DOCKETED

Docket Number:	17-BSTD-03
Project Title:	2019 Title 24, Part 11, CALGreen Rulemaking
TN #:	222730
Document Title:	Transcript of 02/05/2018 Lead Commissioner Hearing 2019 Energy Code and CALGreen Code
Description:	N/A
Filer:	Cody Goldthrite
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	2/26/2018 1:17:49 PM
Docketed Date:	2/26/2018

CALIFORNIA ENERGY COMMISSION

In the Matter of:	)	Docket No. 17-BSTD-02
	)	and 17-BSTD-03
	)	
2019 Building Energy	)	
Efficiency Standards	)	
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Lead Commissioner Hearing
2019 Energy Code and CALGreen Code

CALIFORNIA ENERGY COMMISSION

ROSENFELD HEARING ROOM – FIRST FLOOR

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

MONDAY, FEBRUARY 5, 2018

9:00 A.M.

Reported by:
Peter Petty

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PUBLIC COMMENT:

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Mike Hodgson, ConSol for CBIA

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AGENDA

AGENDA

P R O C E E D I N G S

9:20 A.M.

MR. BOZORGCHAMI: I think we can start now. We have Martha in the house, who's acting for Commissioner McAllister until he shows up. So if we could take our seats, we could start and try to catch up. If everyone could please take their seats we're going to get started here.

So welcome to the Lead Commissioner Hearing for the 2019 Building Energy Efficiency Standards. I sincerely apologize for being delayed a little bit. We had some scheduling conflicts here. For now, Martha Brook will be sitting in for Commissioner McAlister, while we do the full introduction and where the snack bars and the bathrooms are. And then as soon as Commissioner McAllister gets here, we will start with the meat of the standards.

So with that, the restrooms, out of the double doors to your left; snack bar is on the second floor. I think Mike Fischer found it already. In case of an emergency, let's everybody reconvene back at the Roosevelt Park, kitty corner from us and nobody take off and go back to their office. We need to do a head count. If not, we're going to have to send someone like Mazi back in to look for you.

So the topics for today are mainly residential topics. We have an admin section, Part 1, Section 10 that we're going to be discussing. We've got the joint appendices, residential appendix and a quick Alternative Calculation Method Approval Manual. That's a real short presentation there.

And tomorrow, we will be presenting all the non-residential measures. The Section 10-103 will be presented tomorrow. That is the Acceptance Test Technician Certification Provider's Protocol. We feel that since really all non-residential folks will be here tomorrow, that part should be within that section.

So with that, I'm going to give a quick, fast history of how the Energy Commission started. In 1974, the Warren-Alquist Act was signed into law by Governor Ronald Regan, in 1975. It was signed and funded by Governor Jerry Brown, his first term in his position. The requirement of the Warren-Alquist Act of the Energy Commission is to look at ways to reduce the unnecessary consumption of energy and requires that the local jurisdictions and building officials to enforce these through a permit process.

There are other goals that are bestowed on the Energy Commission staff. One of the key ones, as you all know, is that the California Energy Commission tried to

come up with standards that hits this zero net energy for 2020 and 2030 for non-residential.

How do the standards work? The Energy Commission staff with the help of the utility partners develop the codes on a tri-annual basis. I would like to give thanks to Pacific Gas and Electric, Southern California Edison, Southern California Gas, San Diego Gas and Electric, Sacramento Municipal Utility District, Los Angeles Department of Water and Power and Southern California Public Utility Authorities, who with their consultants, really helped out in development of the 2019 Standards.

I also would like to give thanks to Kelly Cunningham of PG&E, and Heidi Hauenstein of Energy Solutions. Without those two we would not be here today. They really kept the dialogue going between Energy Commission staff, Energy Commission consultants and their own consultants. They really kept us on this path.

And everything that we did, that PG&E or the utilities did, went through a vigorous life-cycle cost, based on a time dependent value calculation. This is the value of gas and electricity change, depending on season and time of day. So all of that was taken into consideration when coming up with our proposed changes for this code cycle.

California is divided into 16 climatic zones. They're a little bit different than what some of you guys that work on the international field or scene, working with ASHRAE or the I Codes. (phonetic) If you look at ASHRAE'S climate zones, California is primarily Climate Zone 3, but you guys that reside in California know that's not true. If we drive a few hours, we're in the hot desert. We drive a few hours we're in the foggy, snowy weather.

For this code cycle, the utilities sponsored 19 pre-rulemaking or what we call stakeholder workshops. Nine of them were in person and they had 10 that were done through webinars. And there's a website on the bottom of those slides. If you want to see what was presented, at what time, it's right there. At the Energy Commission, we had 14 pre-rulemaking staff workshops here at the Energy Commission, prior to this hearing today.

Our goal is to take everyone's comments into consideration, everyone's different ideas and try to come up with a very productive standard energy code as possible.

So where are we at today? Today, being February 4th (sic) and 6th and I apologize to be right a day after the Super Bowl. I hope everyone got to see it, hung over or not. That's okay.

Comments for today's workshop and the 45-day language that was posted on January 19th are due by March 5th. But the sooner we get those comments, the better we are off. We want to be able to start a dialogue with you folks and get the final 15-day language done properly and appropriately. I've already talked to folks at CBIA. There's a couple edits that they found and I'm very thankful that they did. And we will be fixing those later one.

On March 21st, there will be a 45-day language hearing at the Commission business meeting. That will probably be a five-minute presentation I will be doing for the Commissioners, giving them an update of what's happening and letting everybody know that we're going to come back for a 15-day adoption on April 11th. That's the business meeting in April.

With that, CALGreen is going to be a little bit later on. The Code Advisory for CALGreen will not be meeting until July-August of this year. So that part of Part 11 will be a little bit delayed, going into adoption with our Commissioners. We're trying to get everything wrapped up and the software development, the manuals, electronic documentations, to be all done before the first of the year 2019. So it gives you guys a one year in advance to have things available to study, learn,

understand, and ask questions.

What we're doing this code cycle, staff's committed to coming out with an electronic index for the standards to make it easier for doing the search in the standards itself. That's going to be a big task. We have a couple of staff here, Alexis Smith and Ronald who will be leading that project.

New for the 2019 Standards, a lot of it is updating the efficiencies a little bit more. And there's a couple of new mandatory requirements. The indoor air quality measures will be new for this code cycle. We will have new prescriptive door insulation requirements. We'll be improving the air handling efficiency. And I think later on today or this morning, Mazi will be talking about PV and batteries.

Like I said, what we're here today. We're hoping that you folks have already reviewed the standards, the proposed language that's already posted on the website. Staff is going to be providing a high-level presentation on sections that have been changed or that has minor edits, but don't really get into those. Those are like we missed a comma, we missed a period here or there.

But in reality, this presentation is trying to get your comments in. There's a lot we're going to be

covering in the next few hours, I should say eight hours or so. So if we can't get to your comments please submit your comments in writing to our docket or communicate with me and we'll get them in somehow. Those other two websites that we have posted for dockets, and if you have any questions, I can answer them right now.

So with that, any questions on the line? No? Okay.

(No audible response.)

So with that, we're going start going over the Part 1, Section 1, the admin section of Title 24.

So again, my name is Payam Bozorgchami. I'm the Project Manager for the 2019 Standards. And I'm going to be talking about Part 1 of Title 24, Part 6. This is the admin section.

So under the definitions of 10-102, we updated some definitions. We added in some new definitions to really capture what we're trying to present and propose today. One area, like I said earlier today, we're not going to be presenting today will be the whole ATTCP requirements. Those will be presented tomorrow, but there was a lot of cleanup done in this section and Joe Loyer will present that in the morning.

Locally adopted energy standards, we wanted the local governments, when they submit their package to us

for approval, we wanted them to clearly state that we want to see their code provide us a cost-effective analysis for what they're proposing to their own constituents.

We added a new section into 10-109. This is when someone's coming in for approval, the photovoltaic system requirements and determinations. In this section, what we're trying to say is there will be areas in California that PV -- buildings not areas, but in buildings in California that will not take a benefit for adding PVs. And this gives them an exception to provide that information to us.

Under 10-110, procedures for consideration for application, we get a lot of compliance options coming in. And we wanted to give it a timeline of what the Energy Commission staff is to do to evaluate these completed applications. These are -- and it's between 15 days and 60 days of review.

UNIDENTIFIED SPEAKER: He's here.

MR. BOZORGCHAMI: As you guys all know, Commissioner McAllister just walked in. Martha, you're off the hook now.

It provides a timeline between 15 and 60 days for staff to evaluate the completed documents submitted to the Energy Commission.

Certification and labeling of fenestration products, there has been -- we're trying to streamline that California Energy Commission and the building officials really need to look at the NFRC label that's on the fenestration. Certain products and certain manufacturers provide two labels for the same type of efficiency, one being higher than the other on and it's causing a confusion for the inspectors or the building officials. So we're streamlining it. All right, from now on if you've got a U-factor, SHGC/VT or leakage, it has to be an NFRC label, not a third-party certification label that claims that they meet the protocol of NFRC.

We changed the term "certification" under the certification and labeling of roofing products for reflectance and remittance. The Cool Roof Rating Council is the agency that the Energy Commission relies on to do the rating of our roofing products. They don't certify them. They rate them. So we tried to clean the title a little bit and clean up the terminology that's used in the admin sections to capture that properly.

10-115 is a new section that's been added. This is added to provide a clear understanding of the community that's coming in with the community solar type system that they can show is actually equivalent to onsite PV systems.

With that, that's in for that section. If you have any questions or comments please come up the podium. But before you do, please state your name, your affiliation and please provide a business card or contact information to our court reporter. We are always having a hard time figuring out who is making that presentation or who's making that comment, because we don't know how to get back to that person.

MR. PENNINGTON: Commissioner McAllister, would you want to make some opening remarks?

COMMISSIONER MCALLISTER: Yeah. Hey, so thanks, Payam. I gather you all started what about 9:20 or something, so I didn't miss too much.

MR. BOZORGCHAMI: I apologize.

COMMISSIONER MCALLISTER: Yeah, no worries. Sorry. We had a scheduling conflict, so I was elsewhere when that one started, but I rushed over.

So thank you all for coming. I'm really excited about this workshop today and it'll continue on into tomorrow. I have a red-eye. I guess maybe I should have been, rather than where I was, I should have been meditating. You know, we're getting ready to air drop into D.C. tonight, on a red-eye. You know, meditation is important when you go into foreign lands I guess, (laughter) but getting mentally prepared, as it were.

So but and so I'm going to miss tomorrow, unfortunately. But I'll be paying attention, obviously. And I really want to thank staff, first and foremost for all the work getting this large ship moving forward. We happily, if you take a sort of historical perspective we, on the Title 24 Building Energy Efficiency Code or Standards, we are now sort of -- I think it's great that we're on a three-year cycle. Everyone knows that and takes if for granted. We're doing it in lock step with the Building Standards Commission and all the other pieces they have to deal with. And that's the clear expectation.

So the process really matters to keep everything moving forward and being able to engage with all the stakeholders in making sure that all the concerns are treated and all the goals of the state are implemented and developed in a way that works for the marketplace and all the stakeholders. So that is no mean feat and I want to just thank staff and all the stakeholders who've been actively engaged, up to now, on getting to where we are. So thanks for that.

So the focus this round has been, not entirely, but largely on residential. And we have stated policy goals for this round and we're getting to a certain point with this round. And we'll continue on into the next

rounds as the marketplace evolves and the technology develops and all that good stuff happens. I think a lot of people across the country and world are looking at this to see what we can do in California in terms of decreasing the footprint of our built environment, helping incorporate new technologies, making sure we pay attention to all the grid issues and the distributor technologies that are out there and increasingly are going to be out there. And really doing that in a way that provides a solid foundation for the long-term future, and not just sort of nose to the grindstone today, which we have to do, but also looking with some vision out further on.

So those are a lot of big concepts to juggle and a lot of things to be aware of as we work through all these issues that are going to come up and plan was just some of the details on windows and other building technologies that absolutely have be -- the trenches have to be dug for that. But also, thinking about how we can keep the lanes open for new technologies to come in to help us solve problems that are coming in the future. And so -- or just issues, not necessarily problems, but just being attentive.

Our buildings are part of a bigger network and need to provide multiple services. They both need to

serve the people who live in them, but they also need to engage properly with the grid. We're going to have lots of solar and other distributed energy technologies. We're going to have increasingly probably batteries. You know efficiency continues to be the bedrock of our policy, you know? The less energy we need in our buildings, the less all these other problems are, the smaller all these other problems are.

So juggling all those things, just keep all that in mind as we move forward. Each person's going to have their set of issues, but long term, we have to de-carbonize our grid. And that starts with our buildings. So let's sort of link arms and think about where California is going and needs to go and how our buildings can support that.

So sort of high level, those were my introductory comments. I really appreciate everybody again, for being here. And I'm looking forward to a robust discussion today. So thank you.

So (indecipherable) for now, yeah.

MR. HODGSON: Mike Hodgson, ConSol representing the CBIA. Payam, I'd like to talk about Section 10-106, locally adopted --

COMMISSIONER MCALLISTER: Is there a mic up there?

MR. BOZORGCHAMI: Can you get closer to that mic? Oh, there it is, yeah.

(Off mic colloquy.)

COMMISSIONER MCALLISTER: If you're tall you have to hunch over a little bit, there you go.

(Laughter.)

MR. HODGSON: Mike Hodgson representing CBIA. I'd like to talk about Section 10-106, the locally adopted standards. I made this comment earlier to staff on the 45-day language in the draft, as well as this form.

Under Section A1 determinations of standards or cost effective, this is an area where I'm glad staff is clarifying that we need submit, that local jurisdictions need to tell us that they are cost effective, but the methodology that they use is all over the map. It can be a simple pay back. It can back of the envelope. It can be some type of study sponsored by someone.

So what we'd like to do is insert after the word "cost effective" is "by current CEC methodology." So we're consistent in that not only are we looking at cost effectiveness as the Energy Commission looks at it, but if the local jurisdictions want to look at it, they're using the same well-defined methodology. Thank you.

COMMISSIONER MCALLISTER: Thank you, Mike. We'll look into that and we'll keep that dialogue going with you.

MR. NESBITT: George Nesbitt, HERS Rater, Section 10-110-115, the community solar, under (indiscernible) for durability. You say that the community solar system would have to have an equal or greater life as compared to a PV or storage system. So what's that life? I mean that's horribly undetermined.

We know that panels can last 20, 30 years. Inverters, they should last at least 10 years, if not longer. But that varies. So rather than comparing the life of a community solar system to something that's undefined, it would be far better to define the length of the community solar system. Say 15 years, 20 years, 25, 30, whatever. But just make it clear that it is supposed to have a minimum determined life.

MR. STRAIT: Thank you.

MR. BOZORGCHAMI: Any comments on the Web? No?

(No audible response.)

Okay. So with that, we will move on to our next section, our next presenters.

MR. STRAIT: While the next presenter gets up, just one housekeeping item. I know some of the people attending today filled out blue cards for their comments.

We will get to those cards at the very end of the day if there's anything left over that you don't have a chance to comment on as we go section-by-section. Otherwise, at the end of each of these sections, there'll be an opportunity to comment. So thank you.

MR. BOZORGCHAMI: Peter.

MR. STRAIT: Sorry, I forgot I also have to use this mic now.

So jumping to Subchapter 2, all occupancies, I'm going to walk through some of the simpler changes. A lot of these are cleanup changes, so I'm going to move fairly quickly.

On the Section 110.2, mandatory requirements for space-conditioning equipment, we updated the numbers in the columns and the tables. These are largely federal standards that have shifted. We did some cleanup to remove standards that were no longer applicable. We also updated references to the efficiencies to line up with ASHRAE 90.1 2016.

And 110.3, mandatory requirements for service water heating systems and equipment, we made a change to align with the California Plumbing Code. This was updating a temperature specification from 110 degrees Fahrenheit to 120 degrees Fahrenheit. And we added appropriate exceptions for healthcare facilities,

covering controls of outlet temperatures and hot water distribution systems. We know they have their own sets of needs and much higher levels of stringency they have to attain, so we don't want to get in the way of those requirements.

For Section 110.4, mandatory requirements for pool and spa systems and equipment, we added cleanup language necessary for clarity, but didn't change any of the underlying requirements.

In Section 110.5, we added fireplaces, so it's a requirement to prohibit continuously pilot lights for indoor and outdoor fireplaces. This is simply to treat them consistently with the other sources of gas use that can use a pilot light. It's worth noting that this is not a prohibition on pilot lights that are intermittent. That is that are not on when the device is not in use, but are on for the duration that the device is there. We are not getting in the way of that. We are simply saying the ones that are constantly on, regardless of the status of the device, are prohibited.

And as we move to fenestration, I'm going to hand the presentation off to our fenestration subject matter expert.

MR. SHEWMAKER: Good morning. My name is Michael Shewmaker. I'm a Residential CEA with the

Building Standards Office. I'm just going to touch on the fenestration here quickly.

