is that we don't map across every skylight, that we either don't have any in the baseline, or we have a fixed number. But I think what I'm hearing from you is, 1) if we're summarizing the prescriptive requirements in Table 150, then we should include skylights in that table, regardless of the fact that the baseline didn't include a skylight in the

assumption. We still have requirements for skylights and their prescriptive requirements, we could put them in the table, in my opinion. And then, 2) we just need to make sure that it's real clear in the prescriptive section what the requirements for skylights are, and not just somewhere where it's stated as a special exception.

MR. SHIRAKH: Well, the other question is whether there should be an area limit on skylights. We have a total fenestration limit and whether we should treat skylights as part of that 20 percent, or should it just be totally -- my thinking is that it should be part of the 20 percent, but you know, allow .55 and .30.

MR. LEBRUN: I believe that was in the draft that I was referring to when there was tabulated values there, there was a footnote or something saying how all fenestration couldn't exceed 20 percent.

MR. SHIRAKH: Twenty percent, but you can have different U-Factors and SHGC, depending on site fenestration or skylight.

MR. LEBRUN: Yeah, and the justification for that is just the way these slow products are evaluated. The same construction window tilted at 20 degrees and sticking up four inches over the roof is going to be 50 to 70 percent higher U-Factor just because of the way they're tested.

MS. BROOK: Uh huh.

MR. LEBRUN: Unless you want triple-pane skylights, but what Martha is suggesting is a good approach, if you will --

MS. BROOK: Okay. Do we have any comments from staff or consultants? Okay.

MR. LEBRUN: One of the other things I just wanted to throw out to help pin -- underpin that argument, if necessary, was we have learned through new modeling that skylights are not an energy loser, they're actually an energy gainer when they're put in for good reasons like the daylight practice, but they're an energy winner because you can have less total fenestration area if you put them in.

MR. SHIRAKH: If you look at the language, I'm not sure if it's appropriate to have it in the table, or not, there was an exception, but essentially what we're going to do is the language that says skylights are part of that 20 percent, but they're going to have different requirements for SHGC and U-Factor, and we also have that exception of 10-square-feet. I think with that, we should be able to respond to your --

MR. LEBRUN: If it has the same intent of listing the same value all the way across the Climate Zones, that's fine.

MR. SHIRAKH: Yeah.

MS. BROOK: And I'm guessing and hoping that Ken is going to talk about the performance approach for skylights.

MR. LEBRON: Well, one more thing, in the future, something to look forward to is our parent company is a European company and they're the largest window company in the world when you talk about all windows, they don't do windows here, but they are embarking on a collaborative effort for the European market to develop something called "Active House" where you don't have the major expense of all the mass and all the tightness and you can utilize your fenestration to its fullest, control it when it's not doing the best for the energy, and maximize its good points at the right time of the day, so you control things depending on what's going on. That's in a fledgling state, but I think in a very few months, or a couple years, you're going to see a lot written about that, something to kind of look out for. I do like to think it's greener than Passive House because of the resource it takes to build a good passive house, but they're both good, the products can be used in either one, but we're focusing on the Active House concept.

MR. HURLEY: But this is Kurt Hurley of Passive

House California, and I just wanted to share the perspective that skylights that have a poor U-Factor could present the weakest component of a building envelope and contribute to a building's heating and cooling load, no less so than any other fenestration. So I'd like to add that.

MS. BROOK: Okay, thank you very much. Yeah, we understand that.

MR. LEBRUN: If you'd like me to come back to the mic during the alterations, conditions and repairs section, I can do that, or I can just give you a real quick comment about it.

MS. BROOK: It actually would be better, just if you are planning to spend the day, if we kept it in that section and also because I'm really hungry.

MR. LEBRUN: Amen. I am sorry that I made everybody growl a little longer. Thank you for your time.

MR. NITTLER: Ken Nittler with Enercomp. I was a member of the statewide case team that looked at fenestration and let me explain, knowing performance the way I do, the way it is treated right now is the standard design, what a builder has to beat in order to comply, is silent on skylights. So what that says, in effect, is you can add skylight, there's no percentage limit, or

square footage limit, but it has to be traded off against the performance criteria we recognize for fenestration products. And I would say that the language as is in the draft right now maintains that stance, that on the performance side, what we're saying is you can put skylight in, you just need to account for it as a fenestration product. And there are no accommodations for different U-Factors or solar heat gain. In my experience, the number of skylights in any given homes tend to be a fairly modest amount, so when Mr. LeBrun showed up last fall, I think, was when he first came here, or at least joined us via phone, and said this was a problem for the skylight manufacturers, those of us on the case team went back and looked at skylights, and I agree with him that, as we've tightened the fenestration, we've gone in the last two Code cycles from aluminum dual glazing down to pretty much front of the line low conductance frames with low solar -- extra low solar gain glass in that because the skylights, they're at a tilt and the physics are a little bit different, they can't quite get there no U-Factor taken by themselves. So we looked at that and we said, okay, so prescriptively, what I believe the language says as drafted here is that, if you're following prescriptive approach, okay, we give you 10-square-feet with a relaxed U-Factor and solar heat

gain, and the way I think of that is that means a skylight can -- at least one skylight of a reasonable performance level can always be added prescriptively. But, again, if you're doing performance, it just needs to be accounted for.

MS. BROOK: Okay.

MR. NITTLER: With regards to the various drafts, I will just say this on behalf of the case team, when we put our language together, we always wrote it only as an exception, exactly as you see in the document now are very similar, we never proposed putting it in the table and that's because, if you go put it in the table, then we need to talk about how much glass area and what do you do about west facing, and all sorts of other issues on skylights that, you know, since our biggest problem is air-conditioning, solar heat gain, that sort of thing, it becomes even more of an issue. So we're treating them very similar to the way we did before with those prescriptive exception, but this was our intent anyway, to allow for one to be added prescriptively with slightly relaxed performance values that are typical of the sort of products that Velux, for example, manufactures.

MR. SHIRAKH: Thank you. So the 10-square-foot, that's more than two skylights, usually typically

they're 2 X 4?

MR. NITTLER: Numbers like that.

MR. SHIRAKH: Okay.

MR. LEBRUN: I appreciate what traditionally has been done when skylights are analyzed on a U-Factor and solar heat gain penalty, if you will, alone. But keep in mind that three to 10 times the amount of daylight enters each square foot of glazing in a skylight, then through a window. When you intelligently place those units, you have potential to save energy when you put total square feet of glass lower in a building; I don't believe their study took that into account. We commissioned a study that I've shared with Nelson that shows that skylights, when properly assembled -- or properly arrayed -- in combination with intelligently placed windows in a given space, you're more than likely to save energy and they're not an energy loser. We're just beginning to quantify that, we've always felt that way, but the numbers are starting to come in and I really would encourage the Commission to ask Nelson to share that with you because there's some good information in there. I would like to vet it through your smarter folks who do this fenestration stuff a lot, we've vetted it through U.C. Davis, it cost us probably -- Papa Michael -- the study was done by Sue Riley's group, 14 Colorado

[ph], and we collaboratively set the parameters so that we took the conservative approach forever and there was a choice to make, we chose windows that were built exactly like the skylights, just that couldn't be questioned --

MS. BROOK: Uh huh --

MR. LEBRUN: The results speak for themselves. Essential energy savings are there if we encourage people to properly array them.

MR. SHIRAKH: I'm going to ask about the U-Factor because it's an aluminum frame or something, why can't they make them?

MR. LEBRUN: I'm talking about wood frame, I'm talking about double-pane, triple low-e, argon-filled, same thing that would get a U-Factor in a window of 0.30, 0.32, 0.33, the skylight is going to come in at 0.44, 0.45, if it's got its own curb, if it sets on a sentinel curb, you've got a different rough opening and that makes the U-Factor go up just be default to around 0.49, 0.50, 0.51, depending on the glass package. So, I mean, that's about as efficient as you can get double-pane and still be reasonably caustic for a discretionary product that doesn't have to be in the building. Windows have to be there up to at least eight percent. It's easy for granite countertops to look pretty attractive when we make the skylights too expensive.

MS. BROOK: Okay, thank you. Any other comments before we break for lunch?

MR. MCHUGH: Sorry.

MS. BROOK: Half a cup for you, Jon.

MR. MCHUGH: Two gallons.

MS. BROOK: No.

MR. MCHUGH: So this is Jon McHugh, McHugh Energy, and I'm very interested in finding out more about the study. I've done research on daylighting systems over the last 20 years. Primarily, the issue with, you know, skylights are great amenities, so, you know, Velux has a great history in terms of expanding the useful space in buildings, but nonetheless, the issue is this, is that commercial buildings are not a big house, they are dramatically different from houses where skylighting has been an extremely important energy efficiency measure, and the State has adopted that into the Standards; the difference is that commercial buildings are typically occupied during the day, houses may or may not be. Commercial buildings have higher Lighting Power Densities than residences, residences have lower LPD. Houses are envelope dominated, the heat transmission across the envelope is a major component of energy consumption whereas commercial buildings are internally load dominated; primarily, air-conditioning is associated

with rejecting internal gains. So, given all those things, the balance between whether a skylight is providing energy savings vs. energy losses is dramatically different between houses and commercial buildings. So, people may not be there; even if they are there, the other this is, because houses are smaller, they also tend to also have windows, and so the skylight might be providing light, but people may still be leaving their lights off just because they're getting some lights through the windows. So, you know, the issues are dramatically different in terms of skylights and windows. Now, the other thing about skylights is they face up, so where is the sun during our peak demand and our peak loads? It's up high in the sky. So when you look at the solar heat gain coefficient, that's measured normal to the glass, meaning, you know, perpendicular to the glass. The sun in the sky is essentially perpendicular to the glass when we're talking about skylights, whereas we look at windows, the angles are more oblique, especially in the summer. And so, actually, the real -- the angle dependent SHGC is even lower for the windows. So from an energy perspective, even though I support skylights and I think that they're a great amenity, you know, I think the balance of having an exemption for so many square feet is a good one prescriptively, but in terms of the

performance baseline, I think let's actually propose that makes sense.

MS. BROOK: It sounds like what we've been doing makes sense, yeah. Okay, thank you.

MR. LEBRUN: I would ask anyone who has trouble absorbing the possibility that skylights can be an energy winner in residential to get the study from the Commission, it's free, you're welcome to read it, you'll find that we do not count lighting energy savings in our analysis, it's strictly heating and cooling. You'll find that we varied the location of the skylights on the south face, north face, we've varied the position of windows all the way around, we varied a lot of different cases in the same space, and in every case except for one very minor exception, no matter what we did, we saved heating and cooling energy in California.

MS. BROOK: Okay, we'll look at that study, it sounds very interesting.

MR. LEBRUN: Whatever Jon has in his historical database, and I know he's a very intelligent guy and he's done wonderful things encouraging skylight use in commercial buildings, you've got to look at residential through a totally different prism.

MS. BROOK: Right, and I know Sue Riley's work, she's very highly recommended in the building modeling

space, so look forward to looking at the report. Thanks.

MR. YASNY: There's a Robert Mowris on the line.

MS. BROOK: Hi, Robert.

MR. MOWRIS: Yeah, well, my question -- hi, how are you today?

MS. BROOK: Good.

MR. MOWRIS: Can you hear me okay?

MR. SHIRAKH: Yes.

MS. BROOK: Yeah.

MR. MOWRIS: Okay, I'm not sure if you talked about showerheads yet, but --

MS. BROOK: Well, we did, and I know you needed to call in and talk about that, so go ahead.

MR. MOWRIS: Okay. Yeah, I don't know what the recommendation is, I read the case report, and --

MS. BROOK: Do you want me to read to you real quick? It's short.

MR. MOWRIS: Yeah, no problem.

MS. BROOK: Did you want to make a comment anyway in the absence of knowing what we have in our Standard or --

MR. MOWRIS: Oh, I saw the recommendation in the case report, so if that's what is there, I think I know what's in that, but if it's revised, let me know

what --

MS. BROOK: Why don't you go ahead, then?

MR. MOWRIS: Okay. The recommended Standard was to eliminate multiple showerheads, which I think is a good idea and I support that. On the flow rate issue, the recommendation was for a maximum flow rate no more than two gallons per minute at 80 PSIG, which I think is too simple and actually not consistent with ASME's current standard. So what I was concerned about was that the research that we did over three years, under a PIER funded grant, was to look at improving the standard for ASME. The American Society of Mechanical Engineers and the Canadian Standards Association jointly formed a committee that spent about three years developing a new standard, and the standard was released in 2011, and so that standard basically has two types of compliance paths, one is for a standard showerhead where the old testing procedure is still in effect, which would be 2.5 gallons per minute at 80 PSIG slowing pressure, and they have the high efficiency standard which is consistent with the water specification, and that specification is a maximum of two gallons per minute at 80 PSIG, but it also has other criteria, it has a minimum flow rate, and the minimum flow rate is specified in the standard as being 60 percent of the maximum at 20 PSIG slowing pressure and

75 percent of the maximum at 45 PSIG slowing pressure, and the reason for that is because a lot of products can meet the 2.0 GPM at 80, but most consumers don't have 80 PSIG slowing pressure, and so what happens is they typically have about 40 to 50, or less, and the products that have six orifice designs actually end up delivering far less water, which ends up causing high consumer dissatisfaction, which can end up having consumers look online or other places to get a better showerhead, and then that result is that you might end up having people buy showerheads that are flowing greater because of the way the standard is written. So, to get around that consumer dissatisfaction issue, ASME spent three years developing these new test procedures, and if you were to tighten the Standard, I would recommend that you look at the ASME Standard and the current Standards that they have is the 2011, so you can get that off of the AMC website.

And the other thing that would be worth looking at is the issue of certification and there are some products that would meet the standard, but they wouldn't be certified as *WaterSense*, and then there are products that are actually labeled currently as *WaterSense* that you could test independently and find that they don't actually meet the *WaterSense* specification. So, with

further research that was done by the manufacturers and the lab work that we did, we determined that the test itself probably needs to be improved in order to make it more reliable and more consistent, and so if you were to adopt a standard like you suggested, it would be really helpful if the State of California randomly tested products to make sure that they, in fact, met the standard, because it's very easy for a manufacturer to provide a sample to a testing laboratory that could test that product and have it pass the specification, and then, in the production process, something gets changed and the product actually -- the consumers might not meet the specification. So that was a real big issue that was raised during our study and DOE actually issued fines that were totaling more than $5 million within several months after the work that ASME did against companies that were basically selling products that exceeded the 2.5. So there are products that are sold today that are rated at 2.0, but actually flow at higher than 2.0, and there are products that are rated at 1.6 and they flow at, you know, 1.8 at 80, and the reason is because of the fixed orifice design where the flow is not consistent across a wide range of pressures. And so that's why the ASME team/CSA group, developed the minimum maximum testing procedures. The flow rate test was actually

conducted at 20, 40, 60 and 80 PSIG, so that the product, the flow characteristics of the product can be understood as far as how does it perform in a given situation where you wouldn't have 80 PSIG. It's pretty rare to have 80 PSIG except in places like Los Angeles where you find very high pressures at multi-family buildings that could be as high as 100 PSIG, and in those situations the flow of a 2.0 would be considerably higher than 2.0. I might have other comments, too.