So in Section 110.6(a)s 2, 3 and 4, we have reduced the allowable square footage from 1,000 square feet to 200 square feet that is able to take the site-built fenestration to use the default values to NA6. This is something that has been long standing and was, over time supposed to be phased out, so we're slowly stepping that back. And for anything about 200 square feet, they're going to be pointed to use the CMA approach.

And then in 110.6(a)4 we changed the term "tubular skylights" to "daylighting devices."

I'm now turning it over to our lighting expert.

MR. STRAIT: Sorry, I'm bouncing back and forth here. The change we've made to Section 110.9 bring back into Title 24 some language that we had moved into Title 20. This is non-substantive change. It's actually made to ensure that changes to Title 20 that happen outside of the cadence of the Building Standards doesn't cause a change in the California Building Standards code. That could create some problems, both legally and on the ground. So this way they stay on cadence with the changes that we've made. This applies to the types of devices listed here. And again, this is not a

substantive change.

110.9(c), track lighting integral current limiters, manufacture certification is not required. And installation certification is not required and properly labeling equipment is required. This really is to say that for these devices, we no longer feel that they need to certify something about the devices, but it doesn't otherwise change the standards that apply to them. This just streamlines some of the regulatory process they would have to go through.

Similarly, for track lighting supplementary overcurrent protection panels, the certification component is no longer required, but the proper labeling of the equipment is required.

And I'm going to ask our solar subject matter expert to come up and talk on the changes to the solar ready requirements.

MR. SHIRAKH: Good morning, I'm Mazi Shirakh. I'm the ZNE Lead for this round of standards.

So for this section, the solar ready zone, we introduced a solar ready requirement in 2016 Standards, so there'd be a space reserved on the roof for future installation of PV systems. However, since in the 2019 Standards we're going to have, or are requiring to have, a PV system to be installed on most homes, so we had to

go and take a look at this section and make some changes.

We are providing some exceptions to the PV requirement. And so we felt that for the buildings that fall under one of these exceptions the solar ready zone needs to be preserved in case the home owner decides to install the PV system later on. Or the condition that's causing that exception may be resolved in the future.

So Section 110.10(a) covered occupancies, we modified the requirements for single family residences and low rise and multifamily, which is basically the scope of a PV requirements for this round of standards.

Minimum solar zone area for a single residence, delete Exception 1 for the PV system, basically it means if you are installing a PV system then you don't have to have a solar ready zone; and modified Section 3 to allow all climate zones in wild urban interface areas, with whole house fans to qualify for the exception.

Mandatory requirements for solar-ready buildings, this minimum solar area for single family residences, modified Exception 4 to expand allowable orientation from 90 to 300 degrees of -- some of you may know that the current solar ready zone only covers 110 to 270. So we're expanding that from on both ends, the east and west, to cover 90 to 300. We looked at the effectiveness of the PV system and we found this range

actually works pretty well. It also provides further flexibility to put in a solar system the meets that requirement, you know, If it's a little bit north of the west or actually due east.

And we also modified exception to 6(b)I to add another option for EV chargers. So what this is, is a under the 2016 Standards if you wanted to get out of the solar ready requirement, we provide this exception, which basically required you to put in an ENERGY STAR dishwasher along with some other measures. It might have been a very efficient whole house fan, so we added another option to that. And that is to install a Level 2 charger. So if you install an ENERGY STAR dishwasher along with a Level 2 charger, then you don't have to meet the solar ready requirements.

And the 110.10(b)1B, that's basically the same requirements, but for multifamily buildings. Similar to above, we modified the exceptions to expand the range from 290 to 300 degrees from true north. And we also modified this exception to add the EV charging requirements, similar to the single family.

MR. STRAIT: All right. Briefly, we've added a new section, Section 110.12, mandatory requirements for demand management. What this section does is it consolidates all the requirements that were in other

sections throughout the code that related to demand responsiveness and expands into this more inclusive idea of demand management.

Section 110.12(a) is probably the most significant change that's in here. Previously, we had specified a version of OpenADR 1.1 or SEP. We are updating that requirement to a requirement of OpenADR 2.0 is required. Other communication protocols are allowed. And the thermostats must comply with JA5. And there are some significant -- there are some clean up edits to JA5, so that chapter is rewritten fairly extensively.

Importantly, we are looking for a robust discussion with stakeholders about how the OpenADR 2.0 requirement is implemented. We've had folks that have pushed fairly strongly for having the virtual end node be something that's exists in the cloud but not onsite in the building. On the other hand, we have some concerns if the building itself isn't capable of speaking a non-proprietary language, can that building end up getting stranded and that demand management equipment not be able to work if that communication protocol it is using cannot be used by other entities.

Section 110.12(b)(c) and (d) is purely consolidation. That takes nonresidential HVAC, lighting and message center requirements and simply moves them

into the section. There are no changes in the current requirements for those classes of equipment.

So we've put this like at the end of every presentation. We strongly encourage submitting comments via our e-file system. That's an automated system that lets us most easily track and document all the comments. Comments can also be submitted physically or by email at the addresses here. The final deadline for all written comments is March 5th, by 5:00 o'clock, easy to remember, March 5th by 5:00.

So with that I'd like to open the floor for comments, for people that have commentary on these sections.

MR. BOZORGCHAMI: Also, these presentations will be posted on our website on Friday. Excuse me, on Wednesday. Sorry about that.

MR. BERELSON: No problems with the height of the microphone for me.

Good morning, Commissioner McAllister and CEC staff and stakeholders. I'M Serj Berelson on behalf of Nest Labs. We thank the Commission for the opportunity to speak today and support the continued efforts to improve upon existing Building Energy Efficiency Standards.

Nest Labs provides products and services that

contribute to a thoughtful home. Nest products are sold in 18 countries across the US, Europe and Asia. Of note for today's workshop Nest manufactures the learning thermostat as well as the new lower-priced Thermostat E. Nest thermostats incorporate user friendly features that present energy efficiency and allow secure remote access to the thermostat settings. Independent studies have shown that Nest thermostats can save up to 10 to 15 percent of annual heating and cooling energy usage. These energy efficiency savings comes primarily through their ability to create their own efficient schedule, the ability to go into savings mode when no one is home, and the ability of consumers to control the thermostat remotely through their smart phone.

As a result, the Nest learning thermostat was the first thermostat recognized by the federal Environmental Protection Agency as an ENERGY STAR smart thermostat. Both Nest thermostats are currently self-certified under Title 24 for residential and non-residential uses as owner-controlled smart thermostats.

Nest thermostats also have demand response capabilities. Through our Rush Hour Rewards Program, Nest is working with dozens of utilities and load aggregators to help balance electric system loads while providing tangible benefits to consumers in the form of

incentive payments and not unduly reducing their comfort. The keys to be able to do this are one, the voluntary opt into the program and two, the customer can always change their thermostat setting it they're not comfortable. As an example of this, during the solar eclipse in August, 2017, Nest thermostats contributed 700 megawatts of curtailed load for the eclipse.

Therefore, our comments this morning are focused primarily on the language proposed for Section 110.12(a), related to demand response capabilities, which could be interpreted as required utilities and demand response aggregators to use OpenADR Standards exclusively, when communicating with the end use devise, in this case the thermostat.

While we appreciate the Commission's contributions to developing the OpenADR communication platform, limiting demand responsive controls to only OpenADR is a constraint that is not consistent with the current and developing market and unnecessarily stifling of developing technologies.

In today's demand response markets, load serving entities, or LSEs, generally use demand response aggregators. Demand response aggregators include companies that manufacture one or two products, such as Nest, as well as other companies set up with the express

purpose of managing large demand response events using demand response management systems, or DRMS.

Such aggregators receive a signal from the LSE, which may be sent using the OpenADR protocol announcing a demand response event. Upon receipt of the LSE demand response signal, the aggregator then communicates directly to the demand response devices in their portfolio to implement the demand response event. Demand response aggregators are not limited to aggregating single-device types and can aggregate responses from a wide variety of devices such as thermostats and pool pumps, as well as different brands of similar devices.

It is this signal sent from the aggregator to the manufacturer and/or demand response devices that in today's market is typically not sent using an OpenADR signal. Nor is it necessarily desirable or feasible for communications platforms to solely utilize OpenADR signals, given the various security and privacy concerns posed by our increasingly technology-based society.

Given these concerns, Nest has concerns that the language for Section 110.12(a) proposing the draft standards can be read as prohibiting the ability of aggregators to send a signal to end use devices with a communications protocol other than OpenADR, which would be a deviation from current market practices and

potentially stifle innovation.

The current model is thriving. As just one example, Nest is partners with Southern California Edison, SCE, in a program where Nest functions as an aggregator of demand savings from Nest thermostats. SCE initiates a demand response event by sending an alert to Nest via OpenADR. Nest reads that alert and communicates the signal to the aggregated Nest thermostats, using Nest application program interface, or API, to securely call on the Nest thermostats in the portfolio to let their set point temperature rise a couple of degrees, therefore reducing demand on the SCE system.

In this case, the utility, SCE, sends its signals via OpenADR, but the aggregator, Nest, does not send its signal to the end thermostats using OpenADR. Of the dozens of utilities, Nest works with across America, SCE is the only one that sends trigger signal via OpenADR, and none of them require Nest to only use OpenADR to communicate directly to thermostats.

As proposed, Section 110.12(a) is too narrow, focused exclusively on OpenADR. The language should be revised to be more inclusive, allowing either/or options that would provide for both OpenADR and other forms of communications by aggregators of demand response. Imposing an OpenADR-only requirement on occupant-

controlled smart thermostats is unnecessary, non-consistent with current markets and technology, and could result in significant disruption of the emerging markets in demand response, leaving valuable megawatts on the table.

We will continue to work with Commission staff and other stakeholders to craft more inclusive language that reflects current markets and technologies. Thank you.

COMMISSIONER MCALLISTER: Thanks for being here.

MR. TAYLOR: Commissioners, this is Gabriel Taylor, with the Buildings Standards Office; may I respond?

COMMISSIONER MCALLISTER: Yeah. I'm not sure how we're interacting here, in real time or not. I guess, my question was -- I kind of had a similar question, why don't you go ahead, actually?

MR. TAYLOR: Yeah. My understanding is that in general we're not going to be doing a back and forth discussion. This is a hearing, not a workshop. The intent here is to hear from the stakeholders, primarily. However, this is a conversation that we've had with Nest and I just wanted to clarify one of those points there.

You're statement was fairly emphatic that you

believe the language required OpenADR and only OpenADR. I believe the language is very clear that it requires OpenADR as a minimum, but it does not prohibit any other communication protocols. Is that your understanding?

MR. BERELSON: We wanted to make sure that it was clear that OpenADR is not a foundational requirement, but merely one of a series of options.

MR. TAYLOR: Understood. And that is my understanding of the language right now and we can work on that. But I also wanted to clarify one other point. You did mention the communications pathways from the aggregator to the individual devices. It sounded to me like you were describing the current practice of a cloud-based virtual end node structure. Is that what you're requesting? Because that wasn't entirely clear from your comments. Like, you seemed to focus a lot on the a perceived prohibition of other communication protocols, which I do not believe is in the language. But I'm very much interested in your comments on the cloud-based virtual end nodes.

MR. BERELSON: Yeah. We would prefer a cloud-based virtual end node.

MR. TAYLOR: Okay. And we'd be very interested in any support that you can provide on how that will benefit consumers.

MR. BERELSON: Absolutely, we will be including that in our written comments.

MR. TAYLOR: Wonderful. Okay.

COMMISSIONER MCALLISTER: So just to be clear though, Gabe. We are asking for every end use -- we are asking for OpenADR to be there, compatibility to be there in all cases. And then it's up to the manufacturer of end or service provider to whether or not they want to put in other protocols that may be used as well.

MR. TAYLOR: Absolutely. The current language that's in effect, the 2016 code language, requires an open source communications protocol to the end use device.

I understand that many manufacturers have been confused by that language and have interpreted it to allow for a cloud-based virtual end node structure, which I do not think complies with the open source communication protocol to the end use device.

Our language this year tries to clarify that. Just clarify that not only as an open source communications protocol or an open standard communication protocol required to the end use device, which has been Commission policy for more than a decade, now. But specifically we're saying that at a minimum OpenADR should be available, so that the utilities and the

aggregators don't have to speak in dozens of different languages.

But it does not -- I believe it says in the language, it says must be a virtual end node for OpenADR 2.0a. It certainly doesn't prohibit. There's no language in there that prohibits or requires "only" or anything like that. And I'm happy to clarify the language as necessary to emphasize that point.

However, I do want to further emphasize and we've had this discussion I believe offline, our interest in hearing from the stakeholders. That cloud-based virtual end node structure, that is the way that the industry is working right now. There are a lot of arguments in favor of that. But that would be a deviation from current policy. Our current policy is that open source communication protocol to the actual device. If we allow for a cloud-based virtual end node, then we're allowing for a proprietary signal between the aggregator and the individual devices, such as a Nest thermostat is an excellent example.

There are a lot of advantages to that. We understand that. But it is a change in policy. So we need to substantiate that. We need information on the record that proves, not proves, that demonstrates that it's beneficial to the end use customer and why.

MR. BERELSON: We are happy to demonstrate that.

COMMISSIONER MCALLISTER: So the flip side of letting markets function is that markets also -- providers also go out of business. And I'm not saying that's going to happen with Nest. But we could have a lot of stranded devices out there, depending on which way the market goes. So the backstop is having some standardized protocol there ready, which doesn't get in the way of somebody using their own protocol in the near term.

MR. BERELSON: Absolutely. This is a discussion that we have thought through internally and are happy to continue to elucidate that in our comments.

MR. TAYLOR: Okay. Thank you very much. I apologize for interrupting the hearing, the opportunity for the stakeholders to speak here. I do want to emphasize that our goal today is to hear from the stakeholders, not to have these kinds of discussions. I just wanted to jump in because you're point was so emphatic, I just wanted to make sure we understood each other.

MR. BERELSON: Thank you.

MR. TAYLOR: Thank you.

MR. NESBITT: George Nesbitt, HERS Rater. So

Section 110.5, the no pilot light section. It refers to a number of household appliances that may or may not have traditionally had a pilot light, including fireplaces. Now, if you go to Section 150.0(e) there's a section -- I don't have it pulled up on my computer at the moment -- but there is a section where there's some requirements for things like fireplaces, decorative I think gas appliances and gas logs, in saying you have to have things like doors and whatnot. So my question would be in 110.5, why we would not prohibit pilot lights for decorative gas appliances or gas logs also?

Then Table 110.6(a), there are no default U-values for triple pane windows, yet we know triple pane windows have been taking a larger, an increasing share of the market. And we the Energy Commission, I believe has even said that triple pane windows are a great compliance option for the upcoming 2019 code and provide lots of benefits.

We also, in the table 110.6(a), the U-value table, in 2005 code we used to have a low E credit. So if you had a window that was low E, you could take a lower U-value. That was removed I think, in 2008. It really should be put back in.

And then on table 110.6(b), which is the solar heat gain coefficient table, I've been asking for years

the definition of tinted. Because when you're talking about, especially in existing buildings and you may not have NFRC values, you can tell if a window is clear or tinted or not or if it has low E. You're putting stuff in the computer software and you may be getting credit or a penalty, based on your default value that you use. And especially since the proposal to change the default solar heat gain coefficient in some of the heating-only climates in the performance path, if you have to take credit for a clear window, you're actually then going to get a larger credit than you would deserve. So you need to define what a tinted window is and that should include if it has low E.

I don't have a section at the moment, but the section on pools and spas we've required a 36-inch space for adding solar hot water. It occurred to me the question would be does that requirement also apply to manufactured spas? So a spa in a box, as opposed to a built up spa, site built.

MR. STRAIT: What section was that?

MR. NESBITT: I'm sorry, I don't have a section at the moment. It's the pool and spa section. I just -- I added it during the presentation, so I just didn't have time to look it up.

MR. BOZORGCHAMI: So George, while Peter's

looking at that, let me -- you brought up your issues with 150 and burning pilot lights?

MR. NESBITT: Yeah.

MR. BOZORGCHAMI: Well, 150(e)2 contains burning pilot lights are prohibited in all products. So I'm not sure where you get that information on burning pilot lights not being consistent with 150 --

MR. NESBITT: Well, 110.5 says "fireplaces," but it does not say "decorative inserts or logs". And my understanding has been in the past that a fireplace was required to not have a pilot light where decorative logs and or "decorative appliances" were allowed to have pilot lights. So it would seem we would want to prohibit all pilot lights.

MR. STRAIT: This is Peter Strait with the California Energy Commission. I do recall there is a quirk in federal law about appliance rate as related to decorative fireplaces. That might be a reason that this is set up the way it is, but I would have to research that. Otherwise, I agree in principal, from a policy perspective standing pilot lights are bad, so.

MR. NESBITT: Right. So then the last comment is on Section -- I don't know if I have it right -- 10-10 or it's the solar ready section. The main issue I have with this section and have had is Section (e), which is a

service panel where you have required a 200 amp service panel. That's far too big, especially when you get into multifamily. Who puts in 200 amp service panels on a multifamily apartment unit? It requires larger service wires, larger conduits, a more expensive panel. It's simply not needed, even on a lot of single family homes.

The requirement -- well, I believe there is somewhere also a requirement that you have a space for a -- it needs to be a two-pole space for a minimum of a two-pole space for a PV system. But what the electrical code used to say and I think some of that language has changed, is that the panel has to have the ampacity. Used to be the PV system had to be included as a load on the panel. Although I think they've changed that requirement, where I think they don't consider it a load any more. But requiring a 200 amp panel is simply not reasonable.

Another thing that had come up in some of the various workshops was the issue of also having a space for EV charging. Having the capacity to have space for EV charging, as well as you need to have space for battery storage system. And the reason this is important is it's expensive to change out service panels. And I've been on plenty of jobs where the electrician has put in a subpanel, filled the whole panel with half breakers,

there's not more space. So what's it cost every time you have to back and redo something? It costs a lot of money.

So the idea should be being ready and being ready by having spent a little bit of extra money to have the capacity to simply to tap in as needed.

MS. PETRILLO-GROH: Good morning. I'm Laura Petrillo-Groh from the Air Conditioning and Refrigeration Institute. Thanks for holding these public hearings and also I appreciated some of the back and forth conversation on the demand response section, I believe it was 110.12(a).

AHRI has been working with CEE and EPRI on a standard for variable capacity heat pumps that are demand response ready, smart equipment. And one is the draft is currently working its way through committees. And one of the comments that's come back is the desire to include a test method for communication through the cloud by OpenADR, but then on a proprietary system from the cloud to the end node device. The standard also does include provisions for testing and signals related to OpenADR directly to the equipment as well as CTA 2045. But having the market options, it seems to be highly desirable for the manufacturers of those products as well.

MR. HARING: Good morning, Rick Haring from Phillips Lighting, we appreciate the opportunity to participate in the rulemaking through the comment process. Just a quick comment on the changes described in Section 110.9 by Mr. Strait, yeah we support these changes although we would suggest that there be a reference in Title 20 that points to the requirements in Title 24.

MR. STRAIT: Simply to clarify, we are working internally with staff to discuss whether we should or can make matching changes to Title 20. I don't have the ability to speak for that team, but we are working internally on the topic.

MR. RAYMER: Yes, Bob Raymer with the California Building Industry Association and sort of in response or clarification of a comment that George had mentioned, back in July of 2015 HCD's regulations for EV-ready charging facilities took effect in Part 11 of Title 24. And so 100 percent of all new homes that were permitted after that have to have enough space on the electrical panel. I realize that that can be confusing to the general code user, having electrical provisions in Part 3, Part 6 and Part 11. But the fact is all new homes have to have that extra space, so we're good to go with that.

MS. WAHL: Hey, Francesca Wahl of Tesla. I just quickly wanted to follow up on the discussion with Nest on the OpenADR language. We've also expressed some concerns there similar to what Nest spoke about, and just wanted to also reference the fact that at the PUC there might be some competing standards for distributed energy resources, under Rule 21 with SEP 2.0, for monitoring and control. So we wanted to take that into consideration and will follow up in our written comments as well. Thanks.

MR. BALNEG: Okay. We have an online question from Jonathan Houle from ecobee. "Will the code specifically state which building types 110.12 applies to, for example commercial or residential building forms?

MR. STRAIT: So for those sections it's in 110.12, because it potentially applies to both types of buildings. Some of the requirements that were moved were non-residential-specific. And those say that that section applies to non-residential. So Section (a) applies both to residential and non-residential. And then the following sections specify that they only apply to non-residential. We can look at improving the clarity of that language. Do we have anyone else on line that has raised their hand to speak?

(No audible response.)

MR. BOZORGCHAMI: No. Okay. So with that we can move on to next section?

COMMISSIONER MCALLISTER: You know, I want to make just a color commentary a little bit about the DR discussion. I know it's an area actually that I have -- in the two IEPR that I've lead in 2013 and 2015, and actually this past IEPR as well, sort of as part of it under the Chair's leadership -- have really tried to force the demand response discussion and have it as a stand-alone topic. And honestly it's been quite frustrating, because it's relatively complex. It happened at the same time we've seen influx of a wide diversity of distributed technologies, on the demand side and certainly also on the -- whether they're generation or storage, or efficiency, controllable efficiency, dispatchable resources of one form or another.

So the fact is this is a very fragmented marketplace. And if we are going to scale demand response, we need approaches that actually are simpler and are at least somewhat standardized. So I would exhort everyone to sort of look at it from -- certainly you have to look at it from your own kind of commercial perspective, but absolutely look at it from a California policy perspective as well. And try to appreciate the fact that we need some scale if we're going to get demand

response sort of in its rightful place, at the top of the loading order if you will, right? Otherwise, we're going to be making lots of investments in hardware that may not be necessary.

Anyway, that's my view. And I'm not expecting everyone to completely buy into that from your commercial perspective, but I think from a policy perspective as a standard-making body, the Energy Commission has to consider these pathways. And so I really want people to look at it from the perspective of our state goals and how we, here at the commission and over at the PUC and our sister agency can coordinate such that this ecosystem for demand response, and all the different technologies that have to plug-n-play within it, can work together.

Okay. So that's my ask to all of you, so thank you.

MR. STRAIT: All right. So we're moving on to Subchapter 7, that's Section 150.0 et seq.

For Section 150.0, mandatory features and devices and wall insulation, we modify the mandatory minimum wall insulation requirement to R20, specifically in 2x6 framing.

We would note one request we got nearly immediately, was to also include a U-factor requirement, so that someone can demonstrate compliance either by

meeting the R-value, or by meeting the equivalent U-factor. And we're working internally on that.

In Section 150.0(d), raised-floor insulation for wood framed assembly, we changed that to make clear that the requirement of 150.0(d) only applies to wood-framed floor assemblies. This wouldn't make sense to measure in other assemblies.

In Section 150.0(k), we undertook an effort to remove a significant amount of redundant language and to clarify the way each measure is phrased. In addition, we added language to address step lights and path lights to provide the same function as a night light and to address lighting internal to drawers, cabinets and closets. We also clarified the phrasing of the elevated temperature requirements to make it clear in applying to lamps and similar removable products, not to fully integrated SSL products such as SSL down-light retrofit luminaires.

We know that right now in the market we're getting a lot of questions from folks regarding these insertable solid state retrofit products. They are effectively complete luminaires, but they make use of a housing that's already installed. The ENERGY STAR has clarified that they treat these as luminaires. We'd like to make that same treatment, but that is causing confusion regarding marking. We're looking at ways to

resolve that in 2019 and we're trying to get in front of that as best we can.

In Section 150.0(k)2, interior lighting switching devices and controls, the substantive changes are that we add an exception to allow ceiling fans to be controlled by remote controls and added language to allow installation of occupancy sensors provided they are initially configured to manual on behavior.

The other changes to these sections are clarifying, so just consistently using the term "control" rather than "switch" and condensing language used to specify the outdoor control requirements. These small changes can be important, because for example, there are now new types of controls, digital controls, that may or may not operate by opening and closing the circuit. And therefore the word "switch" might be read as being more limiting when all we're asking for is a control behavior.

And now for a discussion of the ventilation system I'm going to ask for our ventilation expert to speak.

MR. MILLER: Jeff Miller, Building Standards Office. Oh, tell me how to navigate, please.

MR. STRAIT: One second, I'm going to have to put you back in percent mode. There we go.

MR. MILLER: Section 150(m)1, mandatory duct

insulation requirements were clarified. Our R6 is the minimum R-value. Otherwise a minimum value of R4.2 is allowed if the system is verified to be entirely in conditioned space by use of the leakage to outside protocol.

In reference to Residential Appendix RA3.1.4.3.8, there are two exceptions to these minimal R-value requirements. The first exception, portions of the duct system located in wall cavities are not required to be insulated as long as they are visually verified to be located entirely inside the building thermal envelope and the transition between the wall cavity and the unconditioned space is air sealed to prevent air filtration into the cavity and the transition is insulated to R6.

The second exception is that portions of the duct system that are completely exposed and surrounded by directly conditioned space are not required to be insulated.

150.0(m)12A, air filter requirements were expanded to include ventilation systems that use ducts to bring outdoor air into the building. So now in addition to requiring air filters for ducted central space conditioning systems, supply ventilation systems and the supply side of balanced systems, are required to filter

the incoming air.

150.0(m)12B, design and installation section of the air filtration requirements has been revised to require ducted central space conditioning systems to be installed with two-inch minimum depth filter, which makes possible lower pressure drop and higher air flow rates through the filter.

Alternatively, a one-inch depth filter may be installed, provided the air filter grill and filter media are designed to meet two performance criteria. The filter face area is sized to ensure the face velocity is no greater than 150 feet per minute at the design air flow rate for that filter. And that's simply the sizing is to divide the design airflow rate by the face velocity. And that gives the required area for the filter.

The media installed on the filter grill conforms to the maximum clean filter pressure drop given in 150(m)12Dii, which is 0.1 inches of water column at the design air flow rate for that filter.

The 150.0(m)12C air filter particle size efficiency requirement has been increased from MERV 6 to MERV 13. This is applicable to central ducted space conditioning systems, supply ventilation systems and the supply side of balanced ventilation systems.

For space conditioning systems, the air filter pressure drop requirements have been changed to allow two compliance options. One a minimum two-inch filter is specified for the design, the pressure drop and the design air flow rate for the filter is determined by the system designer. Otherwise, when a minimum of one-inch depth filter is specified for the design, the pressure drop is required to be less than or equal to 0.1 inches of water column.

For all other ventilation systems, the pressure drop at the design air flow rate for the filter is determined by the system designer.

A little bit more information on pressure drop. Staff has relied on research that studied the energy and system effects of MERV 13 filtration. Studies reported that small, approximately 1 percent increases or decreases in energy use when using higher MERV filters, that's MERV 11, 12, 13 and no significant performance issues. References of this research are submitted to the docket.

Staff reviewed air filter pressure drop performance data published by manufacturers when possible, but often manufacturer performance data is not provided by the manufacturer. At CEC staff request, the CASE Team has provided the laboratory testing of samples

of one inch and two-inch depth air filters in a range of MERV levels from a variety of manufacturers, predominantly those that are on the shelf in the big box stores and predominant on the Internet.

The pressure drop varies considerably from manufacturer to manufacturer. And what's clear is that MERV level and filter depth is not a reliable predictor of the filter's pressure drop performance, expected pressure drop performance as the manufacturer may design air filters with greater or fewer numbers of pleats, of the same media type. However, it is clear that two-inch depth filters have the potential to provide greater air flow at lower pressure drop and with a reduced faced area.

The Energy Commission has proposed air filter and label requirements that are expected to make possible a selection of filters, based on test ratings of pressure versus air flow. That rulemaking, we expect it to be completed this year, and have labeled filters available at the point in time when the standards become effective.

This is a graph from one manufacturer of air filters. And this manufacturer has begun to label their products using the California Title 20 required label. Staff plotted the pressure drop performance for MERV levels of 5, 7, 11, 12, 13 and 14. And the pressure drop

performance published for this manufacturer's products is virtually the same regardless of the MERV rating. And highlighted in this graphic, is the 0.1 inch water column design criterion.

150.0(m)13 furnace fan efficacy requirements have been revised. We've added a requirement for a maximum of 0.45 watt per CFM for gas furnace air handling units only. The existing requirement for those air handlers is less than or equal to 0.58 watt per CFM. Additionally, we've added a requirement for small duct, high velocity, systems, so a minimum of 250 CFM per ton and maximum of 0.62 watts per CFM.

Fan efficacy is a mandatory requirement in Section 150.0(m)13. Fan efficacy is also a prescriptive requirement in Section 150.0(c)10 for central fan integrated ventilation systems.

The return duct design tables in -- that's Tables 150.0-B and 150.0-C are available as alternative to HERS verification of fan efficacy. They remain the same except that the allowable pressure drop for the air filter has been changed to 0.1 inches of water column. It previously was 0.05 inches of water column.

Section 150.0(o) covers the requirements for ventilation and indoor air quality. All new buildings and new additions to existing buildings greater than

1,000 square feet are required to meet the ASHRAE 62.2 2016 version, but with the amendments specified in Section 150.0(o)1.

Section 150.0(o)1C specifies a new method for calculating the ventilation rate, which has two aspects. The required ventilation rate will be based on a default dwelling unit enclosure leakage of 2ACH50 for the infiltration credit portion of the ventilation air flow rate calculation. Otherwise, if HERS verified enclosure leakage values are less than 2ACH50 the HERS verified value will be used for calculating the required ventilation rate.

Section 150.0(o)1E is applicable only to multifamily dwelling units. The required ventilation rate will use ASHRAE 62.2, Section 4.1.1, which uses the basic ventilation rate without an infiltration credit. And also is required to comply with one of two alternatives: either use a balanced ventilation system for the dwelling, otherwise if HERS verification of the dwelling unit determines an enclosure leakage less than or equal to 0.3 CFM per square foot of dwelling unit enclosure area using a blower door test, then the dwelling may use continuously operating exhaust only, or continuously operating supply only, ventilation systems.

And note that this means that intermittent

ventilation control strategies would not be allowed for this option. However, demand control ventilation, such as kitchen range hoods and bathroom exhaust fans that are not use for meeting the Section 4.1.1 ventilation rate may operate intermittently.

Section 150.0(o)1F is applicable only to multifamily buildings and dwelling units that use building central ventilation systems that serve multiple dwelling units. For these systems, the ventilation air flow rates to each dwelling unit served are required to be balanced, to be greater than or equal to the ASHRAE 62.2 dwelling unit ventilation air flow rate, and not more than 10 percent greater than that ventilation rate.

The systems are expected to use balancing devices that ensure the dwelling unit air flows in each dwelling served by the building ventilation system can be adjusted to meet this balancing requirement. The system balancing means may include constant air regulation devices, orifice plates, and variable speed central fans.

Section 150.0(o)2 specifies a new HERS verification for kitchen range hoods. The HERS verification will confirm the installed range hood is rated by HVI to meet the minimum ventilation air flow rate, specified in Section 5 of ASHRAE 62.2, which is 100 CFM.

And that the maximum sound rating specified in section 7.2 of ASHRAE 62.2, which is 3 sone at an air flow rate greater than or equal to 100 CFM. And that is also expected to be at the 0.1 inch of water column. And I think we'll need to clarify the reference to this section, just to be sure that that's clear that we expect the rating to be done at 0.1 inches of water column.

Shall I read this again? No?

MR. BOZORGCHAMI: Commissioner, before we start the comment period for this section I want to go back to one of the earlier slides that Peter Strait had presented, this one right here. The wall insulation, modified the mandatory minimum wall insulation to requirements to R20 for a 2x6.

In the code under Section 150.(c)2 we say 2x6 or greater framing shall have an overall assembly U-factor not exceeding a 0.071, or a R20 in the wood frame assembly. I wanted -- to be product neutral we're going to be taking that R20 out and leaving it as a U-factor. So if anybody wants to do -- is doing a 2x6, they could meet that U-factor by adding insulation in the cavity or ridged insulation on the exterior, or using any type of products but being product neutral.

So to us it wouldn't matter if it's spray foam, if it's glass, if it's any of those or SIP type panel --

actually SIP wouldn't meet this because they're not framed systems -- but we don't want the standards to be used as a marketing scheme. And I'm proposing that we go with just a basic U-factor.

So with that, I'll leave it up for comment.

(Off mic colloquy.)

MR. NITTLER: Good morning, Ken Nittler with Enercomp. On that issue, Payam, on the wood frame assembly, does this mean there's no minimum criteria if you don't have a wood framed floor? The term wood framed assembly was already in that code section saying that it had to be equivalent of, in the past R19 with wood framing. And now the wood frame assembly is moved up to the headline. And basically, it appears to me there's no -- you've eliminated --

MR. BOZORGCHAMI: Yeah, I saw that too. I'm going to have to fix that, but like I said I'm trying to be product neutral here.

MR. HODGSON: Mike Hodgson, ConSol representing CBIA, a couple of questions on the mechanical systems and we've had these discussions with staff and Jeff, thank you.

In I believe it's 150.0(m)12, air and filtration, the one inch -- there's a two-inch requirement, but one inch is fine as long as you have the

150, the face velocity of 150, maximum face velocity 150, I guess, CFM. If we have sent this language out to the multifamily installation HVAC, MEP firms and have not received comments back yet and we just wanted to let you know that we've asked that question. Thank you for giving us an off-ramp here, but we'll get feedback from the multifamily folks and how that works. So that's great. I appreciate that.

In Section 13B in 150 where we're talking about the fan/watt draw dropping from 0.58 to 0.45, I understand that that's being driven by the NECA standards and the requirements for gas furnaces; is that correct?

MR. MILLER: The new federal requirement, yes?

MR. HODGSON: Right. And when is the implementation date for that?

MR. MILLER: I don't have it committed to memory, but we understand that it'll be in effect far enough in advance for the industry to react.