The other comment I had, I guess a more general comment, is that the *WaterSense* label has only been out for two years and, so, while there are products that are listed on the *WaterSense* website, there isn't a lot of traction for the label in the marketplace. And if you check -- if you go online and check utility websites, you'll find that only one utility in California actually offers incentives for *WaterSense* labeled showerheads and that would be SoCal Gas. There are some smaller utilities, as well, that offer incentives for *WaterSense*, but predominantly they're very -- the market share is very small now because there hasn't been any programs, there hasn't been any educational effort or marketing to get the brand out there into the wider marketplace. And so, generally, my understanding of standards is that, when standards are being considered, a lot of times it's

based on the fact that either there's a tremendous lack of efficiency and there's a new product that is easily adopted in the marketplace so that efficiency could be improved significantly, that would be one scenario. The other scenario would be like with refrigerators, where DOE had a standard and then *Energy Star* had a rating for refrigerators, and it turned out that recently, last year, DOE decided to raise the standard to the *Energy Star* label because virtually all manufacturers were making Energy Star products, and so everybody agreed that was a good idea. In the case of showerheads, that's not the case right now, and so the question that I'm raising is, that I raised in our case report, was it might be premature to adopt a standard at the current time to lower the flow rate, especially since the *WaterSense* brand is not well known and there isn't any support, really, for the brand by utility incentive programs.

MR. SHIRAKH: So, Robert, can you summarize your comments? You know, we're way behind schedule here -- if you can summarize it, I would appreciate it.

MS. BROOK: So were you saying just then, Robert, that you don't think we should have this requirement in the standard because it's too early?

MR. MOWRIS: Yeah, I mean, that's what I said in our case report, and I'm not against standards, I

mean, I'm an efficiency advocate, so that's not my point; my point is that, when we interviewed consumers and we did a lot of consumer satisfaction surveys and manufacturer surveys, what we found is that showerheads are -- there's a lot of science and art to the design of showerheads and people have different preferences, and so if the goal is to stay at a specific amount of water and energy by a certain date, let's say 2014, it might be better to continue to promote the brand statewide so that the market can mature and consumers can see the advantages of the *WaterSense* products, rather than adopting a standard by 2014. Because it could backfire insofar as if California had a standard that was different in Nevada or other surrounding states, or other states in the United States, consumers could simply go online and buy whatever product they want and circumvent the intent of the standard, and then distributors would simply hoard up on the higher flow products and perhaps sell those, you know, when the standard kicked in so there would be many years of supply of high flow products. And so my recommendation would be to just give this a careful second glance, or evaluate it further, to determine both whether it's merited right now, whether it's the best choice for California, and if you were to implement it, the language that is in there now really

isn't sufficient to be consistent with current standards. So I think it's just premature at this point.

MS. BROOK: Okay. Can you just -- one last thing, can you give me the number of the ASME standard that you've been working on?

MR. MOWRIS: Yeah. Let me just pull that up, one second.

MS. BROOK: Or you can send it to me offline.

MR. MOWRIS: Yeah, it's ASME A112.18.1CSAB125.1 2011, and I would email it to you, but it's -- they don't give it away for free, you have to buy it --

MS. BROOK: So would you just email me the number? Because I'm terrible at -- once you got past the "4," I stopped --

MR. MOWRIS: Yeah, I'll try to email you some comments, but is there another comment period where other people could comment on this? Or is this the last chance to comment?

MS. BROOK: No, the public comment period is open for 45 days and it started February 24th, and our guess is April 9th is what we have published for the end, but we're going to confirm that and get back to people after lunch.

MR. MOWRIS: Okay, thank you very much.

MS. BROOK: All right, thank you.

MR. SHIRAKH: Okay, so I suggest we break and come back at 2:15 and continue on.

COMMISSIONER DOUGLAS: All right, we'll see you at 2:15.

(Recess at 1:14 p.m.)

(Reconvene at 2:22 p.m.)

MR. SHIRAKH: So we're going to get started with the afternoon session. Hopefully we can still get out of here on time, kind of building some slacking to the afternoon section, but we are behind schedule. So we're going to start out by talking about Section 150.2, which is the Additions and Alterations.

Section 150.2 – In Additions, a general clarification to describe the requirements in additions less than 1,000 square feet and installation of glazing less than 50 square feet. These requirements were in the 2008 Standards but have been clarified for the 2013.

The first exception clarifies that the additions less than 1000 square feet, mechanical ventilation for whole-house ventilation airflow is not required; however, all other requirements of ASHRAE 62.2 still applies.

Exception 2 to is where the space in the attic or rafter area is not large enough to accommodate the required R-value, the entire space shall be filled with

the insulation provided such installation does not violate Section 1203.s of Title 20, Part 2.

Subsection (a)1 - the Prescriptive Approach. Clarified the requirement and simplified the total fenestration and west facing fenestration requirement for additions that are less than 700 feet or less than 400 feet. You know, this is kind of a departure from the 2008 Standards. We've created two thresholds, one is at 700 square feet, one is at 400 square feet. And we worked with CABEC members on this to try to basically simplify this and make it flow more smoothly, and eliminate some anomalies that existed under the existing standards. For instance, if you had an addition that was less than 200 square feet, you would get up to 50 square feet of glazing. But if your addition was 105 square feet, then you'd only get 20 square feet of glazing. So we tried to eliminate that kind of stuff.

We also eliminated the credit for existing glass removed, so for instance, in the 2008 Standards, if you have existing glass that's 50 square feet, you know, you are allowed 50 square feet plus 20 percent of the addition. But we heard from the CABEC members and CALBO that that's been problematic documentation for it and in just keeping track of it and enforcement. So what we've done is basically we've loosened up the allowed glazing

in exchange for removing this allowance.

For the Performance Approach, we simplified the rules determining the standard design and proposed design for Existing Plus Alterations Plus Additions. And, again, this was a long effort between the staff and CABEC members, and we think we came up with language that is fairly workable.

Additions larger than 1,000 square feet shall meet the ASHRAE Standard 62.2. These are the indoor air quality requirements.

Subsection 150.2(b)1B - Glazing Properties. Replacement fenestration up to a total area of no more than 75 square feet with a U-factor of no greater than 0.40 and in climate zones 2, 4, and 6-16, and an SHGC value of no more than 0.35.

Subsection 150.2(b)1C clarified qualifications for "new or replacement space conditioning systems."

Subsections 150.2(b)1D and E clarified qualifications for "entirely new and replacement duct systems." This has been a source of confusion, you know, what is an entirely new duct system or space air-conditioning system?" If you replace the outdoor unit and air-handler, but part of the duct board, is it a new system or not? So there were a lot of questions related to that. So I think, you know, Jeff Miller has done a

good job trying to clean up this section.

Eliminated the 60% leakage reduction method for compliance with the duct ceiling requirements.

Section 150.2(b)1F – Altered Space Conditioning System – Mechanical Cooling. Revised the criteria that triggers refrigerant charge verification requirement: now applicable when there is an alteration of refrigerant-containing equipment.

Refrigerant charge verification was clarified to be in Climate Zones 2, 8, 9, 10, 11, 12, 13, 14, and 15 for ducted split system central "air-cooled" air conditioners and ducted split system "air-source" heat pumps.

Added requirements for increased efficiency and submittal of weigh-in refrigerant charge installation certificate documentation for air conditioner and heat pump, a requirement that cannot meet either the standard charge verification protocol in RA3.2, or an alternative special case procedure in RA1. The higher minimum efficiency is required in that system. Basically, you know, if this system cannot comply with a standard charge procedures, the alternative is to put in a higher seer or ER to make up for that difference.

This was added in order to provide regulations of systems such as mini-splits and multi-splits that

cannot meet the HERS verification requirements for refrigerant charge.

Packaged systems are exempt from the weigh-in requirement if the refrigerant charge is certified by the manufacturer.

Section 150.2(b)G – Water Heating Systems. Clarified the water heater replacement requirements for natural gas, propane, and electric heaters not exceeding 50 gallons.

Subsection 150.2(b)1H – Roofs. The reflectance and emittance requirements have been changed to be consistent with the prescriptive requirement, basically, of 150.1(c).

The increased free ventilation area 1/150 has been removed. That's an exception.

The ¾ inch air-space changed to no less than 1.0 inch between the top of the roof deck and bottom of the batten to allow free air movement. So this is an exception to the cool roof requirements. I think the existing standard says there shall be a ¾ inch air-space between the top of the roof deck and the bottom of the batten. I think the research that, you know, we had indicated that one inch is what we needed to get.

Specifies that reflectance requirements for low-slope roof in alterations is 0.63. Again, for new

construction it was 0.65.

And provides continuous insulation as a prescriptive alternative to low-slope cool roof requirements for reflectance range down to 0.25. You know, we had talked about these requirements extensively yesterday.

Section 150.2(2) – Performance Approach for Alterations. Again, this was an area where there was a lot of ambiguity and we worked with the CABEC members to simplify these rules. So we actually, for altered components, now we're proposing to have two paths for compliance, a path -- was that me? A path -- a route with third party verification which generally sets the standard design on the existing condition, meaning larger compliance credits -- oh, I'm sorry, I'm reading the second bullet first. The first one is the route without the third party verification which generally sets the standard design on the mandatory requirements, or the proposed design, meaning a smaller compliance credit. Basically, if you don't want to have a HERS or third party verification, you can get some credit, but the credits are smaller.

In the second bullet, the second alternative is that, you know, you can have a HERS verification route, and in exchange you get a much larger credit. And in

this case, the standard design will be based on existing conditions rather than mandatory requirements.

For fenestration, you know, it's a little bit more complicated. The standard design without third party verification is the U-factor of 0.40 and SHGC of 0.35. With third party verification, the standard design is based on existing conditions if the proposed U-factor is 0.40 or better and SHGC is .35 or better.

That's it for Additions and Alterations. Any comments?

MR. GABEL: Mike Gabel. So just one point, Mazi. On Table 150.2(b), the standard design for an altered component, it says "standard design with third party verification," right about that, the text mentions third party -- I think maybe do you want to add something without specifying the third party, something like the Executive Director shall determine the qualifications required by the third party verification? In other words, I don't think you've decided it has to be a HERS Rater, I think you decided it may be. So maybe if you put a sentence in there that acknowledge the Executive Director has to determine what the third party verification requirements are, or qualifications are. And by the way, that would be the similar language for nonres because we have only that one instance in 141.

whatever that is zero, same kind of reference needs to go in there, as well.

MR. SHIRAKH: Okay.

MR. NITTLER: Ken Nittler with Enercomp. I had Dee Ann Ross in my office to look at this and the first thing she looked at, I think we might have accidentally edited something out here on additions, this is on 150.2(a). It doesn't actually anywhere say -- point to the portions of 150.1 that do apply. When you go through the list of things like, well, if it's more than 700 square -- or less than 700 square feet, you do this, and more than 1,000, it doesn't say that you shall meet everything in Section 150.1(c) except there's some sort of --

MS. BROOK: Okay, so it just covers the outliers but not the --

MR. NITTLER: Yeah, accidentally what it says, if you're building an addition that's more than 700 square feet, all you have to do is the glazing.

MR. SHIRAKH: That's a requirement for everything else, that's what you're saying.

MR. NITTLER: Yeah, it seems we lost that, I think. Thank you.

MR. KLEIN: Gary Klein, Affiliated International Management. I actually have a question on

the slide you showed for the roofing, before I go into hot water. Can you pull that slide back? That one. I don't understand the language in the third bullet. Can you describe to me what that means in installation?

MR. SHIRAKH: This is an exception --

MR. KLEIN: I understand, but tell me, I don't understand how to build it.

MR. SHIRAKH: This is just battens.

MR. KLEIN: I understand, but read what it says, I think it says there needs to be no less than one inch between the top of the roof deck and the bottom of the batten, and the batten is attached to the roof deck.

MR. SHIRAKH: Those are -- well.

MR. KLEIN: Is there a raised batten?

MR. SHIRAKH: Yeah.

MR. KLEIN: Okay, so that's not at all obvious from the language. So it's a raised batten case, there has to be a least a one inch air gap on raised battens. It doesn't say "raised batten," it just says "batten."

MS. BROOK: Okay.

MR. KLEIN: And the normal construction is battens are attached.

MR. SHIRAKH: Got it.

MR. KLEIN: Thank you. I was confused. So I want to talk about the hot water in 150.2, Exception

5(1). A natural gas or propane non-recirculating water heating system. What is a non-recirculating water heating system? And it talks about does not exceed 50 gallons in capacity and has an energy factor greater to or equal, etc. I think we mean we want to put in a natural gas or propane water heater that meets the requirements, period. And there shall not be a recirculating system.

MS. BROOK: Okay, so this is similar to your other comment where it's just the structure of the sentence is confusing and you want us to pull out that explicitly --

MR. KLEIN: Yes, I think we need to pull it out and make it separate.

MS. BROOK: Okay.

MR. KLEIN: And then if no type of natural gas is connected to the building -- this is the next one -- does that mean natural gas or propane?

MR. SAXTON: I believe it does.

MR. KLEIN: Okay, then I would just say it as that, just repeat the parallelism; it would be easier to figure out what we mean. And, again, in that sentence there is a problem with non-recirculating. And then in 3, I think there is a simpler way of handling the language. It currently allows the Executive Director to

qualify anything they choose that uses no more energy than either one or two. And my recommendation would be to say "a water heating system determined by the Executive Director to use no more energy than the one specified in Item 1 or 2 above; or…." Again, I'll give you the wording for that. There's no need to have the second part of the sentence, it's just you do one or the other.

MR. SHIRAKH: Okay.

MR. KLEIN: And then, under "G," which comes later in this section for water heating system replacement, I have the same issues with nonrecirculating, no type of natural gas, nonrecirculating, and fixing 3 which is the same parallel language.

MS. BROOK: Oh, okay.

MR. KLEIN: It looks to me that these are identical language sets and they ought to be identical.

MS. BROOK: Okay.

MR. KLEIN: Okay. Thank you.

MS. BROOK: Thank you.

MR. SHIRAKH: Any other questions on alterations?

MR. NESBITT: George Nesbitt. On the section of alterations for cooling systems, in the 2008 Code,

there was no exception for climate zone; of course, as a HERS Rater, I was not taught that. So my question is, when you make the inevitable mistake in adopting the Standards as not something that we meant, how do we actually change that so we're not doing one thing, even though it says an opposite thing?

MR. MILLER: Jeff Miller. George, are you commenting on the 2008 Standards?

MR. NESBITT: Well, yeah, or these standards. I mean, somewhere we'll find we didn't dot an "I" or cross a "T" or we said something we didn't mean.

MR. MILLER: So you noticed that.

MR. NESBITT: Yeah, I noticed that in reading the Standards in detail that, at some point later on, but of course, as a HERS RATERI was taught, you know, refrigerant charge is a climate dependent item --

MR. MILLER: Right.

MR. NESBITT: So, you know, we've updated the NSHP Guidelines three times in the past two years, so the question is how do we update the Standards if we make a mistake, rather than doing one thing when we say another?

MR. MILLER: Is that a question for me?

MR. NESBITT: I don't know. My job is not to choose who to direct questions at.

MR. PENNINGTON: Bill Pennington, staff. So we

tried very hard not to make mistakes, that's the first thing. We used the Compliance Manual to clarify the intent of the Standards, and we try very hard to stay within what the Standards in writing say in making that clarification. Sometimes we have to live with mistakes.

MR. NESBITT: Right. I mean --

MR. PENNINGTON: And we change them in regulation the next time.

MR. NESBITT: 2018 is a long way away. I mean, obviously in the past year we've had a rulemaking on low density foam for QII, and the all thermal water heating, so it doesn't seem like, if there is a mistake, it's that big a deal to say, "Okay, we'll make this change, publish it, have a workshop."