MR. HODGSON: Okay. So I don't remember whether it's the '13 or the '16 standards, I think it was the '13 standards, we had the implementation date with air conditioners. And the issue there was not when the manufacturers could quit making the units, but when they could be sold and installed. And so we would like to have a discussion with staff on the implementation date

for this also, to make sure that we're not in that gray zone of where it is not manufactured, but there is still a supply that's out there, but oops, they can't be installed in California. So we need to clarify that, so we'll follow up with staff on that.

MR. MILLER: Okay.

MR. HODGSON: Because we'd like to understand that. And last time in the NECA standards it was very clearly outlined. We just have to find it and get it together.

In the section on addressing ASHRAE 62.2, which is (o), there was a comment earlier and I'm not sure -- I just can't find it right now, but it had to do with labeling. And there was a labeling requirement in the California code that's been dropped out. And this is a labeling for the homeowner to understand which switch was controlling the ventilation fan, the ASHRAE 62 ventilation fan. And I believe in this standard or the previous one, there was a reference to ASHRAE on how to label. But we question what that label was. We don't quite understand what it is and it's now -- I can't find it in the standards, so I'm not sure if it's even there.

MR. MILLER: It's still in 62.2

MR. HODGSON: So what we would like to see is what those exact labeling requirements are. And I

believe they refer to the fan and not the switch and the standards were referring to the switch and not the fan. So we want to make sure we're all on the same page for labeling.

MR. MILLER: Okay. It's under controls, so it says there should be an override control that's labeled.

MR. HODGSON: Okay. And can you explain the labeling requirements in 62.2 then for that switch?

MR. MILLER: Expect it to be labeled as to its intended use, unless it's obvious in the case of a switch for a bathroom fan.

MR. HODGSON: Okay. I don’t want to belabor this, but that's really not -- it's not clear to the industry what to do. And it also seems to cause implementation of actually running the fans in the field to be done poorly. So we would like to get some clarification possibly not in code, but maybe in the residential manual, to make that better enforcement and more implementable. Thanks, Jeff.

MR. MILLER: Sure.

MR. STRAIT: Yeah. Actually, this is Peter Strait. I know that part of the reason we had for reducing some of that language in the prior code cycle was to prevent R code and the ASHRAE code that we were referencing from being in conflict. But yes, I think

that the compliance manual or some other vehicle would be fully appropriate for that.

MR. NESBITT: George Nesbitt, HERS rater. So 150.0(c), the wall insulation since you brought that up, I think we have always had a minimum specified R-value. And I would think, in some respects, a 2x6 should still be specified as a minimum R19. Part of the reason would be so -- how do I say this -- one issue that's not addressed in this section, but of course is a requirement of QII is that you're insulation fills the wall cavity. So this section, I think needs to say that all air permeable wall insulation needs to fill the cavity completely.

I think we've all seen 2x6 cavities that had R13 or R11 installed, in the past. I mean that was not uncommon and we know that's not a good thing. So by going to a U-value, I guess in theory -- or I mean with a U-value you can average the area. So in theory, you could insulate some areas R11 in a 2x6 wall with a fiberglass batt, insulate other areas with spray foam and I guess, in theory, on average you'd be all right. That's kind of my concern with not stating a) a minimum and b) stating that wall cavities have to be filled with air permeable insulation.

Then on 150.0(d), the raised floor, I guess

kind of to -- so if I build a raised slab, there's no minimum insulation requirement?

MR. STRAIT: No.

MR. NESBITT: If I build a steel building, with a steel framed floor, there's no minimum requirement? So, okay, it's one thing to have a requirement for wood floors, but shouldn't there be minimum requirements for other things too?

MR. STRAIT: So just one point of clarification, and I probably wasn't clear with this in the presentation. But the issue with this section, which is 150.0(d), is that at the end of that section it said "any wood framed assembly." And so we moved that up to the top of the section, so that it was clear to the reader that that particular provision only applied to that circumstance. That doesn't say that there is not a requirement elsewhere in the code.

MR. NESBITT: So then back to the 150.0(e)2, back to my issue about the decorative appliances and gas logs, so in 2 it does say a continuous burning pilot lights in the use of indoor air, for cooling a fire box jacket when that indoor air is vented to the outside of the building, are prohibited. I still don't think standing pilot lights are a good idea. Although up above, you say you're supposed to have a door I can tell

you, I've seen people put in decorative logs or things with a standing pilot light in an open fireplace.

We should also be prohibiting unvented combustion appliances. Sadly with the exception of the stove/oven in the old days the ovens actually did have a vent pipe to the outside.

Moving on to Section 150.0(j)A, I believe. On pipe insulation you've I guess punted, essentially punted to the plumbing code. But at the same time you are requiring a minimum of one inch of pipe insulation. So one inch of fiberglass or one inch of the polystyrene or one inch of the, well like Armaflex, the kind of material that's used on air conditioning lines. Those have different R-values.

So if you want to be -- I mean so if you're going to require a minimum thickness you're actually requiring different R-values and at different cost. And the cost of air conditioning, the type of material in that is far greater. So what I have asked for, for years and years, is that the pipe insulation chart actually be based on R-values for the different temperature conditions, as opposed to a thickness, or something.

And additionally, you're requiring pipe insulation on only three-quarter or one-inch pipe. So if someone installs an inch-and-a-quarter pipe, or an inch-

and-a-half pipe, or a larger pipe, they don't have to insulate it. So I believe you really want that language to say, "All three-quarter inch or larger pipe should be insulated."

MR. TAM: So I think you might be misreading that section, but yeah to your first point if you go to 120.3, the table, we did add the R-value for the equivalent thickness that you've been asking for.

MR. NESBITT: I haven't seen the table.

MR. TAM: It's in 120.3. And the one-inch requirement has been there since 2013. I understand the different type of insulation though, different R-values (indiscernible) --

MR. NESBITT: And I've been probably been raising it since 20 (indecipherable) --

MR. TAM: So it just for a simplification we asked for one inch, knowing that some insulation has higher R-value. But it's not our intent to not require pipe insulation above a certain level. It just saying within those conditions, you need one inch insulation. And otherwise you have to go with the plumbing code, which requires pipe insulation on all pipes.

MR. STRAIT: This is Peter Strait. To clarify, the requirement in Section 609.11 of the California Plumbing Code does apply to one inch and higher. So

there's a -- and it's the requirement scales based on the thickness of the pipe. So we're saying follow that. And then in addition, for these areas where 609.11 would have required less insulation than what was specified in the 2016 version of Part 6, those areas are the ones we're specifying continue to meet that minimum one-inch requirement that we've had. So we're not punting so much as aligning with the California Plumbing Code. This was adopted in the plumbing code in 2016 and we want to make sure that our language and theirs is consistent.

MR. NESBITT: Okay. Well, if the plumbing code includes one inch, then you don't need to include it in the energy code and you just need to say three-quarter.

MR. TAM: So those sections, the requirement is less than ours. That's why there's a little disconnect.

MR. NESBITT: Okay. Well, then it would just be clearer to state what you want. I mean in a simple table that says R-value, because when I buy pipe insulation it is stamped on it what the R value of it is.

MR. STRAIT: So just to point it out, this same section, this is under Part B, we've added reference to Section 120.3. And this was previously a reference to Table 120.3-A. That's where you get directed to 120.3 and we did add the table with the R-values over there.

We're not discussing the non-residential changes in this setting, but if you have comments in that section, we'd be willing to hear them today.

MR. NESBITT: Okay. You also removed language in this section, I guess saying piping between storage tank and the heating source, buried pipes and whatnot. The other thing is then the requirement or then the exception for pipes that are buried within the insulation. And so you require a minimum of one-inch coverage for that.

So in walls that requires QII. But I guess in floors and ceilings, people do a good job installing insulation. And I'd also like to point out that -- is that one-inch cover in a ceiling with blown-in cellulose before or after the cellulose settles? And what about when the wind blows it away? Or the electrician who goes up there, or the cable guy, or whoever it was and stomps the insulation or moves it around so they can do whatever they do. Especially in an attic, it needs to be deeper buried than one inch. That would be my comment.

Then on Section 150.3(b), which is in exterior lighting, basically I think if I'm understanding it right, you're saying that a building with four or more units has to require what the outdoor -- the non-res outdoor lighting requirements? Is that --

MR. STRAIT: If that's a question, the changes to those requirements are we simply consolidated two sections. There is no change in the requirement for 2016.

MR. NESBITT: But is that correct that it basically is saying you're complying with the non-res? In my understanding in non-res, for high-rise, multifamily residential units, it falls under the residential lighting. And if the exterior lighting is controlled from in the apartment it falls under the residential, so I'm just wondering if there's a --

MR. STRAIT: So the specification is for low-rise residential buildings with four or more dwelling units, any outdoor lighting for residential parking lots or car ports, so eight or more vehicles per site, any outdoor lighting not regulated by Sections 150.0(k)3B or (k)3D, shall meet the non-residential requirements. So I think the scope there is fairly straightforward.

Then we have here the low-rise residential buildings with four or more dwelling units, outdoor lighting for private patios, entrances, balconies, porches, residential parking lots and car ports with less than eight vehicles per site, shall either comply with 150.0(k)3A, or they have the option of complying with non-residential requirements. So this gives flexibility

--

MR. NESBITT: Okay.

MR. STRAIT: -- rather than mandating.

MR. NESBITT: Okay. But I do remember there is an exception in the non-res for if it's controlled from the apartment.

MR. STRAIT: That's correct.

MR. NESBITT: I was just wondering if it was somewhat circular or confusing.

So on to 150.0(m)12 I believe, so this is the section on filtering for supply ventilation. A couple of things. I'm wondering if requiring filtration on supply ventilation does not discourage people from using it. Plus, the requirement is that if it's ducted it's only filter if there's more than ten feet of ducts. Yet, it's required on a balanced ventilation system as well as any supply-only ventilation system. So I'm kind of wondering why ten feet doesn't make any sense. So a) what that would apply to, but does it even make sense?

MR. STRAIT: We're considering simply saying "ducted systems." The thing that we want to be clear about is that we're not requiring not ducted systems to comply.

MR. NESBITT: Okay. Then state that ducted supply only systems must be filtered. Non-ducted supply

only systems or supply systems don't have to be filtered. I mean that sounds so --

MR. MILLER: I understand your comment.

MR. STRAIT: Just to specify this was based on an earlier comment that we've heard from manufacturers of ductless equipment that occasionally what they will do is they will install one terminal above two rooms and use a short like two-foot run to have that one terminal serve two rooms. But it still using a non-ducted piece of equipment. So there's a question whether if we just said non-ducted and didn't have a minimum size, whether it would rule out that approach. Because we were sensitive to having to put a filter in addition to the filter on the equipment in that system. And we really don't want to limit -- we don't want to get -- cause any more disruption to some of that stuff. Nonetheless, I agree that the simpler language would be preferable to that.

MR. NESBITT: Then the simple solution would be to say, "All supply ventilation systems that are ducted more than ten feet have to be filtered." That's it. You don't need anything else. It has nothing to do with balance or supply only. It's laying for the duct.

MR. MILLER: Well, actually we do want incoming air to be filtered whether it's ducted or not. Space conditioning systems recirculate air and it's those types

of systems, some of them are ducted and some of them are not. We would not require higher MERV filters for not-ducted space conditioning systems. That's what we want to be clear on.

MR. NESBITT: It would be more clear if it was more clear with -- if your language actually reflected what you want.

So 150.0(m)12A2, so on the filter size. I mean I understand the issue with filters and size and pressure drops and all that, but when I size a return grill all the tables are based off of a maximum of about 350 feet per minute. And so you're saying if I have a one-inch filter, I have to stay below 150 feet per minute.

And then you also, for I guess the one-inch filters, want to restrict the pressure drop. My concern here is we want to go to higher MERV, which on average probably means a little more pressure drop, we have a serious problem with air flow, because people don't design systems. They don't size ducts right, they don't size grills right, they don't size their return grills right. So basically, you're saying I can put in a two-inch filter. I could greatly undersize it, go to 500 feet per minute. But technically I've basically met the code, because I put in a MERV 13 and a two-inch, whether I did the right thing.

MR. MILLER: Well, you would also have to pass fan efficacy for that scenario. It's the flexibility that is needed to be available.

MR. NESBITT: Right. But I just wonder if it would be better to state what size filter, thickness filter you use, but just state a maximum face velocity and a maximum pressure drop. And you have to size it, whether you want to go to a one-inch or two-inch or a four-inch as opposed to --

MR. MILLER: We've attempted that in the past, but found that some systems require the flexibility to design for higher pressure drops. And so we have to allow that as what we expect them to do is to be able to pass fan efficacy, the watt per CFM.

MR. MEYER: Okay. Just for the second time I think it's been -- we'll just try to wrap your comments up and just get them in writing, because some of these are getting a little technical. And then we can respond to your comments in writing.

MR. NESBITT: I just had a couple of more comments. On the air flow measurement, the 350 CFM per ton, in a number of places you refer to it as being high speed, but I would like to remind you that you can select speeds on furnaces. It should be ideally at the operating speed.

So then in 150.0(n), which is the water heater section, you have -- we've added requirements I think in 2013, to do -- essentially pre-plumb it for a tankless water heater or another high-efficiency condensing tank. I was noticing that in 1(a), you're requiring a 10 gauge, 120 volt wire. And that seems a) big, because that's actually bigger than a 20 amp circuit. And most water heaters that require electricity would not even need a 15 amp circuit. But it also raises the issue of being heat pump ready. There you would need a 240 volt circuit. So the question should be, should we be requiring a 240 volt circuit be run to the water heater locations, so someone can put in a heat pump?

Another issue I kind of came up with is if you have an all-electric house and you have an electric water heater, do you still have to install the 200,000 BTU gas line? I did not notice an exception on that, so maybe there one. Maybe I didn't catch it last night.

MR. TAM: So George that requirement I think is specifically for gas water heaters. So if you install a heat pump, then you will not need to run the gas line.

And to your first question about the 10 gauge, that is intent to allow easy replacement for heat pump water heaters in the future. That's why it says "dedicated," so in the future they can switch out the

circuit.

MR. NESBITT: But a 10 gauge 120 won't do it.

MR. TAM: Right (indiscernible) --

MR. NESBITT: A 10 gauge, 220 would, but that's not what you're asking for.

COMMISSIONER MCALLISTER: Hey, George let's -- I want to just reiterate what something that Christopher said just a little while ago, some of this stuff is highly technical. And we're not here to work through all the details, but have your comments in writing so we can respond in kind. Thanks.

MR. NESBITT: One last -- under 62.2, I don't think you stated a reference year in the codes. I did not see a reference year.

MR. MILLER: In 150.0?

MR. NESBITT: Yeah. I did not notice a --

(Off mic colloquy.)

MR. MILLER: Okay. Yeah.

MR. NESBITT: And then you need to remove the infiltration credit for the blower door for the ventilation rates.

MR. RICH: Curt Rich, North American Insulation Manufacturer's Association. I want to speak back to the mandatory feature requirement on 2x6 wall assemblies.

We support the move to R20 and the rational for

that is the current requirement of R19 insulation in a 2x6 cavity, that's a typically for fiberglass insulation. That's a six-and-a-quarter inch thick product. When put in that cavity, it has to be compressed to five-and-a-half inches. And so you're actually seeing a delivered R18 in that product. So moving to an R20 product delivers that R20.

I think I'd raise concern with the comment made by staff that a need to express that only as a U-value. Insulation, thermal performance can be expressed either in terms of an R-value or a U-value. R-value is not product specific. All insulations types can be expressed in either of those terms. I think it's important to remain consistent and express that requirement both as R-value and as U-value, going forward. To not do that would I think, interject a lot of uncertainty in the marketplace. If a builder were to purchase insulation at a big box store they're going to see that insulation on the label expressed typically, in R-value. U-value would be in the fine print. And so I just think that you should remain consistent with the code as currently written, in terms of providing that option, both R-value and U-value. And I don't think you lose the ability to say that you're product agnostic in doing that.

MR. BOZORGCHAMI: So Curt, the reason I said

that is not based on glass, I know glass couldn't meet the R20 in a five-and-a-half inch thick cavity. The problem I'm having is having spray foam, open cell spray foam trying to meet the R20 in the five-and-a-half inch cavity. They can't really get up to an R20. They get close, but not there. So someone might -- one of the major builders here using spray foam is going to have do something else like add in continuous insulation to make up that U-factor.

The basis of our study that we did isn't R20, you're right. But I just want to make sure that we're product neutral and we could get that part of the market still to play in the game of insulation.

MR. RICH: And I think you accomplish that by, as the proposed change provides, expressing it as R20 or a U-value of 0.071.

MR. BOZORGCHAMI: Fair enough.

MR. RICH: Thanks. Thank you, (indiscernible).

MS. PETRILLO-GROH: Laura Petrillo-Groh, Air Conditioning, Heating and Refrigeration Institute. We've got the for Section 150.0(m)13, I believe it's C, the federal furnace fan efficiency rulemaking comes into force July 3rd, 2019. So all products manufactured on or before that date now have to comply with the new federal test procedure.