MR. PENNIINGTON: Those are compliance options that we approve continuously. The authority that we have for compliance options.

MR. NESBITT: So basically you can't change the standards?

MR. PENNINGTON: Correct.

MS. BROOK: So that's why we're here now, George, we want to get them right and all, you know, agree to live with them if we can't get them perfect, but we do want -- we do have that obligation to -- if it's going into the Building Code and the Building Code is

only changed every 18 months, and we only update our Energy Standards every other 18 month period, so we're trying hard to get them right.

MR. NESBITT: Okay. On -- so this new Table 150.2(b), sort of how you determine your standard design, whether it's third party verified vs. not, I'm having a little hard time, I mean, currently when you do, say, existing plus addition, or alteration, you put in the existing conditions, you put in your alterations, and the way the language reads right now is, if your standard design is always based on -- well, Package D currently will be Package A and/or mandatory minimums in some cases, and if your alteration doesn't meet or exceed that, then -- I'm sorry -- you actually get compared to the vintage, so whatever the vintage table, whatever the requirements were, and those were mostly mandatory minimums, but if you did not improve something to the current package level, then the Package D requirement got put in as part of the standard design, which means in a way, in theory, you get penalized for not being able to come up to the current Code. It's just, I think, with the increase in wall insulation, especially, more so than perhaps the increase in ceiling and roof insulation, that comparing the current Code as your standard design is going to make alterations a lot harder to just even meet

minimum Code. Mike kind of had an example, he talked at a previous workshop where he had a cottage and he basically couldn't get there.

MS. BROOK: Uh huh.

MR. NESBITT: So the -- I mean, obviously we want to improve buildings, and I'd say generally existing plus addition, our alteration is relatively easy to comply. But I think we may be getting to the point where we're making it extremely hard or expensive, or you know, and it's just not going to happen.

MR. SHIRAKH: Mike Gabel wants to respond.

MR. GABEL: Yeah, quickly. I think, George, we work very long hours with Mazi and staff and with a lot of CABEK members, to resolve this, and I think this approach solves the problem. Basically what it says is you don't get any special compliance credit unless you have someone to verify existing conditions. But if you just meet the mandatory measures in insulation, if you meet those threshold measures, and you have a HERS verifier go out and verify the existing conditions first, you will get the full credit from the existing condition to what you're building. So basically it just means under the new Code, someone has to just check what was there before. That's the only difference under the new Code. But you still get the same kind of credit,

essentially, more or less.

MR. NESBITT: Right, well, I mean, my preference would be as a HERS Rater, that's what we're trained to do, although certainly in the column without the verification -- well actually in both columns, the windows is a .4 and a .35, U and solar heat gain coefficient, which is -- although that's larger than the current package, that is a much tighter value than, say, the default, the vintage tables. So, does essentially the vintage tables disappear, I mean, in that?

MR. SHIRAKH: I think, yeah, under this approach we don't need the vintage.

MR. GABEL: Mike Gabel again. We haven't worked out -- there might be some unusual cases where we have a default, the vintage table, but for the most part, yeah, it is to not rely on the vintage table, it's to rely on existing conditions if they can be inspected; if they can't be inspected, then we'll have to use some vintage tables.

MR. NESBITT: Well, I mean, the vintage tables, they're defaults, they're what you use when you can't fully -- you can't necessarily tell R-11 from R-13 in a wall, without ripping it open.

MR. SHIRAKH: It will still be there, we're not taking them away.

MR. NESBITT: I would say in a lot of respects that the refrigerant charge should remain in all climate zones. I think we're seeing a lot more people wanting to go all electric, thinking that that's the way to go to net zero, so when you do heating with electric, you automatically get cooling, and a lot of our non-cooling zones, like Zone 4, you've got San Jose, you don't build a single-family house in San Jose without air-conditioning, and a lot of people retrofit air-conditioning in that climate, it's not nearly as severe, but when they need it the most is, you know, when we have issues the most with the Grid.

MR. SHIRAKH: I think it was a question of cost-effectiveness.

MR. NESBITT: Yeah. And then just a comment on mini-splits. In theory, they don't work if the refrigerant charge isn't right, but my experience has been they actually don't shut down, they can lose all their refrigerant and they still try to operate, so although I guess there's no real good way to shut charge other than weighing it in, is the only real way with those.

MS. BROOK: Thank you, George.

MR. FERRARO: All right, John Ferraro, Asphalt Roofing Manufacturers Association. A point of

clarification. What was the justification for eliminating the ventilation alternatives?

MR. SHIRAKH: Removing the 1 to 150?

MR. FERRARO: Correct.

MR. BOZORGCHAMI: This is Payam again, California Energy Commission. One of the reasons that we removed it, it was only required in three requirements -- the climates 10, 12 and 13, and one of the issues that we have was that you can't measure air movement.

MR. FERRARO: Okay. Thank you.

MR. SHIRAKH: Any other questions? Okay, so we're going to move to the next section which is the Reach Standards.

MS. BROOK: Okay, this is the Residential Voluntary Reach Standards, this is going to go into Title 24, Part 11. What the Energy Commission is proposing here is for the first Tier of the Reach Standards to be where a building's Energy Budget is less than or equal to 85% of the Part 6 Energy Budget, so that's 15 percent better than the base code. And also a requirement that the calculated total building electricity consumption is less than or equal to 10,000 kWh hours, and with a caveat that this additional energy efficiency required to meet that electricity consumption cap can be met with either energy efficiency or on-site photovoltaic systems to get

to that cap.

The Tier 2 level for the Reach Standard is 30 percent better than the base standard, or 70% or less of the Part 6 Energy Budget, and then, with the calculated total building electricity consumption of less than or equal to 8,500 kWh hours and, again, that that limit can be met with either the energy efficiency or PVs.

New for the 15-day language is a proposal by staff that we add a Tier 3, Zero Net Energy Tier, and the way that this would be documented in the Compliance process is that the Zero Net Energy Homes will comply with all Tier 2 requirements plus have a Home Energy Rating System (HERS) Design score of zero or less. So as we go through this prerequisite, you'll see that we're already requiring Reach Standards to produce this HERS design rating, and so this just sets a target, which you know, we're going to get there in two Code cycles, so we think it's the right time to introduce it in the Reach Standard. The other thing that this does for us is it establishes in the Building Code our definition for Zero Net Energy, which we think is very important. And it's basically a time dependent valuation definition for Zero Net Energy, is how we calculate the cost-effectiveness of the Standard so it makes sense to us to also calculate Zero Net Energy on the same metric. So these energy

budgets in the HERS design ratings that we're requiring under this Reach Standard will be calculated with the Energy Commission's compliance software, either the public domain version, or third-party compliance software certified by the Commission.

The prerequisites for the Residential Reach Standard, again, I mentioned the "Design Rating." Basically what this is, it takes our current compliance process, Energy Budget, and it adds the unregulated loads with assumptions consistent with the Home Energy Rating Whole House Technical Manual, which is how the existing building HERS Whole House Rating is calculated. So we would be using a consistent methodology there to get to a whole building metric for these new buildings.

There is also a requirement as a prerequisite for a Quality Insulation Inspection (QII). There is also a requirement for the maximum volume of water in distribution pipe between the water heater and any fixture to be on a volumetric basis. Systems without recirculation would be less than or equal to 32 ounces in volume, and systems with recirculation would be less than or equal to 16 ounces in volume. And there's an exception for branches, not braches, serving bathtubs without showers.

This is actually borrowed from the IAPMO Green

Building Code, so hopefully we're consistent with other aggressive Reach Standards across the nation. And Gary Klein will probably come up and mention that there is some additional language we probably need to add here to really get this requirement to be something people can understand and implement.

Additional prerequisites are that indoor lighting shall be high efficacy, all permanently installed lighting high efficacy controls as required by Part 6 are required for the Reach Standard. Permanent lighting must be installed in kitchens, bathrooms, utility rooms, and garages. And every room has either permanent lighting or at least one switched receptacle.

And the outdoor lighting prerequisite is that all permanently installed lighting mounted to buildings is high efficacy, and the controls as required in the Part 6 are required.

For Additions and Alterations in the Reach Standard, we have the Tier 1 Energy Budget is less than or equal to 95% of the Part 6 Energy Budget for each mechanical system altered. So, for example, if you have an alteration where you're only doing a heating system replacement, then your Tier 1 Budget would be 5 % better than the base Code. If you have an addition or alteration where you're changing the heating, the space

cooling, and water heating system, then it would be exactly like the newly constructed Tier 1, it would be 15 % better than the base standard. And that's equivalent for Tier 2, except that you would have to get 10 % better for each mechanical system altered in the Tier 2 level.

If there is an addition or alteration that only changes the envelope, but doesn't change any mechanical system, then we're not recommending any additional efficiency requirements above Part 6. We think we've pushed the envelope for -- no pun intended -- for the base standard for the envelope measures, but we think they're aggressive enough and can't in all due diligence recommend something that we know will be cost-effective for every climate zone and every building configuration if you're only changing the envelope.

And then the Energy Budget that is used for the Reach is calculated with certified compliance software.

So there are three prerequisites for the Additions and Alterations part of Reach and that is only if they are applicable to the building project, so if there's a change to the envelope, then there would be a quality insulation inspection required, and if the -- so, Patrick, maybe you can help me out here -- so I guess if there's an addition and an alteration and it included lighting, then they would have to meet the same

prerequisites that we have for newly constructed for the indoor and outdoor lighting. Is that correct?

MR. SAXTON: Yeah, I think Addition would probably be the more likely case, but yeah.

MS. BROOK: Okay, good. So that's it for the Reach Standard. If there are any comments or questions or issues, this would be the time.

MR. RAYMER: Thank you. Bob Raymer with the California Building Industry Association. Before we get into Tier 3, will the Energy Commission be providing assistance to local jurisdictions when they have to do their -- the cost-effectiveness, you know, the Public Resources Code 25402.1(h)(ii), the thing that requires --

MS. BROOK: Right. So it's not the Energy Commission's budget or ability to resource that, but our understanding and, Pat Eilert can come up and say otherwise, but our understanding is that the investor owned utilities do have plans for their future energy efficiency portfolio to include support for Reach Standards, and that has historically been exactly what you said, help with the cost-effectiveness calculations.

MR. RAYMER: Okay, with regards to Tier 3, this is the first I've heard of it, and I'm unfamiliar with a HERS rating of zero for a standard production style home. Could you explain what that would mean in terms of the

size of the PV system, if it's easy enough quantified or -- can you describe what this would be?

MS. BROOK: So time dependent valuation, it's on that basis that the Zero Net Energy -- that the HERS Rating is on the time dependent valuation of energy. So basically it's -- you have to generate as much as you use on a time dependent valuation basis. So you don't -- to the extent that solar is coincident with peak load, and your use isn't, that gives you a little bit of an advantage that you can get more credit for your solar if it's coincident with peak.

MR. RAYMER: I guess specifically one of the concerns I initially have, and we'll get to 15- vs. 45-day language in a minute, the PUC has a task force that's been kind of bouncing back and forth on a definition of PV ERP, a Zero Net Energy, for some time. And there's a lot of different opinions on what that should be.

MS. BROOK: Uh huh.

MR. RAYMER: Obviously, you certainly have the authority to adopt a particular definition that seems like one of them, but this does not -- would I be correct in saying that this does not assume two fully electric vehicles in the garage, nor would it assume embodied energy?

MS. BROOK: No, no transportation, no embodied energy. It's actually an easier metric to meet than site energy, and so you know, if you look at all the different definitions that were discussed in that working group, I think we've covered them all -- site energy, and then the different permutations of transportation and embodied energy, and source energy, which is what TDV is, it's just a different version of source energy than it really is -- includes the time dependent valuation.

MR. RAYMER: Okay, lastly, sort of on a legal question, one that I can't answer, the difference between 15-day language, my experience in working with rulemakings in the past is that 15-day language, although some opinions vary, it's sort of fine tuning the existing regulatory package, making slight adjustments, tweaks, within the boundaries. This seems to be a fully new proposal that we didn't discuss over the last 12 to 18 months, I mean, we've been working on this for quite a while, not that -- I mean, certainly you are authorized to do what you can do, but wouldn't this constitute 45-day language -- a second 45-day language proposal?

MS. BROOK: I don't know. I mean, Pippin can respond to that, but --

MR. BREHLER: Good afternoon, this is Pippin Brehler with the Office of Chief Counsel here. Without

really debating it, but it would be our position that this would be substantially related to the 15-day language, and it's also the 45-day language, and it's also voluntary.

MS. BROOK: Right, right. So this is definitely -- this is a Voluntary Appendix of Part 11, it's not mandatory, and knowing that it's very aggressive, it's even more voluntary. I mean, you can't -- I can't imagine any local jurisdiction adopting this as a requirement. So this is really just a policy statement by the Commission that says this is where we're going, we want you to know we're going here, and it seems appropriate to put it into a voluntary standard.

MR. RAYMER: Oh, I understand completely. I have no opinion on that, but I do think jurisdictions, once the CEC puts this forward, I do think jurisdictions will be adopting. I don't think a lot of them, but I do think it will be an issue that starts popping up much sooner than later.

MS. BROOK: We don't even have any record that people are adopting Tier 2 as mandatory, do we? As far as --

MR. RAYMER: Oh, we've got -- there's lots of jurisdictions that have adopted the base -- Cal Green -- they've gone 15 percent over, but that's Tier 1.

MS. BROOK: That's Tier 1, right.

MR. RAYMER: Okay.

MR. GABEL: Mike Gabel. The only jurisdiction that's really adopted the equivalent of Tier 2 or higher is the County of Marin, and a few cities in Marin, and it's related to a new home size over 7,000 square feet would be a Tier 3. But that's just as a way of controlling very large homes, that's the only instance in the State that I'm aware of.

MS. BROOK: Okay, thank you.

MR. HURLEY: Yes, hello? This is Kurt Hurley again, Passive House California.

MS. BROOK: Did he get cut off? Through the firewall.

MR. MCHUGH: This is Jon McHugh. I'm supportive of this Cal Green proposal and, in fact, this proposal for the Tier 3 is actually quite similar to the comments that I submitted to HCD back in December of 2011 during their public process, so this language has been there. CEC in their wisdom has done something similar, so -- and I thought I'd just share with you a little bit. I had an earlier project sponsored by the Energy Foundation to look at some of the issues associated with definitions, and I call this societal energy, or the societal value of energy, TDV is essentially that since

it has both carbon in it and also addresses things beyond just source energy, but looks at the effect of peak demand. When I look -- and I think this goes directly to your question, Bob, about the issues. I looked at the components of energy consumption using the RAS [ph] database, so I used the new buildings which are those buildings that are built after 2000 in the RAS database, so they're essentially the buildings that are from the 1998 and 2001 vintage Title 24 Standard, and then I looked at the various reductions from that standard. And if I look at a 48 reduction just in the Title 24 covered loads, so that doesn't include the essentially 50 percent of electricity consumption that is due to appliances and those sorts of things. So just the Title 24 covered appliances are reduced, but all of the non-covered loads are still kept the same, so they're still high. And when I look at that, I looked at different definitions, the first one was site energy where you would treat electricity and natural gas as being that a kilowatt hour is equal to 3,413 Btus; I also looked at source energy where you use a 3:1 multiplier, so a kilowatt hour is essentially 10,000 Btus; and I also looked at societal energy. When I do that, the site energy PV system would be 7.7 KW, this is on average for these older building -- or, I'm sorry -- but still with the 48 percent reduction,

which I think we're actually getting pretty close to, even right now -- 7.7 KW, source energy 7.9 KW, and societal energy 3.9 KW. So it gives you an idea of that the reason that the societal value is lower is because there is some coincidence between the generation of electricity with PV and peak demand, and so that's why it's saving more societal energy than just if I treated it uniformly across the board.