And I do appreciate that additional testing was conducted for this measure, for the proposal that CEC has brought to the floor. But just to restate, there's no calculable method to connect the federal FER metric to what Title 24 is achieving with their fan efficacy proposal. The additional testing did look at a lot of ten furnaces for this. However there is concern for minimum efficiency, particularly package products, that there may be some stranded inventory, or it would be to some complicated situations between homeowners, builders, distributors and manufacturers. Because there will be inventory in distribution that is federally compliant after that July 3rd date.

So we would request that CEC include some way to tie back the date of manufacture to this new fan efficacy proposal to ensure that these compliant products are allowed to continue to be allowed to be installed.

MR. PENNINGTON: And could you submit your comment in writing?

MS. PETRILLO-GROH: Yes. Of course.

MR. PENNINGTON: Right.

MR. BOZORGCHAMI: Did you say that's July 3rd, 2019?

MS. PETRILLO-GROH: Yes. And for 150.0(o), we appreciate harmonization with 62.2. We understand that

some of the measures being proposed to be adopted by Title 24 2019 are draft addenda for 62.2. So while a year may be worthwhile to be cited, there are some citations that probably will not go back to the current edition of 62.2.

For 62.2, the standard uses attached and non-attached when describing the dwelling unit, a suggestion my colleague made when reviewing this text is that CEC make clear how this relates to multifamily units. He noted that someone could misinterpret an attached dwelling as a single-family dwelling and misapply requirements. So I'll also submit that in writing, but just a not for you all today. Thank you.

MR. BOZORGCHAMI: Okay.

MR. STRAIT: Just to clarify the edition or year of the test procedure we referenced is specified in the definition Section 100.1. We also specify them at the back of the document and in documents incorporated by reference section. So they're not present in-line in this section, but they are present in the code.

MS. JENKINS: Good morning Commissioner McAllister and everyone. I'm Peggy Jenkins and I manage the California Air Resources Board's Indoor Air Quality Program. And thank you for providing this opportunity to comment on the Title 24 proposed changes.

ARB supports the amendments proposed by your staff. And I would just like to highlight our support of two priority proposals. And if I have this correct these apply to Sections 150.0(m)12, 150.0(o)2B. And it also applies to some of the non-res sections, 120.1(c) and 120.1(b), 2(b).

We fully support your efforts to maintain and improve both indoor and outdoor air quality while pursuing increased energy efficiency in California buildings. We especially support your staff's proposal to require high efficiency air filters for all new buildings statewide for new HVCA systems installed in existing buildings. We also support the proposal for verification of the Home Ventilating Institute certified product ratings for kitchen range hoods. We believe these measures are needed to protect public health. And they are consistent with ARB-funded research as well as CEC-funded research.

Regarding MERV 13 filtration, based on our current research findings we believe this action would reduce indoor particle levels by 50 to 90 percent in new homes and buildings depending on factors, of course such as tightness of the building, opening of windows and how often the central system is operated.

And even a 50 percent reduction in indoor

concentrations of particles will result in a significant reduction in exposure and potential health impacts. Because of course as a population, we spend most of our time indoors and the greatest amount of that time is in our homes.

Because state policies especially SB 375, the Sustainable Communities and Climate Protection Act, now promote the siting of new construction in in-fill areas. We believe this reduction in indoor particle levels will be especially timely in preventing increased exposures to particles in new homes. In addition a new bill, AB 617, was signed last year, with the ultimate goal to reduce air pollution exposures in environmental justice communities where a population often experiences higher exposures to air pollutants than others. And we believe the proposed code requirement for higher efficiency filters would help achieve the exposure reduction goals of AB 617.

Particulate pollution is especially burdensome in California, as I think we all know. But it by far accounts for the greatest percentage of health impacts attributable to air pollution. Those impacts include increased cardiovascular and respiratory disease, increased emergency room visits and even premature deaths. Our current estimate for the PM 2.5 exposures

that result in premature deaths in California each year is 7,200 premature deaths.

The Commission's staff have done an excellent job in highlighting the seriousness of this particulate pollution problem throughout our state with maps showing that a majority of our state, especially the most populated areas, do not yet fully meet the state and federal ambient air quality standards for PM 10 and 2.5. And this is despite ARB's and EPA's extensive regulation of motor vehicles and local agencies' regulation of stationary sources that emit particles.

The use of higher efficiency filters, statewide, is a straightforward approach to reducing the impacts from particles. And we do support the state wide application of this requirement, as proposed by your staff, rather than a regional requirement, which was discussed extensively I think during the case studies for several reasons. One, of course the infill considerations. Also just that most of the state experiences unhealthful levels of particles at some time during the year. But also because of the changing climates and recent disasters we really cannot predict where future accidences will occur. Our best estimate is that they're going to continue to occur in different locations throughout the state.

The statewide requirement will also provide equal protection to all citizens in new construction. And also will make implementation and enforcement much easier.

Based on our review of the ARB-funded study results, the scientific literature and government reports, last year our agency issued guidance recommending high efficiency filtration in new construction in infill areas and near busy roadways.

While, frankly we would prefer to see MERV 16 filters required in order to remove a greater percentage of the smaller particles that produce the most harm in the lung, we do nonetheless, support the proposed MERV 13 requirement, based on greater ease of implementation and enforceability.

We also concur with the proposed requirement for two-inch deep filter slots, or the one-inch slots for systems meeting the specified air flow performance criteria. Research results that we have seen, as well as information from CEC staff, show that air flow resistance differences between MERV 13 filters and MERV 6 or 8 filters are truly minimal and are readily dispensed with, by for example, using a deeper filter.

In a recent study conducted for ARB staff at the Laurence Berkeley National Laboratory found that a

one-inch MERV 13 filter reduced air flow by 4.9 percent, but a deep pleat MERV 16 filter reduced air flow by just 2.7 percent. And then more recently the CEC staff identified even lower air flow reductions of 1 percent in very commonly used filters. And the other thing is I would add if you look at the current market share the public is buying higher efficiency filters at a much greater rate.

So finally, we also agree with the low costs that are estimated by the Commission staff for compliance with these requirements.

CARB also supports the proposed requirements for HERS verification of the HVI certified ratings for installed kitchen range hoods. Cooking and gas stoves can emit hundreds of chemicals, many of which are toxic and harmful to health. Range hoods are commonly used, of course, to remove the pollutants and odor and moisture generated by cooking. However, many of the installed kitchen range hoods cannot provide adequate protection, often because the air flow is too low and sometimes because they're too noisy. So people don't use them.

It is critical to verify the HVI certified ratings for the installed kitchen hoods. I would note that for a number of years our building code has had this requirement, that range hoods used need to meet the HVI

requirements. So the proposed action is simply to verify that installed hoods do meet this longstanding state code requirement.

And very quickly, we do also support the multifamily provisions that were discussed regarding ventilation and filtration. This is because we do believe those in multifamily dwellings deserve the same level of protection and care as those in single family homes.

And finally, last but not least, I may not be able to attend tomorrow's hearing. I wanted to comment very quickly that we also support your staff's proposal to retain the current minimum ventilation rate requirements for non-residential locations. While a change to the ASHRAE recommended rates would align our rates with those of others, we found that a number of the key building uses, such as classrooms in particular, would have a reduced minimum ventilation rates compared to the current rates. And we believe that these would not be sufficiently health protective for the occupant populations.

So again thank you for the opportunity to comment and I'm happy to answer any questions.

COMMISSIONER MCALLISTER: Thank you very much for being here. I want to just highlight that energy

efficiency and air quality really go hand-in-hand and have for a long time. And tight envelopes is one place where we need to pay attention and I really appreciate your presence and your assistance really, for helping us keep our eyes on those issues as well.

We know that particulates and other criteria pollutants are a big deal in California, remain so even though our air's a lot better than it was back in the day. But we still have a lot of issues and they're a little more pernicious actually then they were back then. So I think our partnership with the ARB is really a very positive critical thing for us to get where we need to go as a state. So thank you very much.

MS. JENKINS: Sure. Thank you and we definitely appreciate your sensitivity to the air pollution needs. Thank you.

MR. BOZORGCHAMI: Peggy? Peggy, could I have you docket that document. That was just too much to write. Could you docket that for us, that was just too much to write.

MS. JENKINS: Great, (indiscernible)

MR. BOZORGCHAMI: Beautiful. Thank you so much.

MR. ROSE: Hello. I'm John Rose. I'm with the Home Ventilating Institute. That's HVI. And thank you

for allowing us to comment today. HVI certifies the performance of residential ventilating products third-party tested, and we publish an on-line directory of those performance ratings. The HVI ratings are then used by agencies such as ENERGY STAR or ASHRAE and CEC to set thresholds that they would like to be achieved. So there's no set minimum for HVI ratings. We test it and rate it and that's what it is.

So we've been working with CEC staff on item 150.0(o)2B. And we'll follow up with comments soon as that work finishes up and continues. But we'd like to request that the Energy Commission amend the regulation or reference to allow rating for sound according to HVI procedures. There's a bit of a disconnect, particularly where range hoods and microwaves are concerned, where the way that HVI ratings are presented. So we believe that CEC understands the importance of the issue and want to just ensure that references to HVI certified ratings are in alignment with common rating practices, so that raters can determine whether or not a product complies using the readily available ratings in our online certified products directory.

So with that said, I just want to ensure that we don't get if wrong in such a way that would result in a burdensome and costly retest for the industry. The

ratings are out there and easy for anybody to access. Anybody have any questions?

COMMISSIONER MCALLISTER: Thanks for being here.

MR. FISHER: Can you hear me?

MR. BOZORGCHAMI: Yes.

MR. FISCHER: Mike Fischer with Kellen Company. I'm speaking for the American Chemistry Council Spray Foam Coalition, which is a partnership between the American Chemistry Council's Group from the Center for Polyurethanes Industry and also SPFA, the Spray Polyurethane Foam Alliance.

These hearings are conflicting with the International Roofing Expo, so I'm here all by myself although we do have some help in the back, from Lindsey from ACC. But I'll be flying from here to New Orleans to hit the Roofing Expo. So at least I got to watch the Super Bowl on my in-flight screen in front of me in Seat 15A last night.

Just a couple of quick comments. There was a discussion back and forth between Curt Rich and Payam earlier. I think the issue that we have on the R-value prescription for the SPF is really more around some of the publications in the -- not in the materials that we're calling it an R21 is the baseline for the case, I

believe.

If you actually are looking at R20, there are a lot more products that comply. R21 really is where it kind of kicks over.

So speaking for SPFA who's not here, but also for SFC, we do believe the U-factor approach is what everything should be based on. And the reason for that is the same builders who have to deal with this for the walls can look at the appendices. All the combinations of cavity and continuous that you can do with different framing types, you have all those options laid out in a really nice matrix. And frankly, we would love to see ICC take that into the model code. We've tried. We'll keep trying. But that seemed to me to make more sense.

I say give the builders some credit. They can figure out how to buy windows where they don't have an R-value. They only have a U-factor. I think having that information spelled out in the code will be helpful and they can do that. So we would urge that we focus on U-factor going forward for that reason.

The second issue I want to put on the record and there will be public comments filed on this. goes back to the issue -- this is a long standing discussion -- on the role of air impermeable insulation in high-performance attics and where the ducts are located inside

of the conditioned space.

The ICC actually exempts builders from having to do the duct testing requirement, (indecipherable) testing if the ducts are inside the thermal envelope. I understand the reason to want to verify some of that out here, because you pay a greater attention to installation and quality insulation here in California. And we get that. But we think that enough data has been submitted to the CEC over the past six years I believe, that indicates there's real world performance differences between some of these products. So we're going to revisit that issue in the public comment process. I don't know that we have a solution that we can work on, but I do think there has to be some consideration given to ducts that are inside the thermal envelope and inside the air barrier that have air impermeable insulation as the baseline for that. That's a different system.

If you really want to take forward the high performance attic, finding some cost benefit for the builders, some incentives, some carrots to do that by taking a way that duct leakage test requirement when your burying everything inside essentially what becomes conditioned space, that would be a good carrot to dangle on the cost side. And we think you should consider that. Frankly, that cost reduction should have been included in

the case for those applications that use that solution.

Other than that, I'll echo Commissioner McAllister's comments when he started about the work the staff did. You guys, I know have been busy, I've been in Sacramento too many times. But that's what we all get paid to do. Thank you very much.

COMMISSIONER MCALLISTER: Thanks for your comments.

MR. MCHUGH: Jon McHugh, McHugh Energy. I just wanted to make my comments in support. I think we're getting to final strokes towards a Zero Net Energy Building Standard. And this is a lot of work that's been a long time in waiting, since 2008. So it's really enheartening to see the progress that we're making.

I have a few minor comments about on the standards. I was one of the authors of the 2016 Lighting Standards, or a CASE proposal. You guys are of course the authors of the standard. And one of the things that would be ideal is that the Section 150.0(k) and Table 150.0-A, that the language remains in the standard where it's actually describing to the building inspectors, designers, etcetera, they don't really need to understand all the details of JA8. That there's actually a description of the marking that the inspector is looking for or the purchaser. So that'll just -- it's just a

code simplification issue.

And then related to the -- there's a change to the table. I believe it's 150.0(a), I believe, which is the high efficacy requirements. In there there's a recommendation to include lighting in cabinets and closets and these sorts of things as long as they have a control that automatically turns the light off when the door is closed, etcetera.

And firstly just in terms of the code, basically what it's doing is exempting this particular source. So it's essentially saying, "You can call a incandescent a high-efficacy source. We're allowing you to call it that." And if you want to exempt that, it just makes more sense just to exempt those applications rather than calling it artificially an high-efficacy source.

And then related to that, I understand you get some small little peanut lamps or something inside of a cabinet, that's one thing. But when we're looking at an entire closet that the light source in the closet be exempted from the high-efficacy requirements, I don't think that's such a great idea. I don't always close my closet door. If you look at the 2016 CASE Report, the cost effectiveness calculations were based on it's like 620 hours a year of use. And that had a benefit cost

ratio of 7 to 1. The incremental cost of LEDs have dropped that much more in the last three years. I'm expecting that if there's cost effectiveness analysis sheet, you'd actually find that this probably increases the life cycle of those closet lights. So my recommendation is to not include that in the exemption.

Thank you very much.

MR. BOZORGCHAMI: So I think we have two comments on -- oh, sorry. Sorry, sorry.

MS. HERNANDEZ: Hi. Good morning. My name is Tanya Hernandez, I'm with Acuity Brands.

(Off mic colloquy.)

MS. HERNANDEZ: So first I wanted to say thank you for the opportunity to comment. We also wanted to make sure that we acknowledge the fact that we're excited to see the color temperature restriction removed from that piece of the code and put back in the JA8 section. I know we'll talk a little bit more about JA8 a little later this afternoon.

There is a comment in one of the slides, pertaining to taking out redundancy in the 150.0(k). And I guess I just need to make sure I completely understand what's going on there. Because the striking of language that talks about high efficacy, but then points to Table 150.0-A, which is a table about high efficacy sources, is

a little bit confusing. So we just want to make sure that when we're talking about residential lighting, that we are pointing to the table and pointing to high-efficacy sources.

If you do a search of Chapter 7 and look for high efficacy, it really only shows up again in the low-rise multifamily section. And it doesn't point you to Table 150, so just some consistency there.

And then back in Chapter 2, there was a -- Chapter 2, it's 110.99d) that was struck and it talks about where high efficacy is required and not required. So because it was struck and there was a piece that talks about it not being applicable to non-residential lighting, it is no longer clear as to what high efficacy applies to, if commercial or non-residential lighting actually has to meet those requirements.

MR. STRAIT: Just to clarify that, part of the reason that was struck is that we did add an option in the non-residential lighting for use of JA8 compliant light sources. So while the language in 150.0(k) is by its placement only applicable to low-rise residential construction, there is a place now in the non-residential where that is available as an option. That's why we no longer specify here the language that is redundant with 150.0(k), but also therefore contradictory to what we're

now allowing in the non-res section. And we'll have a small discussion of that tomorrow.

MS. HERNANDEZ: Okay. And there was one last thing about elevated temperature? And that I guess will be covered more in JA8. But there's a still some more confusion as to what actually has to meet the elevated temperature for luminaires and (indecipherable)

MR. STRAIT: That's correct. We'll talk about that when we talk about JA8.

MS. HERNANDEZ: Thank you again.

COMMISSIONER MCALLISTER: Thanks for being here.

MR. BALNEG: Okay. We have Steven Gatz on the line, you can go ahead and speak. Steven?

MR. STRAIT: Sorry about that. Please go ahead and speak.

MR. GATZ: Okay. Can you hear me now?

MR. BALNEG: Yes, we can hear you now.

MR. GATZ: Okay. I wanted to support the activity from HVI and John Rose. The question about kitchen range hood verification, we do support efforts to work on improving the language in this part of the regulations. However, we would like to look at this in terms of an overall alignment of the HVI ratings with the ASHRAE ratings. One of the items I noticed that Jeff had

mentioned in his presentation was that the sound testing or air flow testing would be at a different pressure than what is specified under ASHRAE. And that is one of the issues that we would like to get resolved as an industry before we start changing codes. And our certification process -- the certification of the range hoods is quite a complex testing endeavor. And there are currently no products that are tested under the strict ASHRAE requirements. So the test burden to get in compliance with ASHRAE 62.2 in the certification data would be quite extensive.