I also have a suggestion, which is, when we go for these ambitious targets, that in terms of the prerequisites, you know, I would expect that people would use, you know, high efficacy lighting essentially everywhere, but at the same time, allowing some flexibility and allowing a tradeoff on a 1:1 basis between the installed wattage of the low efficacy lighting and PV, I think, would be easy to enforce, easy to understand, and provides all the right signals. So if someone wants to use a less efficacious source, they can tradeoff with PV.

And if you look at the essentially full load hours of generation from PV where, you know, kilowatt hours per KW peak, you're looking at something on the order of around 1,400 KW hours per KW peak. Most of the lighting applications, in fact, all the lighting applications in residences use less than 1,400 full load

hours, so the tradeoff would not be giving anything away. And I think we talked earlier with Bob about, you know, us having more opportunities to tradeoff with PV, you know, whether it's glass or other things, I think is desirable.

MS. BROOK: And so what you're suggesting is that we make that tradeoff allowable for every one of the tier levels?

MR. MCHUGH: Yes, in that prerequisite, yes.

MS. BROOK: Okay. Would you support that, Bob?

MR. RAYMER: Well, are you talking about an equivalent or -- When we discuss the ACM today, will we be discussing tradeoffs with high efficacy lighting and PV, perhaps?

MS. BROOK: I can bring that up, we're not going to be talking about all possible compliance options, but we can talk about that one. But I think this is different, this is --

MR. RAYMER: Well, if he's talking about a straight equivalency between a tradeoff with energy efficiency vs. PV --

MS. BROOK: He's just talking about the prerequisite for high efficacy lighting, I think.

MR. RAYMER: Well, we would support that.

MS. BROOK: All right.

MR. RAYMER: Which we've discussed earlier --

MS. BROOK: Well, we'll have to figure out how that relates to the compliance option that we can talk about next.

MR. RAYMER: We need compliance options on that --

MS. BROOK: And we're going to give them to you.

MR. RAYMER: So just assume that.

MS. BROOK: Okay.

MR. HURLEY: Hello, this is --

MS. BROOK: Yeah, we're ready for you. Sorry we had to cut you off earlier. Can you introduce yourself? Did you cut him off again? You're making me feel bad. Did you tell him he has to raise his hand? Okay, c'mon, Jamy, sorry.

MR. BACCHUS: Jamy Bacchus, NRDC. A couple comments. And actually, if you want to go back to like the first slide that you had in this presentation. Oh, not all the way back to the morning. One comment on this, it's a question really to Martha, is does by putting the electricity usage only in there, does that create a disincentive to do heat pump systems? Are we encouraging fuel switching to furnaces in this case? That's a good question.

MS. BROOK: So I don't know that I've thought about that. I mean, I think that -- and, Patrick, you can chime in here, but I think the original intent was to basically, you know, some of our stakeholders have commented that, you know, sort of taking after the Marin example of sometimes it's just, you know, you have to deal with the fact that these houses are so big, no matter how efficient they are, they're just consuming a ton of energy. And what we did here, and the way we got to this, and what the reason we're only dealing with it with electricity is, that this is the 10,000 KWH is where, based on our E3 study, where PV is cost-effective. So that's -- you know, houses that big, it's going to be in that top tier of an electricity rate, and therefore it's cost-effective for the consumer to not have a house built and constructed without PV, that is going to hit those high levels.

MR. BACCHUS: If I were the owner of that house and I suddenly got to that 10,000 KWH cap, would I suddenly then put in a gas water heater and a gas furnace to avoid going further over that?

MS. BROOK: You make a good point. The choice for the consumer would be, "Should I use a PV or a gas appliance?"

MR. BACCHUS: Yeah.

MS. BROOK: That's an interesting point. So are you suggesting that we say "additional energy efficiency, or on-site PV, or gas appliances?"

MR. BACCHUS: I just don't want the loophole to be in there, that's all. So that could be one way of trying to address it.

MS. BROOK: Okay.

MR. BACCHUS: But I wanted to chime in on the net zero definitions, and since it was brought up, that new homes today will consume an embodied energy about 15 to 20 years of operational energy. We're talking 1.5 billion Btus of energy of just embodied materials in a new construction for a home built to the current draft standards. So that's not an insignificant amount. You could do a quarter of that energy if all you did was put insulation and new windows on, although aluminum frame windows would actually bump that up even more. So -- and on the transportation side, if you look at the Jonathan Rose study that the EPA funded last year, homes -- again, an energy efficient home built in a typical suburban development will use more energy and transportation than it does in operational energy. So it's still not insignificant. And it may be outside the purview of the CEC, but where you build is extremely important on the energy impact for the State or the community.

MS. BROOK: Right.

MR. BACCHUS: So these things do play in.

MS. BROOK: I agree with you and I think we do need to figure out a way to address them. But I think it's a challenge doing it within a single policy like Zero Net Energy. I think the State needs to have a set of policies that are consistent, but to enforce every important policy goal to be embodied in Zero Net Energy is a challenge that, at least the Energy Commission at this point isn't willing to accept.

MR. BACCHUS: Thanks.

MR. HURLEY: Hello, this is Kurt Hurley of Passive House California.

MS. BROOK: Hello.

MR. HURLEY: Hello, this is Kurt Hurley of Passive House California.

MS. BROOK: George, is it okay if Kurt speaks? Yeah, okay, Kurt, you're on.

MR. HURLEY: Yes. Thank you. I wanted to share an alternative perspective on TDV as it relates to building efficiency and entity building approaches. In California's current electric grid, it lacks substantial storage capacity for energy and relies on ancillary services or demand response, or peaker plants, to satisfy peak loads. So the TDV approach doesn't acknowledge the

need for the grid to sort of build storage capacity to more successfully integrate higher percentages of renewables. So I'd like to advocate for Passive House Standards for the Reach Standards because it more successfully achieves deep structural energy reductions arising from building load.

MS. BROOK: So two comments, Kurt, 1) my evaluation of the time dependent valuation is that it does account for the peaker plants, it actually looks at all of the expected contributions to the electricity grid and factors that into the cost of electricity, and so it's looking at both the Renewable Portfolio Standard and our goals to get there, and the current way that we produce electricity on that grid, and how that's going to change over time, and factors that into the value of the electricity and natural gas that is included in the time dependent valuation. So we would like to help support the goals of the Passive House in regards to producing information out of our compliance software, that you need to prove that you've met the Passive House Standard, but it's not -- the Commission doesn't support a site energy basis for any of our energy efficiency programs, and my understanding is that's the unit of measure that the Passive House Standard uses.

MR. HURLEY: A combination of both for the cooling or heating, but also source for the total consumption of the building.

MS. BROOK: Okay.

MR. HURLEY: So it combines both, so it's very subtle and acknowledges and comes to its own solution of that paradox, if you will, within the NZE community. With California, it will serve with TDV metric for achieving NZE, but I mean, within NZE there's always a discussion of is it site, is it source.

MS. BROOK: Right.

MR. HURLEY: You know, I still -- for my own assessment of energy efficiency and green building approaches, feel that Passive House has a unique ability to achieve deep and structural reductions in energy loads from buildings through a rigorous approach to the fenestration, the building envelope, and features that will last several decades. Renewable energy systems, particularly in the area of concentrating PV, or PV, you know, there may be much more efficient renewable energy systems for those, say, roof mounted systems, and can achieve their ROI or breakeven point. So it's a technology that is still very fluid and moving, whereas a high efficiency window, or additional insulation, or achieving an air tightness standard, is something that

will have a benefit for the larger community of California and the homeowner for decades.

MS. BROOK: Okay. Thank you for those comments.

MR. HURLEY: Yes, yes. Thank you.

MS. BROOK: Sure. George.

MR. NESBITT: George Nesbitt. And I've been a HERS II Rater since 2001 and in anticipating of the rules, which were made in 2008 in this very room, through two public workshops, and then the Commission approving the HERS Phase II in December of 2008. And in that, we defined the Net Zero Energy home and, of course, the whole rating system for rating homes, and I'll remind you that the Commission has published a nice brochure on the HERS Rating System that clearly says it's for new homes, single-family and multi-family low-rise. And that's a legal real estate disclosure. So using the HERS II Rating system in the Reach Code, I think, makes a lot of sense when we've got the policy goal of Net Zero Energy Homes by 2020. And I currently have the Energy Commission and CalCERTS working to verify one of my Passive House projects, which I have rated at a minus 2.

MS. BROOK: I saw that certificate, impressive.

MR. NESBITT: Yeah, nice, it doesn't have the house with and without PV, though. But that's another story.

MS. BROOK: That's right, I heard that, yeah.

MR. NESBITT: So, unfortunately the way this section is written, it's sort of like Frankenstein, so even though you're seeing a Home Energy Rating System, a Design Rating, which is spelled out in the Title 20 Regs and in the Technical Manual, when you get to your Tiers of 15 and 30 percent, you are referring to the Energy Code, which is just heating, cooling, and water heating, whereas the HERS Rating System is everything.

MS. BROOK: Uh huh.

MR. NESBITT: So in a HERS rating, actually, you have the language wrong because you're actually saying the Energy Budget has to be less than 85 percent of the Energy Code Budget for the proposed design, which you really mean the standard design, but the language in the HERS is, it's the reference home. It's a reference home, and then what is proposed --

MS. BROOK: We're deliberately not using HERS language here, George, because the only thing we're taking from HERS in this approach is the scale, and the unregulated load assumptions.

MR. NESBITT: But you're not, no. The way you're -- you're taking the name HERS Rating --

MS. BROOK: And we're specifically calling it a design rating, we're not calling it a whole house rating.

MR. NESBITT: Right, but then what you're comparing the compliance margin to is the Energy Code.

MS. BROOK: Right.

MR. NESBITT: So it's not the Energy Code and it's not the HERS Rating, it's either got to be one or the other.

MS. BROOK: It's the Energy Code and the software will compute a HERS design rating, which is basically the Energy Code plus the HERS assumptions of the unregulated loads. Because we want a whole building metric so that we can start putting new buildings on the HERS scale; so, again, because we want to be able to value the energy performance of residential properties, we want to start using that metric.

MR. NESBITT: Right, but your tiers should then be referenced to -- it would be a HERS score of 85 percent or less.

MS. BROOK: So you're suggesting, since we have zero net energy as to Tier 3, you want to see a HERS equivalent in Tier 1 and Tier 2.

MR. NESBITT: Well, what I'm saying is you're calling it a HERS rating, but then you're really referring your tiers to the Energy Code; now you're coming up with Tier 3, which would be net zero, which would have to be.

MS. BROOK: Right.

MR. NESBITT: One of the dilemmas is, anyone in this room can go in order, EnergyPro today, and order a module, and calculate a HERS rating, yet a HERS rating or HERS index is only supposed to be calculated by approved HERS raters like myself. So -- and for a HERS design rating, it requires a rater like myself to actually press the button and calculate the rating.

MS. BROOK: That's not our intent here, our intent is not for it to be required to be done by a HERS Rater.

MR. NESBITT: Well, then you should not call it a HERS design rating upfront. I mean, that's sort of --

MS. BROOK: Well, we chose the words "design rating" because that's not used in the HERS regulation in any way. The only thing that we're borrowing, again, we're borrowing the name "HERS Energy Rating System" and we're borrowing the scale, and we're borrowing the unregulated load assumptions, but we're not calling it a whole house rating, which is I think what we're calling

it for existing buildings, we're calling it a design rating specifically to not have the other rating requirements that go along with the HERS Whole House Program. But we can clarify that and we'd be glad to clarify that in the language, but that's the intent.

MR. NESBITT: Well, you either have to remove the term "HERS Design Rating" and only have it as part of the Tier 3, or you need to change Tier 1 and 2 to be a percent better than the HERS score.

MS. BROOK: I understand your concern.

MR. NESBITT: Because, and then on the existing buildings, you want a five percent improvement, but if you're actually talking about a five percent improvement on each system of HERS score, that's a lot harder.

MS. BROOK: Yeah, we're not, we're talking about an Energy Code basis.

MR. NESBITT: Right, so it's mixing language that shouldn't be mixed.

MS. BROOK: All right.

MR. NESBITT: And just for example, like my Passive House project, it actually only scores 68 without the PV, and it takes a 5.5 Kilowatt PV system to get to Net Zero. And what I'm finding is it is pretty hard to get low 60 just because of all the added plug loads. See, the thing is, if you actually use the HERS Rating

System, so like you have prerequisites for QII and lighting, all of that is built in and you're either going to get penalized because you choose a lot of low efficacy lighting, or you get credit because you use high efficacy. So, you know, you either need to decide whether you want to use the Rating System, or whether you want this to be Energy Code. It can't be both at the same time.

MS. BROOK: I understand that in my world it can, but we can talk about it.

MR. GABEL: Mike Gabel. I think you should explore the term "HERS Design Score."

MS. BROOK: Okay, thanks.

MR. SHIRAKH: Thanks, Mike. If it's just a matter of name, we'll come up with something. John?

MS. BROOK: Yeah, Mazi is good at coming up with names.

MR. ARENT: John Arent, AEC. I just wanted to clarify for several of the Tier 1 and Tier 2, that when it says "total building electricity consumption," that would be those loads that are regulated by Title 24.

MS. BROOK: No, that's -- again, that's --

MR. ARENT: Or is that included --

MS. BROOK: -- it's including the same assumptions about unregulated loads. Is that correct?

MR. ARENT: Okay, so the upper limit is the whole building electricity and not just the --

MS. BROOK: Right. Again, because that's the level where those high rates kick in and that’s for the whole building.

MR. EISLER: Hi. Martha, earlier you were asking --

MS. BROOK: You need to introduce yourself, Pat.

MR. EILERT: Pat Eilert, PG&E. So you were asking us to clarify our intents regarding Reach Codes, and we do plan to do that, that work was fairly well received, we think, by most local governments, so we're fully intent on carrying that forward.

MS. BROOK: Great.

MR. EILERT: And also, Bill mentioned training earlier and I think that my colleague, Jill Marver, might already have the Needs Assessments wheels turning, so, yeah, we plan to support that, too.

MS. BROOK: Great, thank you. Any other comments online? Gary.

MR. KLEIN: Oh, goody. More hot water. Gary Klein, Affiliated International --

MS. BROOK: One cup worth, Gary.

MR. KLEIN: I was pretty good last time, I wasn't the one who kept us from lunch much, so I did try. So let's see, the first thing I want to talk to very briefly is in the -- where did it go? I just lost it. That never happens to anybody here. On the Additions and Alterations to low-rise residential buildings in the Reach Standard --

MS. BROOK: Uh huh.

MR. KLEIN: It seems to me that we've got something for the shell, and we've got something -- two things for lighting, but we don't have anything for hot water. And it seems to me that, as we build better and better buildings, the Reach Codes and Alterations and Additions ought to cover hot water too. I'm not sure we can do it this cycle, but if I can think of something to propose, I will. I'm just observing that there's nothing specifically there in the prerequisites. So it would --

MS. BROOK: Right, right.

MR. KLEIN: -- be if you do hot water, you should do something to improve its efficiency. It's the same as messing with the permanent lighting. If I'm messing with my water heater, I should be improving it in the same fashion, I would think, to a high efficiency water heater or something. I'm just picking an example

of something for that category -- I'm not sure we can do it now.