We're also working on a range hood capture efficiency program and that's going to yield some additional results and potential changes to the air flow rating systems. So we would just ask that the Commission look at the fluid nature of the requirements around air flow in the building spacer and work together with HVI and ASHRAE to come to a resolution of these requirements at a timing that is not set by the calendar and the schedule for the changes for the regulation.

COMMISSIONER MCALLISTER: Thanks for your comments.

MR. GATZ: You're welcome.

MR. MILLER: Steve, will you submit a comment in writing please. And just know that we're continuing

to dialogue with the stakeholders on this topic.

MR. GATZ: Yes, we will be.

MR. BALNEG: Okay. We also have a comment from Mia, Mia Marvelli from the California Building Standards Commission. She says, "Thank you for this opportunity to contribute to the CEC's rule-making process. CBSC requests that the CEC discuss the proposed MERV increases with CBSC as there are other MERV revisions in the CalGreen and the California Mechanical Code."

"This may be a conflict with the HSC 18930, which the CBSC considers when approving building standards prior to being printed and all parts of Title 24 CCR. And additions was not presented at the CBSC Coordinating Council Meeting in November and we would like the opportunity to discuss. Thank you for your consideration."

MR. BALNEG: And last but not least, we have Chris Primous on the line. One second.

(Off mic colloquy.)

MR. STRAIT: So, for just for one moment. Because this person is a call-in user, we're going to have to unmute all of the call-in user lines, because we're not sure which line belongs to this person. So if the other folks that are only call-in or haven't associated their call-in user ID with their computer

could try to be quiet. If there's a lot of noise on this we may have to mute the call-in and ask for the comment to be submitted either via the text box or some other method. So I'm going to try to unmute now.

MR. PRIMOUS: Okay. Thanks. This is Chris Primous, can you hear me?

MR. STRAIT: Yes, we can hear you. Thank you.

MR. PRIMOUS: Okay thanks. Chris Primous from MaxLite. I've got a quick comment regarding Table 150.0(k) and the high efficacy light sources? I just wanted to clarify by removing the number 4 there, with G-24 sockets containing light sources other than LEDs, that this is essentially driving away any usage of CFL in residential and new construction. And I just wanted to make sure that was the intent here.

MR. STRAIT: So the intent here is actually just to be neutral when it comes to that socket type. We've had a lot of -- outside of this rulemaking, we've had a lot of questions about which types of sockets fit in one or another category, what kinds of adapters are allowable, and a lot of that nature. So it's really more about not making a distinction based on socket and just pointing to the technology.

We would expect most CFLs and similar lights to flow through JA8.

MR. PRIMOUS: Right. And by doing that, it makes everything required to be JA8. And the base requirement to JA8 would essentially eliminate the CFLs at that point, because with the requirements you couldn't do that with CFL without other technology advancements, as you understand probably.

MR. STRAIT: Okay. Is this related to --

MR. PRIMOUS: No -- go ahead. I'm sorry.

MR. STRAIT: I was just going to say if you want to identify specifically what the challenge is for CFLs and put that in writing to us, then we can take a look at that.

MR. PRIMOUS: Right. I will do that.

Another thing I wanted to make a comment on here is it does say here that there's clarifying language, as you just mentioned, so show any light source. Otherwise I list it on the left side of this table is it has to meet JA8 requirements. However the question, I can tell you, comes up quite a bit about linear LED light source, if then. And so you may want to think about calling that our specifically about tube lamps, because that question is not altogether clear from a lot of people who read this, that this is only exempting it. Or if you want to say exempting appendix or (indiscernible) linear fluorescent light source and

not the LEDs.

MR. STRAIT: Understood. Thank you for that. Yes, and --

MR. PRIMOUS: And one of the reasons I say that is because the number, one of the number one -- probably the number one selling light source in the country is probably the LED tube and so that product is going to come up quite a bit.

MR. STRAIT: Thank you.

MR. PRIMOUS: One other question, or comment I wanted to make, and this maybe should be tabled for the JA8 discussion, but there are some light sources that may need to be considered to be either exempted or some requirements made specifically for those types of light sources, because what has been done and it's being evidenced by the fact there's none of -- some of these types of light sources I've refer specifically to an example of a G9 LED, that cannot meet the requirements technologically for the JA8 requirements. And I may be wrong, but there's none of those products that exist on the market today that can meet.

And that's something that should be considered by the Commission that certain products may need to be exempted, or take a look at those and figure out how they can be excluded from meeting every single one of the

requirements. And I'll table more of that discussion for JA8. Thank you.

MR. STRAIT: Thank you. I do have one question request. I assume you might be following up with a written comment letter. If you can identify the uses that are typically of some of those more unusual light sources, like a GU-9 socket, where what types of fixtures and what settings those tend to be used in construction, that might help us to craft an exemption. If not based on the socket type, then based on the application or use.

MR. PRIMOUS: Sure. Sure, thank you.

MR. SHEWMAKER: All right. Again, my name is Michael Shewmaker. I'm a Residential CEA with the Building Standards Office. I'll be touching on Subchapter 8, which is Section 150.1 in the standards. And I will cover the prescriptive approach for low-rise residential new construction. So first I'm just going to brief overview, but I'll go into further detail when we get to Tables 150.1-A and 150.1-B.

In 150.1(c)1A, we removed the above deck insulation option. And then 150.19(c)1B we separated the framed/unframed in mass wall into three subsections. This was done just for clarity. And 150.1(c)1A, we've added QII to the prescriptive package. In 150.1(c)3A, we changed the threshold for glazed doors to follow NFRC and

reduced it from 50 percent to 25 percent. In 150.1(c)5, we added doors to the prescriptive package as well. And then in 150.1(c)11, we removed the term thermal mass from the Exception 2 to Section 150.1(c)11. And this was really to clarify that the exception is dependent on weight.

And then now diving a little bit deeper into the specific changes, so this is for Table 150.1-A, which specifically deals with single family. We removed the option for above deck insulation as well as the options and values for the no air space. The reason for the above deck insulation change was the proposed R-value we felt was too high. And we were a little concerned that there was currently no product available in order to meet those R-values. We're not eliminating above deck insulation altogether. Those looking to utilize above deck insulation will be funneled towards the performance approach.

And then the removal of the "no air space" was to clean up the code and help reduce some confusion. There was, up until this point, two R-values depending on the high-performance attic option that you choose and whether or not you had an air space. We found that about 80 percent of construction utilizes tile and therefore has an air space. And again, just like with the above

deck those wishing to do an asphaltic roof or something with no air space would be funneled towards the performance approach.

Additionally, we increased the below deck insulation requirement so R19. And that applies to Climate Zones 4 and 8 through 16. We also reduced the above grade framed wall U-factor to a 0.048 and that is applicable in Climate Zones 1 through 5 and 8 through 16. We added a new row for quality insulation installation. And that is going to be required in all climate zones for single family. We reduced the fenestration U-factor requirement to a 0.30 for all climate zones. We reduced the SHGC requirement to a 0.23. And that is in Climate Zones 2, 4, and 6 through 15.

We also changed the SHGC requirement for Climate Zone 16 to no requirement. We have found that there actually is some benefit to a higher SHGC in that climate zone and so we wanted to provide that ability for people to take advantage.

We added a new row for doors. And this requirement will apply to all climate zones. And it's a U-factor of a 0.20, which is typical of an insulated door and is currently widely available.

And then we changed the footnotes in Table 150.1A, specifically number 4 to remove the term

"thermal" from heat capacity. And this was done to just eliminate confusion over that term of "thermal capacity."

Now moving to Table 150.1-B, which is the multifamily package. Again, we removed the option for above deck insulation as well as the no air space for the same reasons. We increased the below deck insulation requirement to R19 in Climate Zones 4, 8, 9 and 11 through 15. QII was added in and will be required in all climate zones with the exception of Climate Zone 7. We reduced the fenestration U-factor requirement to 0.30. And this will apply to all climate zones. We reduced the SHGC requirements to a 0.23 in Climate Zones 2, 4 and 6 through 15. And again, changed the SHGC requirement to a no requirement for Climate Zone 16.

And then we also added doors into the multifamily package as well. Same requirement, all climate zones and a U-factor of 0.20. And changed the footnote at the bottom of the table to, again, eliminate that term "thermal capacity" to alleviate confusion.

And then with that, I will pass it off to Mazi Shirakh, who will then cover the performance approach.

MR. SHIRAKH: Okay, Mazi Shirakh. So a couple of important changes in this round of standards, compared to the previous rounds. For compliance here in the current 2106 Standards or the previous cycles we used a

TDV budget as a benchmark for a compliance. So we're proposing to change that to Energy Design Rating, EDR.

And this is for newly constructed buildings. So the energy efficiency, there's going to be an energy efficiency EDR. There's two components, actually three components to the EDR approach. The energy efficiency features of the building are going to be represented by the efficiency EDR. Then there's going to be a second EDR for PV in what we call demand flexibility, which basically captures our demand response battery storage and thermal storage and all that. So its captured by the PV plus flexibility EDR. And then we put these two together and we come up with a final EDR. So the building must actually comply with the efficiency EDR and also the with final EDR.

And there is no opportunity to actually put in more PVs and less efficiency, so we've eliminated that option that exists under the 2016 Standards.

There's an exception for community shared solar and battery storage to offset part of the rooftop PV. And then energy budget for additions and alterations will continue to be expressed in TDV terms. So for additions and alterations we continue, there's no EDR requirement. So that's --

(Off mic colloquy.)

MR. STRAIT: I'm sorry. This is Peter Strait, I'm going to step in for the remainder of these. So, and again just to read off these slides, for 150.1(b)3B field verification we're adding references to new field verification protocols in our residential appendices. These are listed here. It's for the HSPF rating, heat pump rated heat capacity and whole house fan.

I'm going to ask Danny to come up and explain these water heating changes.

MR. TAM: Hi, Danny Tam. Section 150.1(c)8A is the prescriptive requirement for a water heating system serving single dwelling units. We're proposing to delete Option ii for gas storage under 55 gallons. With QII being a new prescriptive standard for 2019 this option kind of becomes obsolete. Just a note. You can continue to use these under the performance method. And the other option for gas storage above 55, currently we require a compact hot water distribution or a HERS verified pipe insulation. We're proposing to add drain water heat recovery as one of these additional options for gas storage water heater above 55 gallons.

So we're proposing to add two new prescriptive options for heat pump water heaters. The first one requires additional PV. That's in addition to the PV requirement in Section (c)14. For Climate Zone 2 to 15

we require an additional 0.3 kilowatt. And for Climate Zones 1 and 16, additional 1.1 kilowatts.

To address the situation when someone cannot install PV, we're proposing to add some language in 15 day for the installation of stream water heat recovery and compact distribution together. With that, you don't have to put in additional PV.

And for Option iv, require the installation of a heat pump water heater that meets the NEEA advanced heater specification, Tier 3 or higher. So if you install one of these NEEA Tier 3 heat pump water heater in Climate Zones 2 to 15, then you meet the prescriptive requirement. For Climate Zone 1 and 16, you need to add additional, just a little bit, 0.3 kilowatt PV on top of the (c)14 requirement.

So moving on to the water heating requirements for multi-dwelling units, that system serving multiple dwelling units or central systems, we're proposing to add an option for reduced solar fraction requirement. Currently, the essential system requires a solar fraction of 0.2 in Climate Zones 1 through 9 and 0.35 for Climate Zones 10 through 16. With one of these systems installed, you can reduce that solar fraction to 0.15, for Climate Zone 1 through 9 and 0.3 for climate 10 through 16.

And this system has to have an effectiveness of at least 42 percent and recover heat from at least half of the showers above the first floor.

Okay, 150.1(c)14 is a new section that describes the PV requirement. It's applicable to low-rise residential buildings, both single-family and multifamily. It's based on a formula that's supposed to equal to the anticipated annual kilowatt hours of the dwelling. And the PV system must meet the requirement in JA11, which is a new reference appendix that describes the qualification requirement for all PV systems.

We added a number of exceptions to this requirement. So there's an exception for if you have a limited solar access. This would reduce PV requirements in Climate Zone 15, also reduce PV requirement for two and three-stories, single and multifamily.

And there's some accommodation for plans as approved prior to January 1st, 2020. And finally, you can reduce your PV size if you have a battery storage system installed. And that battery storage system has to meet JA12, which is a new JA for 2019. We'll talk about that in the afternoon.

And with that, that's 150.1.

(Off mic colloquy.)

MR. HAMMON: Good morning. Rob Hammon, from

BIR Energy. I'm going to want to speak a little bit more in the afternoon when you get to the trade-off for the storage grid. But I did want to mention at this point that there is the -- while you can't trade PV for storage, sorry, PV for efficiency as you could in 2016, you can now trade storage for efficiency. And I think that needs deep consideration and hopefully removal from the standards.

It doesn't make any sense to me that we would be trading efficiency for a measure that is not an energy efficiency measure at all. And I just think that should be removed.

MS. PETRILLO-GROH: Laura Petrillo-Groh, AHRI. I have a few concerns with 150.1(e)3B I believe, and requiring the verification of the heat capacity at 17 degrees Fahrenheit for the field verification. There's no -- this is an optional rating point for this equipment for heat pumps. And this is, I think beyond what can be required for installation of these products.

There's also concern about tying the installation of photo voltaic cells with heat pump water heaters. I think this goes beyond what can be achieved in a building code. This violates federal preemption for these products by giving an additional efficiency requirement on top of what is already the federal

requirement.

So I would ask you all to go back and look what is the authority for these proposals. Thank you.

MR. KING: Hello. My name is Russ King. I'm the Senior Director of Technical Services at CalCERTS, a California home energy rating system provider. CalCERTS appreciates the opportunity to participate. And we've been an important and trusted contributor to the improvement of the energy code.

Me personally, on a personal note, this year marks my 30th year of working with the energy code. And one of the things I've done many time, over those 30 years, is train building departments. Excuse my voice, I'm at the tail end of a cold.

Because it has long been realized that local building departments do not have the time, nor the resources to fully verify every energy feature, California wisely instituted third-party special inspections for HERS raters-, to ensure compliance with the energy code. Given that a HERS rater is already required on every newly constructed home the cost to add more inspections is relatively small, compared to the benefit to ensuring the cost benefits, the cost savings sought by the energy feature being verified.

We were very surprised to find out that even

though the case study for roof-top solar PV systems very specifically called for third party PV/HERS verification of PV systems. The 45-day code language does not, specifically, Section 150.1(c)14.

We understand that PV systems are checked by the utilities and will have monitoring systems on them. However, there are serious limitations to these checks. Furthermore, joint appendix JA11, which will be discussed later, is the new verification protocols for PV systems. As written, it is five pages of step-by-step protocols for verification of PV systems that has no HERS verification and adds even more responsibility onto the backs of building code enforcement personnel.

Not only is this going in the wrong direction, by making a portion more burdensome on building departments, it raises serious procedural questions. This substantive change to the CASE study recommendation was made without notification, consultation, nor was it mentioned in the initial Statement of Reasons.

Hundreds of HERS raters are already trained and certified to perform PV verifications and have been doing so for years with the NSHP program. It is our hope that the Commission staff will involve the HERS providers and rates and reconsider the exclusion of HERS verification of this extremely important energy measure. Thank you.

MR. SHIRAKH: One question, can HERS raters get on the roof?

MR. KING: They've been doing it for the NSHP program.

MR. SHIRAKH: And they can do it for this too?

MR. KING: Yes. We prefer that they don't if there's a way that we can come up with a verification where they don't have to. But it's either the HERS Rater of the building inspector from the building department. Someone's got to do the verification. So what we're proposing is that we're already trained and certified to do this and rather than adding additional burden on the building departments, that we just let the HERS raters do it.

MR. SHIRAKH: Okay. Thank you

MR. NESBITT: George Nesbitt, HERS rater. Section 150.1(c)8, the section on water heaters. So you can do tankless gas up to 200,000 BTUs. You can do a heat pump water heater with certain restrictions, as well as added PV. I'm having a hard time understanding the gas tank option.

Traditionally, it's always been a tank with an energy factor, was what was allowed. But this requirement, I'm having a hard time understanding what water heater would have an input rating of less than

105,000 BTUs an hour with a tank of more than 55 gallons. That is a commercial water heater, because it's more than 75,000 BTUs, but that's also a big tank. And they tend to be bigger tanks and bigger inputs, or smaller tanks and bigger inputs. So I guess I'm -- I don't know if you can clarify or --

MR. TAM: Yes, the newer class of water heater is called residential duty commercial water heater. Their limit is 105. Yeah, it's a larger input, but it's meant for installing in residential dwellings. And these options have been there since the 2016 Update. So we're removing one and we're adding an option.

MR. NESBITT: Okay.

MR. TAM: And the reason there's a break at 55 gallons is because the federal standard is different for below 55 and above.

MR. NESBITT: Yeah. I mean I'm fairly familiar with 50 gallon, 76,000 or maybe 100,000 BTU water heaters. But not this product.