MS. BROOK: Right. I agree about the not sure we can do it now, and the reason is that we already have -- so if the Additions and Alterations is going to touch water heating, then it's going to have a jump in the expected overall Energy Budget, so it's going to have to deal with water heating there. I'm not sure we can come up with anything in short order that is beyond what we had expected them to do to meet that budget, that would have to be done every time they touched a water heater. But --

MR. KLEIN: I'm not sure either. I would also note that there is a minor numbering problem, it goes under prerequisites, (3), it says A, C, and D, you can't see that on the screen, but it is on the document that you sent out.

MS. BROOK: Oh, so it's early in the language, okay.

MR. KLEIN: There is a numbering -- a lettering problem in this case.

MS. BROOK: Thank you.

MR. KLEIN: So I've made that point, now I want to go to the hot water volume, which has been discussed. I'll reiterate what I said yesterday, I think we need to

say the same thing in nonres as we do in res, because it's just as important to get the plumbing right and if we're going after green, we should say it in both cases.

But I would like to cover a few things that I think ought to be more included in the language here, and I'll go through those as quickly as I can. I am a member of the Green Technical Committee of IAPMO, of the International Association of Plumbing and Mechanical Officials. I actually got to sit on that committee because the Energy Commission gave me permission to propose Standards six or seven years ago and I lost every single proposal in front of IAPMO that year, it was rather humbling. But in exchange, they asked me to participate on a committee, well, gee, that's a good result, I guess; I couldn't say now because I'd been so active in proposing all these changes, and they were giving me a chance to work with the folks in their process to help craft them upfront.

So, I sit on that committee, I've been there since its inception, which goes back to about 2008, and we have come up with a chapter related to Water Heating Design Equipment and Installation in the IAPMO's Green Plumbing and Mechanical Code Supplement. We are an IAPMO Plumbing Code State, therefore it makes sense to me to adopt for our Green Building Standards things that IAPMO

has for hot water, that would make a lot of sense to me. I'm not proposing everything, but let's cover the hot water pieces.

What we've got in the draft here is a short piece out of that, and I'll cover the sections and then I'll cover what I propose we ought to do. There is an Insulation section which is so different from what we have, I don't want to raise it here at this point; we'll live with what we have this cycle. I think the one we have in the Green Mechanical Supplement is simpler, but we're just going to live with what we've got.

There is a Recirculation Systems section having to do with pump operation and pump controls that I think is important to get right. If you're putting in recirculation pumps, you need to make sure that the controls are energy efficiency, inherently, and we ought to be doing that in the Green piece. There is a section on System Balancing, that for big systems might make some sense, mostly it's not necessary in small systems. Then there is a case of Special Considerations for Low-Rise Residential, and then everything except Low-Rise Residential.

Under the Low-Rise Residential, they discuss, in particular, the volume to -- the maximum value of hot water from the source to the use, and the title for that

section, the specifics are there's a maximum volume of hot water without recirculation or heat trace; they cover both methods of making trunk lines hot. And then, there's a maximum volume of hot water with recirculation or heat trace. So the category without is the 32 ounces that we talked about earlier, and the category with recirculation or heat trace is 16 ounces, but it's a more broadly formed category, and I think it covers it. They have a similar exception that we've got here for whirlpools or bathtubs without showers, and I think that that's the key that they are without the showers. And then, other than service hot water other than low rise residential covers pretty much the same things, it has -- it's all parallel construction. So it's accepted only if the building is a little bit different, then you would cover it differently. All the insulation rules are the same, and all the volume rules are the same.

So my proposal is that the Energy Commission adopt every -- well, pretty much everything that is in here related to hot water system efficiency that the Green Code has adopted. That would be my recommendation. It's published external to us, it's reference able if we chose to, but it is what the IAPMO Plumbing Code is likely to begin adopting in today's Code over the next several years, it would be appropriate for us to adopt it

into the Green. With that, I'm done with my comments on this point. I'll give specifics, I'll send the document over rather than going line by line, that doesn't make sense here.

MS. BROOK: Okay, thank you.

MR. SHIRAKH: Thank you, Gary. Any other comments on Reach, folks? Online? Okay, to the next.

MS. BROOK: I don't know what happened to our -- a picture is worth a thousand words. I wish you could get that back for me, I don't know why it keeps jumping to the end. You get it all the way until I walk over to the podium.

MR. SHIRAKH: So send your comments to this guy. I had a bad hair day that day.

So yesterday we talked about the Reference Appendices for Nonresidential and today we're going to talk about the Joint Appendices and the Residential Appendices. And I'm going to skip the history since we talked about this yesterday. So the Reference Appendices have three chapters, or three sections, I should say. The JAs, or the General Appendices, they apply to both Residential and Nonresidential Buildings. The Residential Appendices are those sections that only relate to residential standards. And Nonres is for nonres, obviously. The Joint Appendices ensure -- had

only four chapters, but now it's been expanded to nine. JA1 is the Glossary where we talk about -- present all the definitions in the Standards that relates to both the Standards document and all the related documents.

JA2 is the Weather and Climate Data.

JA3 is the TDV Factors that we use for our cost-effectiveness.

JA4 is the U-factor, C-factor, and Thermal Mass Data.

JA5 is a new chapter that describes the technical specifications for the communicating thermostats.

JA6 is the HVAC fault detection diagnostic technology used to -- this used to be called the Charge Indicator Display, but now we've used the more generic term that describes more than CIDs. This includes all devices that are capable of fault detection now.

JA7 is a new section, it's the Registry Requirements. It used to be used for another purpose for the SPF foams, but now it's being used for the various Registry Requirements.

JA8 is the Testing of Light Emitting Diode Light Sources.

And JA9 is Air Qualification Requirements for Low Leakage Air Handling Units.

So those apply to everything in the Standards, Res and Nonres.

These five chapters are only for Residential Standards, only. RA1 is the new Special Case HERS Procedure. This used to be called the HVAC Sizing and the information for that, HVAC Sizing has been moved to the Residential ACM Manual, so we had an open spot here and now we're using it for the HERS procedures.

RA2 is the Residential HERS Verification, Testing, and Documentation Procedures.

RA3 is the Residential Field Verification and Diagnostic Test Protocols.

RA4 is the Eligibility Criteria for Energy Efficiency Measures.

And RA5 has been deleted; it used to be the Mass Capacity, and so it is no longer there.

So in JA1, the Glossaries, you know, we've made a number of changes that kind of track what we've done in the Standards and other documents related to definitions. We've deleted some obsolete terms, modified existing terms, added new key terms throughout the Reference Appendices to include -- well, this is not the entire list, it's a partial list -- Air Barriers and Air Leakage, Building Commissioning, and Continuous Insulation, Data Registry, Fenestration, Global Warming

Potential/Value Hoods, Lighting definitions have been expanded, Micro-channel/min-split heat pumps, Nonres building occupancy types, Particle size efficiencies, Pressure boundaries, Replacement air, Roof recover board, and Vapor retarder class.

JA2 is the Weather Data, it's been updated, climate zone designs conditions, you know, we went through a major revision of these climate zones, and where the reference sites are, and using the latest data that was available for the weather stations that we were reporting, and that actually had some significant impact on the cost-effectiveness measures that we were evaluating. It included city Zip Code descriptions and removed descriptions of WYEC2 climate/weather data format. And I'm not sure what that is. Martha, do you know what that is?

MS. BROOK: That's just an obsolete data weather format that is no longer used, so we don't need to carry it forward.

MR. SHIRAKH: JA3 is Time Dependent Valuation, you know, that has been updated with the 2013 TDV Values.

JA4, U-Factor, C-Factor, and thermal mass, added new section for R-values and U-factors of Spray Polyurethane Foam (SPF) Insulation for both Closed & Open cell SPF.

Updated U-factor tables to capture proper insulation types, added new insulation alternatives for residential metal framed walls, and there's a note here that says Reference U-factors for assemblies can be updated at any time with valid support information, that's an important note. This is a document that this section can be continuously updated in between cycles; as there are more assemblies that people have come forward with, or different technologies developed, they can actually continuously update this in between cycles, which is a nice feature to have.

JA5 is the Technical Specification for Upgradeable Setback Thermostats that includes an Introduction, Required Functional Resources, Functional Descriptions, the HVAC System Interface, and Terminology. And this has been posted in the 45-day language, but as mentioned this morning, this section will go through some major revisions when we release the 15-day language -- because of some of the comments we received from the public.

JA6 is the HVAC Fault Detection and Diagnostic Technology. Again, it used to be called the CID, the Charge Indicator Display.

JA6.1.2.4, the Optional Functionality section, was revised to include more options like Self Diagnostic

Reporting and Data Access Report.

JA6.1-1 - Target Temperature Split was added.

And in JA6.2, Saturation Pressure Measurement Temperatures have been added.

JA7 is the Registry Requirements. This is a new section. The new appendix was created to specify requirements for standard functionality and technology for data registries that provide compliance document registration services. I'm going to ask Jeff Miller to give a brief overview because he's done a lot of work on this section.

MR. MILLER: Jeff Miller. So this is a brand new Appendix and its purpose is to provide direction for how data registries are to be designed and operated. I'll just read these bullets: So the Appendix gives information about roles and responsibilities for the different players in the document registration process, and it gives description for the document registration process, itself, the procedures, in terms of how a data registry is required to accommodate those things. It gives direction for how document revisions are supposed to be tracked and accounted for. And there's a lot of information to give specification for electronic and digital signature requirements. So this will affect those persons who are creating documents and providing an

electronic signature to certify as responsible persons, the information that they are providing to the registry. And the Digital Signature requirements provide security for the registered documents after they're completed, and it provides for an automated document validation functionality, after the documents are completed, exist as electronic files, it would be possible to submit those electronic files to enforcement agencies and others and the validity of those documents to be known very easily, rather than having to compare line-by-line, bit of information by bit of information, to the original copy that is on file in the registry. This would just give a very quick indication of whether you had a valid document or not. That is the intention of the digital signature requirement.

In order to make this electronic documentation system function in a way that works well for the innovations that we anticipate, there are requirements for Data Exchange to be standardized, and the details will be developed along with the ACM developments. But essentially, each compliance document will have a data definition which includes formatting and all the information, basically, that's needed to process data after it is received, and then create a print-out of the document; that is what's on the drawing board and it's

our intention to implement that.

And then there are processes for approval of Data Registries. Currently, we have HERS Providers that are performing Data Registry Services, and the 2013 Standards will require registration of nonresidential documents. And the registration of those documents will not be associated with the requirement that would also perform HERS verifications, so data registries can be approved to do only that documentation process, but only for nonresidential documents. All residential documents are required to be registered by a data registry that is also a HERS Provider, and so there are processes written into this Appendix that say what a data registry needs to do in order to be approved to perform those services. Additionally, we anticipate that there will be software tools designed to link up, if you will, to provide data to a data registry, which will simplify the process of creating documents. You've heard of forms generators, that's the usual term I hear it referred to as, essentially a very well developed user interface that would help people to make decisions about which documents they needed to complete, and then how to go about completing them, much in the same way that the Turbo Tax software helps people with their income tax forms. So there are those plus data collection utilities that we

expect -- we expect innovation. And so this other aspect of approval addresses those software tools. So yeah, that covers it for JA6.

MR. SHIRAKH: Okay. Thank you, Jeff.

So, again, this is JA7, the old data has been removed and relocated to RA3.5.

JA8 - Qualification Requirements for Residential Luminaires using Led light sources. I think Gary Flamm has worked on this section a lot and he cites IES LM-79-2008 -- okay, go ahead.

MR. FLAMM: This is Gary Flamm. The JA8 was developed in the 2008 Rulemaking Proceeding. At that time, there were no nationally recognized standard testing protocols for LED Luminaires, and so the IES Committee was in the process of developing LED Standards, but they did not exist and there were no officially adopted standards. So we adopted something about the same time that IES did, and so our JA8 is actually very similar to LM-79. So instead of just getting rid of JA8, we actually are citing LM-79 now, but we're keeping some of the critical elements of JA8 such as testing lab requirements. We've added requirements for Color Correlated Temperature (CCT). We've moved information from other parts of the Standards into JA8. Is there another page here? No, that's it. So basically we've

kept JA8, but we're now citing LM-79, and that's why the changes to JA8.

MR. SHIRAKH: Okay, thank you, Gary. So this JA9 is the Qualification Requirements for Low Leakage Air-Handling Units. It is applicable to air-handling units rated to move less than 3,000 cfm. Equipment types include furnaces, heat pumps, air conditioners. The method of testing is ASHRAE Standard 193.

The testing laboratory is in compliance with ISO Standard 17025. Nominal air-handling unit airflow 400 cfm per nominal ton of cooling capacity, or 21.7 cfm per kBtu/hr (for heating-only).

Leakage criterion equal to or less than 1.4% of the nominal air-handling unit airflow.

Moving down to Residential Appendices, RA1 is a Special Case Residential Field Verification & Diagnostic Testing. Changes here include the moving of HVAC sizing procedure to res ACM reference manual.

RA1.1, Special Case Protocol Approval requirements.

RA1.2 included new special case refrigerant charge method for Liquid Line Temperature Charging Method, specifically for Micro-Channel Air Condensers.

And RA1.3 included Winter Setup for the Standard Charge Measurement Procedures. Basically in

this section, what we have is a bunch of requirements that are not -- these are not requirements. They only would be allowed if a manufacturer actually allows their use of them. Specifically, that last one, 1.3. which was the Winter Setup, we have developed a procedure for testing the refrigerant charge temperatures below 55, but what we're waiting is for some manufacturers actually to bless that procedure. So this is where we parked all these requirements. It requires further approval from outside vendors.

Ra2 is the Hers Verification, Testing, Documentation and Procedures. Changes to RA2 Residential HERS Verification, Testing, and Documentation Procedures, and some of the changes are also applicable to NA1 which kind of duplicates what is going on here.

The changes include updated to eliminate obsolete language; updated the description of the registration procedures, added references to JA7 Registry Requirements and RA1 Special Case Protocols, reorganized and revised the chapter for clarity, added the documentation author role in the document registration procedures description for installing contractor and HERS raters.

RA2.3.1.1 added language to clarify whole building compliance approach. RA2.4.4 clarified

procedure for HERS verification compliance when the outdoor temperature is colder than 55F. And RA2.8 deleted language making HVAC system equivalent to dwelling unit for alterations; added the procedures for submittal of certificate of compliance for simple projects as described in Standards Section 10-103(a)2A. I think we described these changes this morning.

RA3.1 is the Residential Field Verification and Diagnostic Test Protocols. Procedures for the Field Verification and Diagnostic Testing of Air Distribution Systems (some of the changes also apply to NA2, which kind of tracks the changes in this section.

The first bullet, RA3.1.4.1.1 - Revised and expanded Verified Duct Design language for clarity; RA3.1.4.1.2, Verification of 12 Linear Feet or Less of Duct Located Outside Of Conditioned Space was clarified; and RA3.1.4.1.3, Verification of Ducts Located In Conditioned Space has been clarified.

RA3.1.4.1.4, Verification of Supply Duct Surface Area Reduction has been clarified; RA3.1.4.1.5, Verification of Buried Ducts in the Ceiling R-Value has been clarified. And RA3.1.4.1.6, Verification of Deeply Buried Ducts R-Value has been clarified.