On the packages, a long time ago you had packages for basically gas heating and then a package for an electric option that required higher insulation levels and what not. Now, you're doing essentially one package, or you're doing single family versus multifamily. Heat pump is allowed both for space heating and water heating.

A heat pump for space heating comes with apparently no additional requirements, but the heat pump water heater does. And I'm just wondering if we are treating the technology between the two things differently by adding requirements on water heater but not on space heating. And whether we should be doing that.

And of course what we're doing for the water heater is you're saying add more PV. So you're not making a more efficient building, you're just adding more production. So that is actually a credit for efficiency, a PV tradeoff for efficiency. So I mean my preference would have been a package for heat pump, allowing heat pump technology with greater efficiency requirements.

On the PV sizing, sizing at 100 percent of your predicted site electricity, I think is going to lead to over-sized systems. I have seen numerous cases, where the predicted electric use and the actual were drastically different, including half as much.

Aurora Solar did a big study recently that they published with the Net Metering 2.0. And they say the optimal cost-effective system is about 82 percent of your electrical use, which is slightly higher than what it was under Net Metering 1.0.

So I think the problem, despite talking about grid harmony and all this, we're now going to require a

massive increase in the number of PV systems. And we are going to drastically increase the problem of the duck curve. And the larger the systems we require the faster we're going to drive towards that future, which will change net metering rules. We have seen places where you can no longer export to the grid. So I think just in general that PV, without storage is fast becoming obsolete.

I do also want to reiterate Russ's comment. PV HERS ratings have been around for a decade. Yes, you get on the roof, because you have to. I've been on plenty of roofs. Is the building inspector going to get on the roof?

MR. SHIRAKH: Any liability issues, are you insured for it. Do you have a -- I mean I can't wave my hand.

MR. BOZORGCHAMI: Yeah, George. Do you have a fall protection requirement when or Russ, I think one of you can answer that question, is there a fall protection requirement that HERS raters have gone through training and have liability insurance for it and so forth?

MR. NESBITT: There are no requirements under Title 20 for that kind of thing.

MR. KING: I don't believe there is.

MR. NESBITT: It depends on the roof.

Multifamily flat roofs, no problem. Single family, it's going to depend on conditions. But I can tell you the building inspector is far less likely willing to get on a roof.

So then the last thing is the whole energy design rating. One problem, historically with the code, has always been people just look at the compliance margin. Did I get to 0.001 better than code minimum? Unfortunately, energy design rating just brings it down to a number.

But the big issues is Public Resource Code 25-942 called for the Energy Commission to have a single state-wide rating system for new homes, existing homes. We have it under Title 20. We've had it, well almost a decade now. The energy design rating does not comply with Title 20. It doesn't require a HERS rater. RESNET did make a distinction between a design rating and a rating, between a rating at plans versus a verified rating. Nothing in Title 20 says we can't do the same. So we've allowed greenpoint rating. To have a HERS rating system, we've allowed CAP to have the cap score, which is the HERS rating. We had the EDR in 2013 and 2016, now 2019. All of them violate Title 20. Thank you.

MR. KING: Russ King again, from CalCERTS. I

wanted to address your question, Payam. We're not asking that the protocols be written such that HERS raters have to get up on the roof to do the verification. What we're asking is that currently, in JA11, you're asking building apartments to something in terms of verification in terms of verification.

In fact it says, "The local enforcement agency shall verify that all certificates of installation are valid and that the PV system meets all previsions of JA11." So what we're saying is rather than having the building departments do that just have the raters do that.

MR. HODGSON: Mike Hodgson, ConSol representing CBIA.

In Section 14 there is basically the sizing requirements for photo voltaic systems, for single family and multifamily dwellings. And I just wanted to get staff, or encourage staff, to get the utilities to make comments on the sizing requirements. That they are acceptable to the utilities and that we can hook up our single family and multifamily dwellings to those numbers. I think that would be very beneficial for both parties that we get some type of support and acknowledgement from the electric utilities that PV sizing, as proposed by the CEC is acceptable to them.

A separate comment is in the multifamily Table 151-B, requirements in Climate Zones 8 through 14 shows a whole house fan is required. And I wanted to ask 1) is that true and I'm sure it is or it may be and 2) my understanding of the current version of the research 2019 CBECC software does not allow whole house fans to be modeled. So for the building industry to be able to make some type of judgment on whether or not this is an acceptable criteria we would have to understand the compliance impact of that requirement.

MR. SHIRAKH: And so Mike, on the sizing, you know the equation that you see or was up there, that's basically designed to come up with a PV system that's large enough to displace the annual kilowatt hour of a mixed fuel building, so that is NEM compliant. And if we're using the same equation for both all electric and mixed fuel homes. So that is entirely compatible with NEM rules. I don't know why utilities would have a -- there's no over sizing involved here.

MR. HODGSON: Okay. I think that's great, Mazi. I just think that would be very useful to have an acknowledgement from the electric utility, so that they're aware that photovoltaics is a requirement in the 2019 Standards. And that the sizes as proposed by staff are realistic to them and we can acknowledge that we will

be able to connect buildings to those sizes.

MR. SHIRAKH: Okay. All right, thank you.

MR. HODGSON: Thank you very much.

MR. CAIN: Joe Cain, with the Solar Energy Industries Association. So background 2005-2006, we came up with a loading order. And it's been quite a while since that initiated. And in the meantime it seems as though efficiency people have gone over here and done some great, fantastic things in building science and appliances and lighting. And the solar folk have gone over in another direction and focused on the economies of scale, with the help of the Department of Energy Sunshot Program, with the help of the California Legislature and AB 2188 with the help of the Governor's Office of Planning and Research, with the California Solar Permitting Guidebook and in these gains in soft cost.

And so here we are 12 years or so later and we now, because of the zero energy goals we're bringing the efficiency people and the solar people back together. And the solar industry, I can say we're very happy that solar is becoming a requirement for residential in the 2019 Standards. We're happy that there are some things encouraging the use of battery storage. But I think that one of the continuing frustrations is that again we're not really getting the efficiency people and the solar

people back together. In that some would choose -- still we hear each time we have a workshop we're hearing -- to metaphorically build a wall between efficiency and renewables. And so we hear over and over that there should be no compliance credit for renewables that have any impact whatsoever on efficiency.

We spent a lot of time talking about production housing. CBIA is primarily focused on production housing. We have the -- I hope that's a correct statement -- Bob is shaking his head in an up and down fashion -- we have also though, custom homes.

And I'll tell you just one little parable. There's a consultant that I know since hometown stuff, who works on very large, very fancy custom homes along the California coastline. And that's his clientele. He designs ultra-efficient homes with hydronic heating. And because his clients have earned their living and they want their fancy home, lots of glass. And they build these homes on the coast. So one of his problems that he's asserted is that you can design a home, give the architect the freedom to design the home with whatever architectural features you want. But because you cannot use renewables to offset the additional energy use from these architectural features he's finding cases where you just simply cannot comply a home.

And so here's the irony. He's got clients who would be happy to install enough renewable energy and storage, so that they actually do build a zero net energy home. However, according to the structure of our standards you can -- and this is I think many would consider irony, that you can design a zero net energy home and have it be none-code compliant.

And so when you think about that, what that has actually driven some of his clients to do is what we call "grid defection", where they simply cannot comply with the California Energy Standards, because of those constraints. So what they chose to do instead is design their zero net energy home and go entirely off grid, because that's really the only option for them to get the architectural features and design that they want.

We have heard in past workshops, now that PV is cost effective in all California climate zones we've heard in past workshops that when you combine PV with storage, battery storage, that at the meter it looks a lot like an efficiency measure. And so we still feel strongly that PV, sized larger than the minimum prescriptive requirement and paired with storage, should get some compliance credit in the overall compliance model.

So we feel that energy storage should be

compliance credit in the compliance model. When you look at those things together, let's take down the wall and let's really look at how these things all work together. We would really like to see efficiency renewables have equal weight and equal standing in the standards.

And I understand we're kind of getting -- we're moving towards zero and we'd encourage the Commission to continue that path, but we'd like to see a better balance.

Regarding some of the comments on HERS rating and such, yes the solar industry is very mindful that rooftop solar requires fall protection. We've had a lot of attention from OSHA and CalOSHA. There have been some incidents. There are some solar companies that have a zero tolerance policy for any employee caught without fall protection because of that. And then when you also look back at some of the things about reducing soft costs in terms of reducing vehicle trips, reducing the number of inspections by a city of county. In this case, when we get to JA11, we'll talk about some of the rooftop requirements for measuring shade.

So each of those individual stops, each of those stopping points requires some person. And that person gets there in some vehicle. And so every time you have another person, another vehicle, another truck roll,

another stopping point in the process, you're working against or kind of reversing the goal that we have had about reducing soft costs, reducing vehicle trips. I mean, even waiting for a building inspector usually the solar company will have someone whose job it is to sit there at the jobsite and wait for an inspector to show up. And that can be pretty significant. And so fewer inspections reduces soft costs.

The HERS rating that on the roof shade, those are the things that we think add additional steps, additional stopping points. And we'd like to see all of those reduced in order to continue these goals of the Governor's Office of Planning and Research to reduce soft costs.

We will have some written comments of course. I think those are some of the key points. And I'll stop there. Thank you.

MR. HILLBRAND: Good afternoon, Alex Hillbrand from NRDC, Natural Resources Defense Council. Thanks to the Commissioner and the Commission for working so hard on this code revision.

NRDC supports CEC, as we've said, in the 2019 proposed building standards. We find it to be a cost effective path towards ZNE and the deep decarbonization of California's building sector. We expect them to

provide major energy benefits and $1.6 billion in net benefit to California, while helping California reach its climate and energy goals.

On the topic of the improvements being made to the standard and mandatory building envelope energy efficiency, above grade walls, attics, windows, doors, QII, we find this to be great progress.

We are willing to accept the improvement in walls to 0.048, although it is really less of an improvement than was deliberated in the pre-rulemaking. We definitely support mandatory PV requirements in residential, (indecipherable) from the efficiency EDR of the home. It's been a key aspect of this proposed code change.

PV is an essential renewable energy source that will help California reach its long-term goals. It will also save homeowners money. While the upfront cost associated with PV accounts for a sizable fraction of the code compliance cost averaging a bit over $10,000, over the life cycle of those panels we expect most homes to save quite a bit of money under reasonable NEM assumptions and future PV costs.

In addition, innovative low and no-cost financing options for PV are becoming widely available in California to help offset the purchase price. More so,

in California it will also increase solar industry jobs related to construction, installation and maintenance of solar systems. The Commission expects 200 megawatts of small scale solar result from this code in 2020. Just a modest boost to installations that are already exceeded 1 gigawatt this past year.

We understand that the Commission is developing an independent electric baseline for the performance path of the code. NRDC strongly supports this effort. A fuel-neutral code that enables the use of electric space and water heating, which can cut greenhouse gas intensity in half compared to gas, will set the stage for deep decarbonization.

We appreciate the Commission's initiative on this and look forward to better understanding if that's all the way in the 45-day language or if 15-day language will need to be added to achieve that goal. We're also curious when the software will include some of those changes for our consideration.

We also understand that CEC plans to provide some compliance credit for battery storage systems. We support encouragement of the battery market. We believe the comparable credit should be provided to electric water heating and flexible electric water heating and space-conditioning flexibility. Thermal storage, hot and

cold, not just electrons can provide grid harmonization and directly reduce the energy intensity, or rather the emissions intensity are thermal demands.

Thanks very much.

MR. SHIRAKH: Alex, just a couple of points, we will be providing credit for thermal storage.

MR. HILLBRAND: Great.

MR. SHIRAKH: And we are planning to release the software new version in a couple of three weeks and we'll have the independent (indecipherable) for heat pump water heaters.

MR. HILLBRAND: Thank you, Mazi.

COMMISSIONER MCALLISTER: Thanks for being here. Just one comment came out of this discussion, a bit more general. It would be helpful if you can help -- I mean in most cases, I think staff has a good sense of this, but perhaps in this case there's a conversation that could happen. What needs to be in the code itself and what can sort of be done in the compliance process, putting together all the compliance materials later on.

Some of the details can probably be put off a little bit, but the basics really need to be there, so that we're all transparent and clear. So help us understand exactly where that could be in this case.

MR. HILLBRAND: Great. Thanks for the offer.

We're definitely happy to do that.

MR. SHEWMAKER: Actually, just a quick comment. There actually was a recent release of CBECC-Res 2019. And that came out about a week ago, so there is a new version, 2019.0.8.

MR. SHIRAKH: So that new version does not have the water heating, heat pump water heating. That's what I was referring to. In a couple of three weeks there'll be an update that would include the heat pump water heater.

MR. GEHLE: Helmut Gehle, I work for Sunrun, a national provider of solar and storage solutions. First of all, thank you for the opportunity to comment. I think this is a great effort, so I'm very, very excited about it.

I would like to echo some of the comments that Joe with SEIA has made. And I have one quick question here and that is around the reduced PV sizing requirements for two-story homes. If you guys could share a little bit the rationale behind it and how that its being enforced, would be interesting.

MR. SHIRAKH: As the building increases in height, two or three stories, there's more limited space available or maybe more limited space that may accommodate the required PV systems. So we're trying to

be cautious and not have a code that would be impossible to comply with.

So basically, we looked at the plans that were submitted to us by builders and some architects. And so we decided to allow some slight adjustment to the PV size for the two-story and further for the three-story building just to make sure. And you have to also consider the fact that we've expanded the allowed orientation. Used to be 110 to 270. We're going to from 90 to 300. That, coupled with these added flexibility for the two and three-story homes gives us some confidence to think that we are having a code that people can comply with.

MR. GEHLE: Okay. Well thanks, Mazi for the explanation.

So in general I may be able to speak to this also when we talk about the appendixes, but we're very concerned about small system sizes and associated costs, especially if you add storage. I think we'll hit situations where the systems are so small and storage costs are relatively high, that it's just not a very strong value proposition for the home buyer. So we are very concerned about that. And if I listen to reduced system sizes, I would like to make that comment that we should take that into consideration.

And as it pertains to shading, I think the shading restrictions are also very, very strong. And today there are technologies, emerging technologies. There's power electronic technologies that allow and deal with partial shading. So I would also like to comment that we should look at the shading requirements and see whether we can soften them up.

MR. SHIRAKH: So one quick note is our requirements are the minimum requirements. People can exceed that if they wish, if they can do their cost effectiveness and determine that the little bit larger system brings better value. As long as they don't violate the NEM rules they can.

MR. GEHLE: Yeah, we will actually have to do that, because I think the mandated system size is from a value proposition to the home buyer are not very strong. So but again maybe there are ways around it, especially if you look at the shading limitations they're very, very restrictive. Thank you.

MR. SHIRAKH: Thank you.

MR. CAIN: Joe Cain, with the Solar Energy Industries Association. To speak to the exceptions or the reduced system size for the two-story or three-story I just would want to make sure that, first of all I don't know that it's necessary. But second, I'd like to know a

little bit more about it. But I can just tell you that ten years ago, it was common to see solar panels come through that were 175 watts per panel. And then we watch them go through 185 and 195, 235, 275. And there's some panels out there now that they may be a premium panel, but there are some out there that are 350 watts in the same space that used to be 175 watts. So the actual output of individual panels has essentially doubled in 10 years.

And so I think this space limitation is a two-story or three-story, I think it's something to consider, but I don't think that I agree that the requirement should be relaxed for those cases. And anyway I'd like to work on that some more, but I think that it may be overstated. And I want to take a real close look at those exceptions.

MR. SHIRAKH: Again, we worked with some architects. They presented to us actual plans that they were working on and it didn't seem to be a problem in those cases. But you know, we'd be happy to look at your data and take another looking.

MR. CAIN: Okay. Looking forward to more dialogue. Thank you.

MR. BALNEG: So we have two comments on the phone. Okay, Clair. You can go ahead.

MS. BROOME: Can you hear me now?

MR. BALNEG: Yes. We can hear you now.

MS. BROOME: Wonderful. This is Claire Broome. I'm a Professor of Public Health at Emory University and have been active at the PUC in considering integration of distributed energy resources. Can you go the slide which shows the electric heat pump water heater requiring additional PV?

I would suggest that it's really important to consider the many functions a heat pump water can provide. You're looking at it just as requiring further electric load. But in fact, it can be a thermal storage device as you have discussed earlier, in the importance of grid-connected communications protocols. I would urge the Commission rather than requiring additional PV, to incorporate the entire value provided by an electric heat pump water heater.

I heard you're considering a credit for thermal storage, but why not have an integrated approach to encouraging efficient heat pump water heaters. This is particular critical, because the importance of getting off gas water heating and transitioning to all electric, we should not be penalizing efficient electric heat pump water heaters. Thanks.

MR. TAM: Thank you for your comments. I just

want to add these are prescriptive requirements. Under performance, we're not envisioning that you can trade off PV with efficiency. Again, we are looking at thermal storage for heat pump water heater. We are working with NRDC to develop some sort of DR credit that can be taken in the performance method. But yeah, we are looking into that.