Continuing with the changes, this section, RA3.13, Duct Leakage Verification and Diagnostic Testing Protocols, and Compliance Criteria has been updated. Sealed and tested duct systems in multi-family homes, regardless of duct location at 6 percent, duct leakage has been added.

Sealed and tested duct systems in multi-family homes, regardless of duct system location at 12 % leakage to the outside has been added.

And 60% reduction in leakage protocol has been deleted.

And also deleted has been labeling requirements from RA3.1.4.3.5 sealing of all accessible leaks protocol.

Continuing, RA3.1.4.3.8, Verification of Low Leakage Ducts in Conditioned Space, has been clarified.

MR. MILLER: A correction -- on the leakage rate for the multi-family, I believe it's 12 percent leakage regardless of location for the regular protocol and it's -- no, 6 percent for the regular protocol and 12 percent for leakage -- it's the opposite way, I guess. Six and 12 leakage to outside is 6 percent, and the regular protocol is 12 percent.

MR. SHIRAKH: Okay, thank you. So RA3.1.4.3.9 used to be RA3.1.4.3.10, verification on Low Leakage Air

Handler with Sealed and Tested Duct System, updated to reference Appendix JA9, qualification requirements which reference the ASHRAE Standard 193 test has been added.

Verification of Mandatory Return Duct requirement by Section 150.0(m)13 has been added, it's a new section.

Verification of Mandatory Air Filter Device Design required by Section 150.0(m)12, has been added.

And Verification of Bypass Prohibition, that's a new requirement.

RA3.2.2.2, Temperature sensor accuracy changed to ±1.8°F; and temperature sensor response specifications has been added.

Digital gages specified (analog gages no longer allowed).

STMS alternative has been deleted, as mentioned this morning.

And SPMS alternative has been added. What does SPMS stand for?

MR. MILLER: Saturation Pressure Measurement.

MR. SHIRAKH: These are saturation pressure measurement sensors, rather than having the STMS, these are actually digital devices that can be added and can be used to measure the temperatures without actually the risk of releasing refrigerant into the atmosphere.

And the last bullet revised to improve clarity; compliance tolerance for passing HERS verification widened to allow for inevitable differences in the measurements.

Minimum System Airflow for valid Refrigerant Charge Verification -- Temperature split method is deleted for newly constructed buildings, minimum airflow verification relies on compliance with 150(m)13 duct design, or Fan Watt Draw, which is new; for altered system verification, it relies on compliance with 300 cfm/ton of nominal cooling capacity using RA3.3 airflow measurement methods.

Under the second bullet, it says Weigh-in Procedure, allowed at any temperature for situations which the Standard Charge Measurements cannot be used, for instance, at low temperatures.

And again, Temperature Split Table has been deleted.

RA3.3.1 - Instrumentation Specifications has been updated. Flow Capture devices -- I let Jeff Miller to describe this one.

MR. MILLER: Jeff Miller. We received a lot of comments about the flow hood topic. We had proposed to eliminate the allowance for use of a passive or standard commercially available flow hood for making measurements

at the return grilles because of information and research reports made available to us. And we had many industry concerns raised, and we felt that we needed to -- we anticipate recommending reinstating allowing those flow hoods to be used, however, we plan to require that the flow hood manufacturers provide documentation that gives detailed instruction for how to use those flow hoods to make those measurements at return grilles in residential situations for systems that have both single return and multiple return systems, and to certify with the Energy Commission that their products would meet the accuracy required by RA3.3 with plus or minus 7 percent of reading, or plus or minus 5 cfm.

MR. SHIRAKH: Okay, thank you. Moving on to RA3 --

MR. PENNINGTON: Mazi, just on that point, staff has put a memo explaining what the 15-day language proposal would look like on the website, so anyone that is interested in reacting to that, we would appreciate comments right away.

MR. SHIRAKH: Thank you. Well, Jeff, since you're up here, you might want to talk about this slide, too.

MR. MILLER: Okay, CID. Charge Indictor Display is an alternative to perform refrigerant change

and the proposed added capabilities for a charge indicator display, which gives rise to the need for a few different scenarios for verification of CID. So this "self diagnostic reporting" concept, essentially if the charge indicator display device is installed on a residential system, this self diagnostic reporting functionality would provide the capability for you to go to this system, and without turning the system on, the charge indicator display could report to you that all the sensors were installed and functioning correctly, and it would also do a self diagnostic and report back about whether it would be likely to report an accurate result to you -- when the weather does finally get warm enough to do an accurate verification. So the idea is you can't check refrigerant charge when the temperature is cold outside and the thing that people are reaching out for here is how could we make it easier to comply with the requirement for refrigerant charge during the winter when the weather is so cold. It's difficult to close permits when you can't -- so that's the self diagnostic reporting function.

And then there are two other scenarios with how a HERS Rater would just be able to validate whether a charge indicator display had been installed, and then how to follow through with making sure it's functioning when

the weather gets warm.

MR. SHIRAKH: Okay, thank you. So this is a Quality Insulation Installation Procedure which has become a prescriptive requirement, and this section describes the procedures, updated and separated the QII procedures for individual insulation types. A new terminology section applies to all the insulation systems. A single QII procedure covering both closed cell and open cell SPF, and there's a note that says this section still is a work in progress and staff is working to include ICFs and SIPs.

MR. MILLER: HERS verification of mechanical ventilation is required for 2013, it is not required for 2008 Standards, so these will be new protocols. A HERS Rater needs to go out to the site and confirm that the amount of airflow that is required by Standard 62.2 is actually being moved by the exhaust fan or supply fan, whichever kind of ventilation system has been installed. Exhaust systems are the straightforward verification, there are existing tools that are not very expensive that do a good job of measuring the flow, for instance, from a bathroom through the grille and out through the exhaust fan.

There are two other verifications here, one for supply systems and one for intermittent systems. Both of

these are less straightforward in terms of how you would direct a HERS Rater to measure these airflows, and since we're unable to really define that upfront, especially for intermittent systems which are -- you could think of them mostly as controllers that would log time for the amount of time assistance it's been on and comparing that to the total expected run time. And these intermittent control systems are sometimes very difficult to -- it's difficult for us to understand how we could tell a HERS Rater to verify whether they're operating properly. So essentially for both the supply systems and the intermittent system, we are going to require the manufacturers to provide evidence to the Energy Commission that use of these systems in accordance with their documentation will result in the airflow requirement being satisfied, the air flow that 62.2 requires. And also, we would expect them to provide us with a method that a HERS Rater could use to make that verification for both the supply systems and intermittent systems, requiring the manufacturers submit this information and certify their systems to us.

MR. SHIRAKH: Thank you. You might have to continue.

MS. BROOK: Mazi is tired of talking.

MR. WARE: David Ware, Commission staff. This is a

new section. In last year's Case Activity and staff workshops that initially presented some of the package measures, low air leakage was proposed as a package measure, and further negotiations with the billing industry resulted in us readjusting the proposed measures for the packages, but still recognizing that the value of low air leakage wanted to be accounted for. And so what we have done is created a new Section RA3.8 that specifically has the site process for conducting low air leakage tests. This test procedure is based on the Residential Mortgage Industry National Home Energy Rating Standards, Standard 800 Procedure. And so this is a new section and the entire procedure is laid out in Section 3.8.

MR. SHIRAKH: Thank you, David. So RA5 is Interior Mass Capacity section was removed, Interior Mass Capacity no longer is being used to calculate the benefits from thermal mass. So that has been eliminated. So that basically concludes all the updates to the Joint Appendices and the Residential portions of Reference Appendices. Any questions or comments?

MR. ARENT: John Arent, AEC. I just wanted clarification for Joint Appendix 4. We mentioned that it was going to be under continuous maintenance, which can be a good thing, but I just wanted to clarify whether the

intent of that was to accommodate new assemblies and not necessarily to change the published values for U-Factors. I mean, just thinking, at least from a -- since the compliance software uses those tables, that could be problematic if we were modifying those values.

MR. SHIRAKH: Basically it's generally for creating new assemblies, not changing the numbers that are already in there --

MR. ARENT: Okay.

MR. SHIRAKH: -- in the Appendix.

MR. KLEIN: Gary Klein, Affiliated International Management. I have one comment on the Joint Appendices. I appear to be in Definitions. And there is an occupant sensing controls, referring to lighting controls. There -- I was reading through things quickly the other day and noticed that there were different definitions for occupant control and occupant sensing controls in different parts of the text. I think there's a correlation you need to pay attention to whenever you're referring to them, particularly for lighting. But I would observe that, given that there are new definitions, it's real easy to have mixed text elsewhere in the document, and so I just think that needs to be checked before publishing.

And then I would note that there are motion

sensor controls for lighting, but there's also motion sensor and occupancy sensor controls for hot water, for demand controlled recirc. I think we ought to make sure definitions are not completely weird there. So we're creating definitions for different purposes, but they're both ability to sense presence of an occupant. So I think we might want to think about the language to make sure that they are different enough so we're not confused or identical, so it's clear. I'm not sure what the right answer is yet, but we need to look at the language for that.

I have a bunch of questions on Time Dependent Value, but I'm not going to ask those now. Mostly, having not read them before this point, I don't understand a single thing that's in the text. I should. It ought not to be obtuse to me and I just don't understand what some of the numbers are, or why the proportions are as different as they are between Climate Zones and Building types; I can't figure it out, it's not obvious. Someone will explain it to me another day. But not now. And if it's not obvious to me, and I should understand it, I worry about those who are trying to work with it.

I'm on now Residential Appendix 3, page 73 of the printout, section RA3.5.2.1.3, Special Situations

Obstructions. There's a section that is repeated a few times in cold climates where water pipes may freeze, Climate Zones 14 and 16, pipes shall have at least two-thirds of the insulation between the water pipe and the outside surface of the exterior wall if the pipe is near the exterior or finished assembly layers, as much insulation as possible should be placed within the pipe, on the outside without excessive compression, and no insulation will be placed between the pipe and the interior assembly material. That appears to apply to all hot and cold and contradicts what we've said relating to pipe insulation. Quite frankly, we ought not to have pipes in outside walls without two-thirds of the insulation to the outside -- ever, certainly in climates that freeze. I was in Dallas last week, they have freezing winters, they require all pipes to be insulated with pipe insulation in the attics, even if they're going to be buried in insulation. There's people who live in freezing climates that have thought about this problem, I think we ought to adopt some of what they've got, but right now the language in this section contradicts the rules we have written elsewhere for hot water pipe insulation. We ought to be careful about that. That happens on page 43, it happens -- that didn't change, that didn't change - it happens again in another special

situation obstructions, it happens again on page 79, and it happens again on page 92, all in special situations obstructions.

Moving on to the next bit, ooh, Water Heating Measures, what a surprise. The first one is RA4.4.1, Proper Installation of Pipe Insulation, this tells us how to install it, but it's not identical to either the language we just read where it talks about cold climate situations, nor is it identical to language that is in the section in the Standards on insulation. We -- my recommendation is, if the Appendix is considered part of the standard, I think it is, then refer people to the proper installation methods and take it out of the Standard, write it once, write it the way you want it, and don't repeat it. That would be my recommendation.

And this is where we're describing how to as opposed to thou shalt insulate -- this is how to insulate and I would recommend that we describe it all adequately here. The distinctions that have been made between batt insulation and with blown attic insulation, it's unwriting what we intended to say under the insulation standards when I originally drafted this stuff years ago. I thought this through at some length for the Green Codes and you want to insulate pipes in walls, and you want to insulate pipes in attics, regardless of the material, you

need a certain amount to the outside, we should specify it regardless of insulation material. To that, we should be agnostic.

I'm on to Mandatory Pipe Insulation. Someone pointed out to me during the break that we're no longer requiring insulation all the way to the kitchen sink, but we are insulating all of the three quarter inch pipe. Okay, something has changed; we talked about that earlier and I'm not proposing we revisit it again much now, but we ought to. I'm not sure if that was the intent. If that was the intent, great; but if the intent was to insulate all the way to the kitchen sink, which I think makes sense given the intermittency, regardless of pipe diameter, then I would say we have to fix it back in the Standard and require it here, explain how to do it here, this explains how.

Standard kitchen -- the standard design assumes that all hot water is insulated regardless of diameter, at least in this category for the numbers. You get pipe insulation credit if you insulate all pipes, including below grade. I would say that this ought to be one of the requirements for hot water in the Green Code. At a minimum, you should insulate them all. And I realize that's sort of out of context now, but this is the Appendix and it's describing something very simply and

very clearly that we ought to put into a requirement for the hot water in Green.

It's sort of like asking me which feet of the 150 to 300 feet of hot water pipe in my house am I not supposed to insulate. Which -- how many square feet of the insulation in the walls of my house am I not required to insulate either? It's sort of asking the same parallel question. And we would say all of them should be insulated properly.

Uninsulated pipes, parallel piping. The parallel piping piece -- oh, as currently worded we're allowed unlimited volume in the TWIGS. We've limited the volume from the water heater, so I have talked about trunk [ph] branches in TWIGs, a twig serves one fixture, hot or cold water, that is not in the Plumbing Code. Branches and fixture branches are, fixture supplies are. A trunk line is from the water heater to the manifold in a home-run manifold system, or parallel piping system, each hot water and cold water fixture gets its own individual twig. And as currently worded, it says that the length of the pipe shall not exceed 15 feet, whether it be any diameter at all, it doesn't say one-inch drainage, it just says shall be no more than 15-feet. I think that's generally buildable, although I'm sure we could find cases where it would be hard, but in most

cases that I've seen in the state, it should be possible. And then, right now it says you can have, I don't know, as many feet as you'd like of your TWIGs, well, that's sort of defeating the point of what we're trying to get at with better performance in the hot water distribution system. The fact that it's skinny, if it's 100-feet long didn't help you much, and I've seen that too often in construction, it has to do with running the pipes as directly as it can be, and it says to do that. I think we need to be a little more careful on this and I would recommend that we limit the length, but I understand that's difficult.

I would also note that we require that the pipes be insulated under proper pipe insulation procedures, and we say that hot water piping must be separated from cold water piping by six inches or the hot water pipes shall be insulated. I have a bundle of red pipes coming from my hot water manifold, only one of them is hot right now because you're drawing for your shower, or you're drawing for your sink, I don't care which one, but only one is hot. All the other red pipes aren't hot, they're cold. And quite frankly, they should be insulated from each other. Hot, the fact that it is red does not mean the water in the pipe is hot. Only the pipes that are running with hot water are hot at that

time, and quite frankly, I think that they need to be done that way.

The International Plumbing Code, which is the equivalent of the Uniform Plumbing Code in other states, now requires that hot water piping be insulated from other hot -- cannot be bundled with other hot water pipe, nor can it be bundled with cold. And I would recommend we do something the same here.

We now have a planned view of compact distribution systems, I like the idea a lot, this is a good start on getting to this compact distribution system. And I think it sorts itself out reasonably, I don't have any specific improvements to make at this point, it's not a bad start on the idea. I would observe that, if you take the 2,800 square foot house, or the 2,800 L1, a typical 2,800 square foot house would have almost 120 feet of pipe from the water heater to the fixtures, based on where we put water heaters and where you put master bathrooms, that would be a very typical configuration to see that many feet, about that length. At 120 feet, it for sure will be three-quarter inch pipe, it might be some of it one inch based on the local Plumbing Code. And so be it. What this says, when you work out the math, is that you'll end up with about 70 feet or so of pipe, so it's better. We've taken almost

three gallons and brought it down to less than two, so it's a good start.

I'd recommend we keep that and I don't think we have any specific things, but I do have a question, the planned view as written here means the radius distance? I take the point where the water heater is, and I draw a circle, and everything has got to fall within that?

MS. BROOK: Uh huh.

MR. KLEIN: Okay. I got it. We canceled point of use water heaters, it's no longer here. Is that correct? It's been deleted? According to what I see here, it's been deleted?

MS. BROOK: Yeah, I don’t have the Appendix in front of me.

MR. KLEIN: So I'm just reading what I see. The reason I raise that is, later on we show how -- we're giving credits later on for HERS ratings of point of use systems, but not the ones that we just approved, which is this planned view compact distribution systems, we're missing something. We need to cross correlate those two sections.

MS. BROOK: Okay.

MR. KLEIN: Research systems, we're requiring insulation on the return line. Oh, yes, so this section, where did it go? This section includes a reference to

clothes washers, clothes washers should no longer be an exception. The only possible exception for length or -- okay, the only exception that should be given is standalone bathtubs, washing machines, and dishwashers now use so little water per cycle, that if you actually want hot water for the cycle, you better be close, and so the clothes washer should no longer be a distinction. Island kitchen sinks may actually need more than 15 feet to get there from a practical construction point of view. If not, you're requiring people to bring circ loops down the wall to just above where you'd go into the pipe under the slab, to go under the sink. It's possible to do, but I'm just observing it's adding some cost to the construction. You might want to relax that a little, although I'm loath to do so.

And then I can't -- this talks about the loop, but it doesn't discuss anything yet about the controls, so I guess that that's going to come in a next section.

Here's where we talk about Demand Circulation Systems, that I think that we should use the language here, to the point that I made earlier about what we were referring to in the Nonres section where it showed up, I think. But wherever we refer to demand controls, we should use the same language we're using for the definitions back here.

MS. BROOK: Okay.

MR. KLEIN: We don't have definitions of this in the text anywhere and at this point, I'm not sure we should, but we should at least use the common language. And I also think that the changes to the text to disable the pump aren't quite right. What you want to do is to shut it off, not disable. Disable to me means make it so it can't operate anymore, as opposed to shutting it off until the next time it's drawn again. I think we should go back to the language that was originally written. Again, we can use what's in the IAPMO Green Supplement for common language for this. What else is there? Moving on. I probably have more.

Sensor -- we're under 4.9.4, and then recirculation sensor control, we took out the word "motion" and called it "any sensor type." "Sensor" is pretty broad. The intent was to describe things that are in the area where people actually are intending to use the hot water, or near it. I suppose there's other sensors that would do that, but I'm not aware of them. Present sensor -- it's something that is sensing someone is heading toward using hot water. And motion was perfectly reasonable, but "sensor" is fairly broad, and I'm just wondering what it's going to ultimately mean.

Now I'm on the Optional HERS Verification

section for this piece. RA4.4.10.2 talks about verified parallel piping, but as I pointed out earlier, parallel piping is no longer allowed. I think this needs to be changed to the one related to the compact distribution systems that were described. I would also note that -- where did it go? Oh, here. C'mon, show up. It disappeared on me.

MR. SHIRAKH: Are you going to give this in writing to us?

MR. KLEIN: Yes, all of these will be in writing.

MR. SHIRAKH: You don't have to go over every single one of them.

MR. KLEIN: I'm just pointing out some of the inconsistencies, I think. On the pump sections for verification, under HERS verifications is optional. All we require them to verify, even for the demand control pumping, or the time and temperature recirc pumping, is whether the pipes are insulated; shouldn't we be requiring the verification of the controls? I would think so. That's the large part of what we're verifying, the pipe insulation is covered under pipe insulation. I think that's enough for now, I could go on for hours, I suspect, but I won't.

You've done a great job with this, this is

really hard to get right, I understand the difficulties here. Okay, thank you. That's enough for now.

MS. BROOK: Thank you, Gary.

MR. FALKE: I'm Rob Falke from National Comfort Institute. We represent about a thousand of our members that we've trained and certified here in California and about 15,000 nationwide. Because what we want to comment on is so critical to who we are, we want to tie those two together, if you just give me a minute, I'll be brief. We see a door opening with the air balance of an issue that's come with the push commercially for NABB and TABB and ABC to bring air balancing as a verification source on the nonresidential side. And we have been coming here for a lot of years and we're very interested in continuing to promote what we have taught for many years.

Our core training certification revolves around air balancing, many of them technical and nontechnical issues, but that's the core of it. As we've looked at air balancing, we've known that for over 50 years it has been commercially the method of measuring and verifying system performance, HVAC system performance. We've been able to take that a lot further down into actually measuring the live performance of the system, which is very different than what is done currently by the State of California. We've gone so far as we've been able to

measure and rate the performance of the system, and assign an annualized energy efficiency rating to duct systems and to HVAC systems, which is a huge stride in this industry. We've been accepted by the states and governments that have come to us seeking us out and we bring it eventually to California, we've been watching the climate here, watching the changes. I've talked to a lot of good people who have encouraged us and moved us forward with this, and we -- this hood issue has gotten us very excited, along with many of our members, as you probably saw by the petition that came through that was in the -- filed with the docket.

Bottom line, we have learned through using air balance methods, and the hood being the primary method, that you can measure and rate the performance of an air-conditioning system under live operating conditions. Under these measurement conditions, we get very different results than what is currently being used by California methods and those other air flow measurements that as describe, our results in that area are similar, but there's many other things that can be measured, and the hood is simply one of those tools. As we looked at air balancing hoods, and we've spoken out as an industry about prohibiting traditional balancing hoods, in Title 24, it really caused an uproar. And our company was the

focus of those because we've trained so many of these people. And we responded and we commend the Energy Commission for the movement to recognize what the industry said, and to withdraw its exclusion of conditional balancing hoods from Title 24. It was a huge issue; for years, other hoods have been there. They are not typically understood by the Building Performance industry, as proved by a lot of the testing that's been done, and the opinion of those in California. And for a brand new hood to come on the market and, within a month, it's specified in Title 24, was a real outrage. And it has caused as stir that is still bubbling, unfortunately. We appreciate the continuance of the use of those, but we do have some questions about what it means by certification of other hoods, so these manufacturers have called me, my phone rang all weekend going, "What is this? What is meant by that?" I was delighted to hear Bill announce that document is online now, and we intend to look at that. There is a short response period time to that, but we are interested in being involved in that, and with the Commission looking at balancing hoods, and what can be done to move testing forward in California.

There's a perception that commercial balancing and residential balancing are very different; well, they are. And our company has a residential certification and

also a light commercial, commercial, and commercial industrial certifications that are in -- throughout the country and in the world, and widely used. We are the largest air balancing certifications out there, even though we are a private company.

The idea that commercial and residential is separate is somewhat wrong. Under the testing conditions that some of this work has been done, outside of normal parameters, have drawn some conclusions that aren't quite right. But the principles are the same, but there are test methods to apply these to residential applications and flow hood -- balancing hood manufacturers have contacted us and asked us to be involved in that process of certifying these new hoods and providing some support to the Energy Commission, which we're very willing to do, and we'd love to be involved in that.

The other reality of air flow measurement and system performance measurement is air balancing hoods are not a standalone tool, it's very unique, there's a lot of skill involved, and not just book learning to use these tools. Also, an air balancing hood is coupled with a number of other tools to get the whole picture of what an HVAC system is doing. Monometers actually measure pressure, static pressure is specified in every equipment manufacture's details, specifications, and that could be

measured very accurately, and compared to what the manufacturer does. You heard me talk earlier that, when it comes to design and performance, the static pressure has to be required and should be required in many aspects of the Energy Commission's requirements for down the road. And a monometer is a way to measure air flow and you can't use a hood inside of a duct, certain grilles, and registers, it can be very accurately used. Those can also be used to make correction factors for hoods, and they're specified by a number of industry standards to be coupled with the hoods and used to determine air flow, it's not just a single measurement. Hydrometers' ability to measure wet bulb and dry bulb temperatures can be very accurately done, but not a lot of standards exist to teach people how to do this, and to do it accurately, but it can be done accurately and it's very repeatable. And this is another part of your air flow picture that can be filled in. Electrical measurements, RPM, refrigerant, and combustion adjustment are also critical measurements that go into interpreting air flow. There are so many facets of it that it's not air flow hoods alone, or balancing hoods alone. We look at eventually all these tests being compiled into one with certain reporting that can be used. Our company has made software that is on the cloud, it collects data from all over the country and

all over California daily, about the live performance of HVAC systems.

We're here to say that what is promised, or implied by Title 24 is not being delivered to the consumer. And the deemed savings and the design savings that are out there are a far far cry of what is being delivered. And we have that documentation and we gather it daily. We gather daily information from -- not daily -- weekly information from our members of systems that they install, design, install and rate, that score well over 90 percent of the efficiency rated by the manufacturer. We document that, raters come out, apply generic rules, generic testing methods, generic refrigeration information, and often these end up in the low 60 percent range, so we're seeing a declining in performance of over 30 percent very regularly -- this is huge. And we foresee a time where field practitioners, contractors, and raters can measure systems under live conditions and rate their energy efficiency -- annualized ratings of duct systems and HVAC systems, that is a great improvement over what is available now. And we're committed to do our part to support the Energy Commission in bringing that out in the future. It's your decision, there's a lot of discussion there, we've appreciated the support of so many people that have encouraged us over

the years, and feel now is the time to bring these things to light. And considering what's going on at the time, and your goals that I've heard here, it's amazing how many of your requirements could benefit huge -- hugely -- is that a right word?

MS. BROOK: Uh huh.

MR. FALKE: From live system measurement. All of your ASHRAE Standards, all of those things can be measured live very simply and people can learn this in a relatively short period of time if they'd learn to use these tools correctly. So this is a long term talk, we applaud what has been done to open it up, we anticipate to be involved in some of the research and some of the rulemaking in the future, and to provide more input. We thank you for this time to discuss it and look forward to what's available in the future.

MS. BROOK: Robert, can I ask you a question. In your training, do you teach your members to use the hood and the other measurement instruments you mentioned to measure the air flow at the return grille, which is specified in our Standards?

MR. FALKE: That's a little slice of the pie and we do that, that's not an accurate fan air flow, there's other better ways of determining that that we teach, and again, it's not that one test alone.

Manufacturers publish data where you can use fan speed static pressure, the condition of the fan, to interpret fan air flow with practice and following our procedures, you can get very close with that. It's very quick, very inexpensive to do, and that's what we prefer. We love an air flow traverse near the fan which is not available in many California systems, but our members build those into the system so you can actually measure air flow there.

MS. BROOK: Okay. Thank you.

MR. FALKE: Thank you.

MR. NESBITT: George Nesbitt, and I live in the hood. Panama said to me after the last Commission meeting, I can too, let's keep it fun. So actually I'm going to start off on hoods. I did some testing on a recent job I installed and, on one system, I got 790 cfm with one of my flow hoods, and 423 with my other. So there's a big difference; one is a 2000 cfm flow hood, the other is a low flow hood. On the other system on the house, I read 600 vs. 510, and in this case, the difference switched between which one read higher and which one read lower. Now, on the first system, I read the return of both flow hoods, well, I got 434 cfm with both of them, so they agreed with each other and they agreed within 10 cfm of one of them reading all of the supplies. On the other system, the low flow hood, caps

out at 500. So my other flow hood, I read 575, for some reason I don't have it written down on this paper, but I also --

MS. BROOK: You're going to get to your point soon, right, George?

MR. NESBITT: Yeah, I also own a true flow and I measured it and I got basically 575 with the true flow. So my point would be that, while I think flow hoods can be highly inaccurate on the supplies and low air flows, or there's great variation, on returns, I would say there doesn't seem to be as big of a problem.

MS. BROOK: Okay.

MR. NESBITT: And head to head, when I've compared, I've always gotten the same answer.

MS. BROOK: Okay.

MR. NESBITT: So I think we're trying to -- in this case, we're trying to solve the wrong problem, we're trying to solve a supply reading problem reading returns.

So I want to move on to sampling. I notice you've changed the language to say that -- the sampling rules have always said the builder chooses the sample units, and now you added language that clearly says that the Rater shall randomly choose which unit to sample within that group, which is a good thing. I have never let my builders tell me what to sample. It just wouldn't

be valid otherwise. I would still say that I would not let the builder choose what units are in the sample group. To be random, ideally, if a HERS Rater is doing it right, it's random. I mean, like when --

MR. SHIRAKH: How do you make it random? Do you flip a coin or --

MR. NESBITT: It's random because I choose this one for that reason, I mean, not for a specific reason, but I kind of like on a multi-family, I'm making sure I'm getting a mix of units types, a location within the building floor so that I'm getting sort of a representative -- at times, on multi-family, I may do 100 percent, or I may just decide to go into this unit or that unit while I'm walking down the hall, it's not predetermined I'm going to go to this one, so it's highly random in the, you know, as long as I'm doing my job and actually failing things or passing things, that's the way it should be.

Then on the blower door testing section, I think we've referenced ASTM E779, certainly, since at least, I guess, 2001. And I started doing hundreds of multi-family tests for LEAD a few years back and they referenced California Energy Code sampling protocols, as well as ASTM U779; I looked at the Energy Code and said, oh, we reference ASTM E779, I know how to run my blower

door test. Well, after doing 100, the Lead consultant informed me that I had done single point testing when it should have been multi-point. So in the HERS II, three years ago, I pointed out that there again in that we also were referencing the E779, but no HERS Rater or Building Performance Contractor in California is taught to do multi-point pressure and depressure tests. So I see in that section you now quote and reference a bunch of things about multiple-point testing, so that's good to see, although I have to tell you it's a pain in the butt, especially running it with a computer, there are actually much quicker and easier and just as accurate methods. But at least hopefully now we will do what we're saying we're doing, although I would argue that a single-point pressure and dew pressure tests with no baseline is accurate.

On the AC Charge, you want to increase the range for sub-cooling and superheat for the rater test and, as a Rater, I sort of feel -- I mean, I can understand on the one hand why you want to do it, but what it also says about us raters is we can't check charge accurately, nor does that help us as an industry, encourage us to do our job well and right. So it's sort of -- I kind of, you know -- kind of hit it -- yes, Bruce. You look so well up there.

MR. WILCOX: Well, it isn't a reflection on raters' abilities at all, it's based on the statistics of random air and how much accuracy we can expect out of two people doing the same test, and you've got to give the wider latitude to the rater because he's the one that does it second and can fail the first guy.

MR. NESBITT: Right, well, yeah. And the basis of science is being able to repeat and get results, the same results. So, and the other point I want to make is the term HERS Raters, so very inconsistently, in places it's Rater with a capital R, other times it's Rater with a lower case R. A HERS Rater is a professional title, just as Architect or Engineer, you would never put a lower case "a" or "e," on that "A" or the "E." So the Commission changed that in the NSHP Guidelines two years ago for me, and I think it's time to go through all the documents and capitalize the R in Rater and just to show -- I think Provider should also be with a capital "P." We're using it as a title, so…. That will be my last little Rater rant.

MR. SHIRAKH: Thank you.

MS. BROOK: Thanks, George. We're going to hold you to that.

MR. SHIRAKH: Every time you write my name as an engineer, I should have capitalized that. Any other

questions on this section? Okay, then moving to the last item, which is the Residential ACM Approval Manual.

MS. BROOK: I don't know if I'm going in the right direction, I'm kind of giddy here. Okay, the changes that we talked about yesterday from the Nonresidential ACM Approval Manual are replicated here for the Residential ACM Approval Manual. Basically this manual now, as we're proposing it, is just talking about the process of certifying compliance software, and so it's a very streamlined document. It talks about -- in this particular instance for the residential software, it does actually specify that all third-party compliance software must use the Commission provided simulation engine and performance rules processor that we're calling the Compliance Manager, this is a piece of software that's -- it's under development now, we'll be demoing the current status of the tool at the May 3rd ACM workshop. And we think this is a big step forward for the Commission, it will allow us to have one consistent and singular interpretation of the Performance Standard. And then all the software products will implement that interpretation.

The other thing that the ACM Approval Manual includes is the Application Checklist, what has to come to the Commission with the version of the compliance

software that gets tested. And it includes a requirement for the third party vendor to include a compliance supplement in their software user's manual. Some of these software tools may or may not have a market outside of compliance software, they might be a design tool, or an HVAC sizing tool, and so their user manual might be focused on that application of the software, so we just need to make sure that the explanation of how the performance standard works in their software tools is documented as part of the user manual.

And then the processes for approving and decertifying and public challenges to the compliance software is also explained in this document.

The Application checklist includes a vendor certification statement saying that they have run the performance tests with their software and that they believe that they've passed all those tests. It includes the computer run results and a summary sheet of the certification tests that were run, and it includes a copy of the compliance supplement and a copy of the compliance software, and an application fee.

And staff is proposing that we reduce the current fee of $2,000 to $1,000 because, since they have to include our compliance manual, we don't need to actually test the accuracy of their software because

they're implementing our interpretation, and we think that that will drastically reduce the amount of testing that we need to do for the third party software. That's it.

Anybody have any comments or concerns?

MR. GABEL: Mike Gabel. I'll be brief since we're late, but I just want to say that I think CABEC and myself, personally, support the staff's effort on the compliance software manager, it's the right goal, and I think you have a good team of smart people trying to accomplish this in a very short space of time. I sincerely hope that you're able to complete it on time.

My own personal view is that, if there's any chance that anything is going to delay the Standards, it's probably the compliance software not fully working and functioning with vendor software coming in on time for approval. I think, I'm hoping from staff before adoption in May is that staff can commit to win a fully functioning, fully working version of Compliance Manager will be done in 2013 to allow enough time for vendors to grab that, work with it, submit their own software for approval, and I would say personally I think you should be shooting for April of 2013, I think by drop dead by June 2013, if that things isn't really fine tuned and working well, I think there's a good chance the Standards

may not make it on time, so I just wanted to sort of run the flag up the flagpole and just say that for the record. And you know, CABEC certification, CEA is going to have an exam testing people how to model buildings for the first time as an actual test, and for that reason, in many other trainings to the IOUs, we really need the software much earlier than in previous Code cycles. So that's all I'll say. Thanks.

MS. BROOK: Okay.

MR. SHIRAKH: Thank you, Mike. Any other questions?

MS. BROOK: So do you have any --

MR. NESBITT: George Nesbitt. I'm not a Rater right now, I'm an Energy Consultant. I, too, agree having the core calculation engine is the right way to go. We've talked at some of the past workshops about what shows up on forms and I think in this ACM section, you do have some language, we just -- the one phrase we really need is "any input that affects the compliance needs to be shown on a compliance form." There are, well, I don't see why you're dropping the application fee from $2,000 to $1,000, because for $1,000 or even a $2,000, I would not fully test software, and I've been going through EnergyPro, especially, going through everything and really checking things, and there are, I

think, currently either one or two things that do not show up on compliance forms. So -- and then, actually, another thing that kind of occurred to me recently was that equipment is supposed to be listed in the CEC database and so we've got the Joint Appendices that, in theory, we're not supposed to alter and be able to alter in the software, and we choose those, yet one of the things you can do with equipment, there are certain inputs that, you know, you can tweak, you don't have the right value, or you change it and it affects your compliance margin, yet it's not something that would necessarily hit you in the face looking at it. So, a thought would be that those equipment database values should be fixed so that you don't -- I'm thinking especially with the water heaters, is especially because you have recovery efficiency standby losses, there's various inputs.

MS. BROOK: So you're suggesting that we pull the data from the database and just require the input to be a model number or an appliance record number? Or -- is that what you're suggesting?

MR. NESBITT: Yeah.

MS. BROOK: Okay.

MR. NESBITT: Yeah, something in the sense so that you can't tweak it. I've seen it accidentally, I've

used wrong values and you go and fix it.

I think that's pretty much the main thing.

MS. BROOK: Okay.

MR. NESBITT: I guess the next step is what? The full ACM Manual development?

MS. BROOK: The next step is the May 3rd workshop where we're going to talk about the current status, demonstrate the current software. We won't have the ACM Manual completed by that date, but we'll have a schedule for when we should get that done.

MR. NESBITT: Right. And since that happens in the ACM Manual and not in what -- I mean, all the details, a lot of the details of the modeling happen there.

MS. BROOK: Yeah, all of the details of the modeling and the compliance option modeling assumptions will be documented in the ACM Reference Manual.

MR. NESBITT: Okay, and then will there be workshops on the Reference Manuals?

MS. BROOK: There will be workshops and also, you know, we're going to honor Pat Splitt's repeated request to have the public test the software before it gets formally certified by the Commission. And then the other thing is that the ACM Reference Manual also has to be approved by the Commission, so that's why we'll have

the public vetting of it first, so that -- but there is also an opportunity for the public to come to the approval Business Meeting and comment on the Reference Manual.

MR. SHIRAKH: Anymore questions on ACM Manual or anything that was presented today? We're in the public comment period now.

MR. RAYMER: Thank you. Bob Raymer representing CBIA. There was give and take between Staff and the roofing industry yesterday regarding the availability, the wind and the wear on some cool roof requirements, and staff correctly pointed out the workshops and the stakeholder meetings that had been going on that had somehow not been attended by various parties. The fact is that the private sector should attend these meetings, they're very important. It concerns me that the room is half full, having been doing this now for close to 31 years, I don't recall us getting to this point in a rulemaking and not having standing room only.

Having said that, CBI has been participating in this proceeding; if you want to say it started in November of 2010 with a workshop, we've been there every step of the way. If I haven't attended a meeting, Mike Hodgson was there, or Adam, or Deborah from ConSol, one

way or another, one of us had it covered. And this comes at a time when resources, you know, we're spread thin and resources are few. And I have to say that, having had that level of meticulous participation, and a very good working relationship with staff, I might add, and this has been a rather contentious Update of the Standards, but the fact is the staff has been very pleasant to work with. We've got a number of good things accomplished. But I was very surprised an hour ago to hear that a new Tier 3 representing Zero Net Energy was being proposed. Having been involved for 16 months, and hearing about this an hour ago, is very concerning. Needless to say, we in no way, shape or form consider this to be 15-day language. This is an enormous issue. Given the amount of time that has been spent on this in the Legislature and in State agencies, ARB, the PUC, and the CEC, for the past six years, this is something that, as a standalone proceeding at the Energy Commission, should have been focused and devoted on. I can't imagine how any legal counsel could view such an enormous change, even though it's voluntary at the State level, it could certainly be adopted as mandatory at the local level, and I suspect it will be. This is an enormous proposal. So, to state the least, we don't agree with the contention that this is 15-day language. We will do our very best in the short

time between April 10th and May 9th to get you comments on an enormous proposal like this. But it's disheartening to find out about it an hour ago. Thank you.

MR. SHIRAKH: Thank you, Bob. I think Cathy Chappelle wants to --

MS. CHAPPELLE: Can I make a clarification in response? Cathy Chappelle, Heschong Mahone Group, representing the IOU Case Team. Just for the record, I want to comment on Bob's -- respond to Bob's comment about no manufacturers or public sector -- or private sector, excuse me -- being involved in the workshops that were held last June specifically for the nonres cool roofs, that if you would like, I could present the list of attendees that include the majority of the people that were in the room yesterday.

MR. SHIRAKH: I remember the cool roof workshop in June was well attended.

MS. CHAPPELLE: Yeah, and we also had --

MR. SHIRAKH: He also is right that, during the stakeholder meetings, CBIA regularly attended, whereas other stakeholders were not as diligent.

MS. CHAPPELLE: Yes, did not regularly attend, exactly, and we don't really have any control over that, I would say.

MS. BROOK: And I guess I would assert that we have had a long workshop process with a combination of the IOU stakeholder meetings and the staff's preliminary workshops leading up to 45-day language, and we've -- my assertion is that's why the room is not filled today and why we're getting through this in a couple days, is that we've resolved significant issues over the last two years.

MR. SHIRAKH: Martha is correct, this was by design to have the stakeholder meetings. Most of these issues were presented at least three times to public during the stakeholder meeting process. And the intent of that was to soften up the issues by the time they get to the staff workshops, so I'm not surprised. And plus we have people attending through the WebEx, so they don't necessarily show up in the hearing room. Jamy.

MR. BACCHUS: Thanks. Jamy Bacchus, NRDC. As was noted earlier by Bruce from Johns Manville, energy efficiency is the first place to go in the loading order, and energy efficiency is still cheaper than fossil fuels or renewable sources of energy. And the current draft Standards saves over 30 percent of regulated energy in both residential and nonresidential construction, and that's the biggest increase in Title 24 history, so kudos to everyone for that. And the fact that we could cost

justify savings over that, close to 40 percent, shows that we have actually come down and met stakeholders part way. And they projected savings of eight power plants, eight 500-megawatt power plants over the next three decades, also speaks volumes to what the 2013 Draft Proposal can do. And when we look at that as trying to achieve other state goals for the 33 percent RPS Standard, for AB 32 reductions, or even the 2020 Net Zero Goals, we think the 2013 Draft Standards are getting us in the right direction of all these state directives, and then looking at the cost projections that the typical cost for a new construction home would be less than $3,000, and that it would only add about -- if you're putting 10 percent down or something, it would only add about $298 to the cost of a new home loan and that you would pay that back without 14 months, it would only add about $13.00 and change to your monthly mortgage bill and you'd save over $34.00 a month, so you would be cash positive in less than 14 months. And over a 30-year mortgage, you would save over $37,000 in your pocket. So, for all these reasons, NRDC supports what the Energy Commission has done, we think they are sound and completely valid, and we hope that the Commission adopts them as soon as possible. Thanks.

MR. SHIRAKH: Thank you, Jamy. Any other --

MR. NESBITT: George Nesbitt. This was my first Code Update process to be involved in and I have a couple observations. One, the IOU case stuff, I think, started and then last spring it then -- I guess there was a period where there was nothing going on, and then it started again and it came to the Commission. So somehow that first step passed me by. And also, in general, most of the organizations in California that are somehow affected by these rules and either should be, are here, are not necessarily publishing all the workshops, so while they may have representatives here, they're not necessarily bringing a lot of people in. I want to say, by being here, it's a lot better to be here than to not; if I wasn't here, I would have no say. And I certainly do feel that you've listened to my comments and they certainly have had an effect, maybe not as much of an effect as I'd like. I definitely have a few major concerns, especially around multi-family high-rise and the REACH Standards. I'm also working on a project that I was hoping to be further along, but I'm really going through the Energy Code, and I think three years from now when we start on the next one, I think there's a lot of little things, as well as maybe some bigger things we need to look at, but just continuing refining, making things clearer, making things simple. So you know, I'm

glad I participated, it's been a lot of work and a lot of time, and God, I haven't even gotten any written comments written, so --

MR. SHIRAKH: Thank you, George.

MR. NESBITT: -- and it's all on my own time.

MS. BROOK: Okay, thanks, George.

MR. SHIRAKH: Any other comments? The public? Sir.

MR. VARVAIS: I'm Dan Varvais on behalf of SPFA. I want to thank the Commission and thank staff for working with us on this Code provision, it's been -- personally, it's been very rewarding and a good opportunity. We did submit our comments in writing here earlier this week. So thank you very much.

MR. SHIRAKH: Thank you.

MS. BROOK: Thank you. Jon.

MR. MCHUGH: So, Jamy stole my thunder about the inherent cost-effectiveness of the Standards, and the quick payback, especially of the residential Standards that we've done a lot of analysis on. So I won't belabor that, but I think that, you know, the glass is half empty, so to speak, because there has been a lot of issues resolved, and you know, there's just a few of us hanging in there.

In regards to Bob Raymer's comments about the

ZNE proposal, I believe I proposed it at the second focus group meeting. I have some cryptic notes and I'd recommend that, in response to Bob's comments, that we ask HCD to look through their notes from the second focus group meeting where my notes say that this was brought up, that Dana Papke from CARB had mentioned this, that there was some discussion with Martha Brook at the Energy Commission about this as a concept that was still under discussion. So this was back in November, I believe it was, I submitted a public letter to the docket on just this very issue. I have notes here from Michael Hodgson from ConSol, who supports -- normally the consultant in support of CBIA making comments about ZNE not being a Code mandate. So that this is kind of out of nowhere, you know, there's been discussion and so I don't think it should be a surprise. Bob is on the committee, or has been, I think he was Chairman of the Green Building Standards Committee at one point, has been regularly participating. So I'd just like to support the proposal and, again, thank you very much.

MS. BROOK: Okay, thank you, Jon. Thanks for all your help.

MR. SHIRAKH: Any other --

MR. YASNY: Avery would like to make a comment. Avery, are you there?

MR. BROOK: Avery Kitler, are you there?

MR. SHIRAKH: I want to make one announcement. Please submit your comments by April 9th --

MR. KITLER: Hello?

MS. BROOK: Hold on, Avery.

MR. SHIRAKH: Just one second.

MR. KITLER: Okay.

MS. BROOK: The absolute last deadline is April 9th, but we won't really be able to respond to your comments unless you send them right away, so tomorrow, please, would be great -- yeah, today if you can! Avery, sorry to interrupt you. We're listening now.

MR. KITLER: Yes, I had some conversations with Patrick and some correspondence regarding the community scale renewable energy strategies that are being processed at the state level and how they relate into the provision for solar readiness.

MS. BROOK: Uh huh.

MR. KITLER: And I was wondering if you could provide some additional feedback on those comments, which specifically we're providing for an exemption on the solar readiness to the extent that a community, solar, a community-scale renewable energy strategy was being deployed by a master (indiscernible) driven project.

MS. BROOK: Are you prepared to do that,

Patrick, or did you want to talk to him?

MR. SAXTON: No, I don't think we're prepared to provide any additional comments today.

MS. BROOK: So we'll continue to work with you, Avery, over the coming days and you know that we'll continue to be responsive to your concerns, and we just don't really have an answer for you right now.

MR. SAXTON: I guess the one thing I would add is what I've discussed with Avery previously is that I would say generally the Energy Commission is supportive of the idea of community-scale renewable energy solutions. Current tariffs and interconnection policies make those difficult, perhaps impossible in many cases, and that's generally not things that are under the authority of the Energy Commission, so we do have some difficulty there, putting things in Code that might not actually be practical for people to achieve.

MR. KITTLER: Okay. Thank you for that, Patrick.

MS. BROOK: Thanks, Avery.

MR. SHIRAKH: Any other comments? Okay, with that, we're going to close and hand it back to you, Commissioner.

COMMISSIONER DOUGLAS: All right. Well, thank you for a really productive day. So we'll look forward

to getting your comments, as staff has emphasized strongly, sooner rather than later is ideal so that they have the most time possible to thoroughly review and consider them. Of course, everything submitted by the deadline will be reviewed and responded to, but, in any case, thanks for being here. We'll look forward to your comments if we don't have them already. And we're adjourned.

(Adjourned at 5:12 p.m.)