MR. STRAIT: Certainly, if it makes sense to do so following that research, then a prescriptive option or a compliance option for a water heater with those features would make sense. We just have to do some more research on that.

MR. BALNEG: Okay. We have Rachel on the line.

Rachel, you may speak.

MS. GOLDEN: Thank you. Hi. This is Rachel Golden, with the Sierra Club. I'm wondering if you can mute there at the CEC, because there's a big echo.

MR. STRAIT: We can hear you just fine. We aren't hearing an echo, I apologize.

MR. GOLDEN: Okay. I guess I can hear the echo only, thank you then.

So I just want to thank the CEC staff for all your work on the 2019 Code. And I appreciate the opportunity to comment on behalf of over 400,000 members in California and also our chapters across the state.

We support and appreciate the CEC's work to integrate zero net energy into the code and requiring solar in homes. We believe it is going to lower the life cycle cost of home ownership and also support California's energy, air quality and climate goals, while at the same time supporting job growth in the state.

And we strongly support the future addition of an electric water heater baseline. This is critical to enable the construction of energy efficient, climate friendly, electric buildings.

Recent studies by Lawrence Berkley Nation Lab demonstrates that in order to achieve California's climate goals the state agencies like the Energy Commission, need to quickly facilitate a shift to high efficiency electric appliances, like heat pump water heaters and heat pump space heaters. So historically the use of TDV and using mixed fuel baseline has meant that the code favors mixed fuel buildings even though the Commissions and E3's own analysis has shown that for almost every climate zone, that electric buildings have lower greenhouse gas emissions and less energy consumption, than those that use natural gas.

So we strongly support the addition of an water heater baseline. And creating this electric water heater baseline is key in the short term to overcoming the

shortcomings of TDV and unlocking the door to achieving natural ZNE, but ultimately deep decarbonization and zero emission buildings.

We also want to make sure that the electric baseline will be available, whether or not gas is available. We also support the integration of a heat pump water heater flexibility credit. And we look forward to seeing what that looks like.

And at a high level just to add, we feel strongly that Title 24 needs to evolve to be aligned with the state's climate goals. A lot of progress has been made in this code cycle. And it's an important step forward, especially in achieving ZNE. In the next code cycle, we're eager to see the code evolve more to be a greenhouse gas-based code and to stop being limited by the TDV metrics.

Thanks very much.

MR. SHIRAKH: Just one quick note, Rachel. The electric heat pump water heater will be available whether gas is available or not.

MS. GOLDEN: Terrific. Thank you, Mazi.

MR. BALNEG: And we have one more comment online by Kelly. Kelly, you may speak.

MR. KNUDSEN: Hi. Thank you very much. This is Kelly Knutsen, from CalSEIA. I just wanted to say

thank you very much for putting together this workshop and for all your hard work over these past years on this. And I'll keep my comments brief. I just wanted to associate myself with the comments from Joe Cain of SEIA as well as Helmut from Sunrun. And I think they've raised some good points.

I just wanted to mention that we are glad to see the solar PV requirements in this code and a role for storage. We'll have some more comments for later on in the afternoon, from my colleague, Laura. We'll share on those specific comments when we get into the details of the appendix.

And also, I'm glad to hear this discussion about the role of thermal both water heating and space heating within this discussion and glad to see that solar thermal, like solar water heating and cooling, has continued to be part of the codes. And so when considering some of these other additional things, please continue to include solar thermal in the discussions when we're thinking about the thermal sizes of the code. And, as Joe mentioned, we are planning on jointly commenting with the -- to get some more detailed feedback on all the discussion from today as well as proposed 45-day language.

So I just again wanted to say thank you and

we'll be talking more soon.

MR. BOZORGCHAMI: Thank you.

So I think this wraps it up for the morning session. We're about 15 minutes behind, so if it's okay with you Commissioner, can we go for an hour lunch, please?

COMMISSIONER MCALLISTER: (No audible response.)

MR. BOZORGCHAMI: All right. So we'll be back here at 1:45 for the afternoon session. Thank you so much.

(Off the record at 12:44 p.m.)

(On the record at 1:47 p.m.)

MR. BOZORGCHAMI: All right, good afternoon everyone. So we're going to start the afternoon set of our hearings. I just want to make sure that everyone's aware that we would like all your comments sooner the better. We want to be very productive and be able to get a very good and accurate standards out for the 15-day language.

So with that I'm trying to -- we're a little bit behind schedule, but I'm trying to catch up as fast as we can. We're about 30 minutes, about 20 minutes behind. So Mikey, excuse me, Michael Shewmaker will be presenting the Residential Additions and Alterations

section.

MR. SHEWMAKER: All right, well I hope everyone got a chance to go outside and enjoy the nice weather. We'll try to make this quick and get you guys out of here as soon as we can.

So I'm going to cover Subchapter 9, which is Section 150.2 in the Standards. And we'll cover the prescriptive approach for low-rise residential additions and alterations.

First, I'm going to start off with additions greater than 700 square feet. We added language to 150.2(a)1A to eliminate the requirement for continuous insulation for additions in which the existing siding is not being removed or replaced.

For additions less than or equal to 700 square feet we made a number of changes. In 150.2(a)1Bi and ii we clarified the ceiling insulation and radiant barrier requirements for Climate Zones 1 and 11 through 16. They'll be required to install R38 insulation, and 2 through 10 R30. And then for the radiant barrier that'd be required in Climate Zones 2 through 15.

In 150.2(a)1Biii we updated the insulation requirements to match the prescriptive requirement for cavity insulation in new construction. So that's a R15 in a 2 X 4 cavity or R21 in a 2 X 6.

We added language to clarify that additions less than or equal to 700 square feet are not subject to the quality insulation installation requirements. We added language to eliminate the requirement for continuous insulation for additions in which the existing siding is not being removed or replaced.

And then we added an exception to clarify that enclosed rafter roofs shall meet the mandatory requirements of 150.0, which is R22.

In 150.2(b)1B we made some minor changes to provide clarity and improve readability. Those changes are non-substantive.

And then in 150.2(b)1D, duct leakage compliance targets for entirely new or complete replacement duct systems were moved to Section 150.2(b)1Diia from Table RA3.1-2 in the Residential Appendices. This is in keeping with staff's efforts to be consistent with locating compliance requirements in the standards and limit the content of the appendices to procedures.

And then in 150.2(b)1F for small duct high-velocity systems, a minimum airflow rate of 250 CFM per ton has been added for compliance with the refrigerant charge verification protocol. This is consistent with the new minimum airflow rate given for these systems in Section 150.0(m)13D.

And with that I'm going to pass it off to Danny Tam who will finish up the prescriptive approach.

MR. TAM: Hi. Under 150.2(b)1H alteration for water heating, we're proposing to add two options for heat pumps in a situation where you're replacing an existing gas water heater to a pump. So the first option is a (indiscernible) minimum heat pump water heater, which will require you to add additional a PV capacity of 1 kilowatt. Alternatively, a second option you can install NEEA Tier 3 heat pump water heater in Climate Zones 1 through 15. And just to clarify, if you already have the existing electric water heater, you don't have a gas line connect to the water heater location, you can already replace it with an electric water heater. So these options only effect when you're changing out a gas water heater to a heat pump water heater.

Okay. And then 150.2(b)1H -- (b)1I, so the changes are to clarify that adding a new surface layer or a roof with re-cover, shall be required to meet the requirement of 110.8.

And in Table 150.2(c) we added a row to define the standard design for altered doors with and without third-party verification.

Okay. And I'll hand it off to Jeff Miller.

MR. MILLER: The language in 150.2(b)2A was

revised to clarify mandatory requirements for performance alterations. The air filter requirements in 150.0(m)12 and the fan efficacy requirements in 150.0(m)13 are applicable to entirely new or complete replacement space conditioning systems, also to entirely new or complete replacement duct systems.

For performance alterations, Table 150.2-C was modified to clarify the references to standards requirements expected to be used for establishing the standard design calculations. Space heating and space cooling systems reference Table 150.0-A or B for equipment efficiencies. Section Table 150.1-A or B for equipment efficiency; Section 150.2(b)1C for entirely new or complete replacement system requirements. And 150.2(b)1F for refrigerant charge verification requirements.

Air distribution systems reference Sections 150.2(b)1D and 150.2(b)1E for duct leakage requirements.

Changes done to Appendix 1-A are minor, but they did reference versions and removed references not used in the standards or joint appendices.

And at this point we're ready for comment.

MR. BOZORGCHAMI: So any comments on our Additions and Alterations sections for 150.2 Residential? Please, don't everybody jump at the mic. Ronald?

Okay. So if you don't have any comments, Commissioner?

COMMISSIONER MCALLISTER: I guess I just wanted to ask a little more information for people, so that they understand. I guess I understand how it could be confusing to understand sort of the "if this, then that" in terms of replacement alteration. You know, if I have an existing that's in such and such a condition, you know, it's gas and I want to go to heat pump, what are the requirements specifically that apply to me? Under sort of a little bit of a structure, so that people can pull a decision tree kind of, if you will. Just so people can understand what the realities are for their particular situation, so alterations and straight replacements and new construction all have different possibilities. So I just want to make sure we're letting people get clear on all that.

MR. NESBITT: George Nesbitt, HERS Rater. Did you want the whole alterations chapter? I can't bring it up. Section 150.2(a)1B(v)i if I'm correct, so there's a -- prior it says if you're extending a 2 X 4 or 2 X 6 wall there's a certain minimum of cavity insulation that you have to put in, but you don't have to put exterior insulation, because of the matching on the outside. So then you also then say if no existing siding is removed

you don't have to put in the minimum R15 or R19, well okay it might be 21, I might have wrote it down wrong.

MR. SHEWMAKER: No, that was continuous insulation, not cavity insulation.

MR. BOZORGCHAMI: That's the continuous insulation. This is so if you're converting a garage.

MR. NESBITT: What you're saying in that section is that if you're not removing exterior siding basically it's saying you're not required to do whatever it was in the minimum, those R values. But what if you're removing the interior wall finish and the walls are open?

And I guess it begs the larger question is in most parts of the code, electrical, if you open up a wall you're supposed to upgrade the electrical to the code. So I've seen plenty of people open up walls, not insulate them, and close them back in whether it's from the inside or the outside.

MR. BOZORGCHAMI: Was that under a repair or was that under an addition or an alteration, because under a repair you just have to fix what you're touching. You don't have to fix everything if it's an alteration. So if I have a detached garage all right, I'm not going to expect you to put the continuous insulation by tearing up all the stucco system to meet our prescriptive

requirement. That just becomes too expensive, too cumbersome.

MR. NESBITT: Right, but if you have a wall cavity open from the inside, you wouldn't want it (indiscernible) insulated.

MR. BOZORGCHAMI: The question is what is the intent here? Is the intent to meet energy efficiency? Then yes, you would have to update the insulation.

MR. NESBITT: Yeah, because like there's a lot of times people remodel bathrooms, kitchens, they open interior walls completely. I have seen people not insulate them and perhaps the code needs to explicitly --

MR. BOZORGCHAMI: Part (indiscernible) or an alteration in that perspective then you have that.

MR. NESBITT: Right, perhaps the code is not clear.

MR. BOZORGCHAMI: We could clarify that in our manual actually. If you look in our Additions and Alterations Section in the manual it has a great explanation on that.

MR. NESBITT: In --

MR. STRAIT: George, if you've got a list somewhere to the earlier list of individual bullet items --

MR. NESBITT: I've got a short list.

MR. STRAIT: Well, I mean please do also submit those in writing to us, so we can use them as a checklist in reviewing the code. That would be useful.

MR. NESBITT: In the 150.2(a)1 area additions, the additions less than a 1,000 square feet are exempt from complying with 62 too. But then you sort of repeat that exception like twice with additions below 700 square feet as well as above 700 square feet. So it's sort of like you have the same -- basically saying if you're doing an addition less than 1,000 square feet, there are three places you're saying the same thing as opposed to just kind of saying it once.

I just wanted to hit on A2(d) the duct leakage, the multifamily at 12 percent. I mean, this was a change I think in 2016. Never, it was sort of made, there was never really seemed to be any real backing or justification. I mean, I can see that it could be higher than a single-family, because they're smaller duct systems, less joints, harder to get to 5 percent. But we've had no problems with any of our multifamily projects getting below 6 percent in the past.

Then, I can't pull it up, but like furnace replacements.

UNIDENTIFIED SPEAKER: (Off mic: indiscernible)

MR. NESBITT: Nah, that's okay.

So 2G, (a)2G, basically you can replace the same fuel. You allow heat pumps as an exception, so you can go from gas to a heat pump yet. And then 2H and water heaters, here again yes you can go to a heat pump, but it's not without additional requirements for PV system. So we're treating essentially the same technology differently between water heating and space heating. I'm not really sure that there's a good justification for that and the water change-outs have been probably one of the greatest areas of lack of enforcement. People putting in commercial gas water heaters, people converting to electric and the heat pump probably without showing any compliance in the electric code.

And that's about all I really want to say right now on this.

MR. BOZORGCHAMI: Thank you, George.

MS. PETRILLO-GROH: Laura Petrillo-Groh, AHRI. My concern is with Section 150.2(b)1H, the replacement water heater requirement. Just so I understand correctly, any time you want to replace a gas water heater with an electric water heater, you're required to install PVs on the roof with this proposal?

MR. STRAIT: No there are two options. There's -- oh, I'm sorry.

MR. TAM: Yeah. Currently there's no path to do that under prescriptive, so basically currently they have to do performance. So we're trying to add some ways for people to easily do that.

MR. SHIRAKH: They don't have to install PV. That's one of the options. The other one is they can (indiscernible).

MS. PETRILLO-GROH: Even in the -- and this is in the prescriptive or performance path for alterations?

MR. TAM: This is in the prescriptive path. We're still hashing out the performance path for alterations.

MS. PETRILLO-GROH: I still think that this presents problems in terms of preemption with minimum efficiency products tying energies of another product to the installation of a product or of requiring a more efficient product. I think it puts you into trouble with the federal preemption on those (indiscernible) covered products. The same concern I had before and I'm happy to submit in writing.

COMMISSIONER MCALLISTER: So my understanding is that we've had Legal look at this, but is that not the case? Anyway, we'll hash that out, but --

MR. STRAIT: I can confirm, we've had some discussions with our Legal Department, but we'll be happy

to take the comment letter that we receive and continue to have that conversation with them, in case there's something they missed.

COMMISSIONER MCALLISTER: Yeah.

MR. BRADT: Hello, Chris Bradt, Frontier Energy on behalf of the Bay Area Regional Energy Network, just a clarifying question about all the options for heat pump water heater electric replacement. In the express terms there was not discussion of that being limited to a garage or condition space. The 45-day language does. And I just was curious, I know performance-wise these products perform better in conditions (indiscernible) garage space. Is there any consideration of kind of the number of existing residential buildings where the existing water heater is actually located in a utility closet outside or a basement, on-condition basement space, and just understanding whether that is kind of going to constrain the opportunity to use these compliance pathways given existing building stock. Or an inquiry, I guess, for (indiscernible) --

MR. TAM: Again this is a performance option. There's a huge performance difference that depends on where you locate the water heater. So in that case if you -- you can go to the performance if you need to do that.

MR. BRADT: So all right, thank you.

MR. BOZORGCHAMI: So, any more comments? If not, we're going to go right into the view that ends part of the standards itself, the 150 sections for the residential.

Now we're going to the Joint Appendices and Peter Strait will do the presentations there for the first half.

MR. STRAIT: Thank you very much. We are going to be moving through all of the Joint Appendices and then opening up for comments, so just bear with us.

First, no changes are proposed to the following amendments. That's JA3, 6, 9 and 10, those are the same as they were in 2016, so those won't have slides other than this one.

For JA1 this is primarily a cleanup change. We removed the definitions that were duplicative of Part 6. We also added a few new definitions for JA11 and 12, both of which are new.

For JA2 climate zones we made some language that enables the use of metes-and-bounds polygons in GIS software. And we moved the zip code tables out of the regulations, so they could be updated between code cycles. So the language still allows for the use of those tables, but that way we have been updating them in

between code cycles when the U.S. Postal Service defines new zip codes, splits new zip codes. And in order to make sure this was not an underground regulation we moved those out.

Also this isn't just talking about the use of a GIS software. The Energy Commission has internally developed a GIS tool. We will be making that available in likely the next few days as a preview. That's something that can get much more accurate much more easily. You can enter lat/long coordinates or an address and it will show you exactly where you are on the map and exactly where the polygonal climate boundaries are on that map. So we're certainly looking forward to that.

For JA4 we've got a few simple changes. The U-factors for Spandrel panels and glass curtain walls, we've installed a new table to separate out curtain walls. The U-factors for log home walls and straw bale walls have been updated.

For JA5, this is primarily a code cleanup. We've cleaned up the language in that appendix. We've removed some unenforceable terms such as "other information display" or "consider security." We're removed the expansion port requirements. We don't think it's necessary to specify to that level of detail anymore. Simply, we want them to be communicative.

Also, several of the requirements have been moved into Section 110.12 in some form and we've really focused in JA5 on a thermostat design. This is an area that we definitely want close attention and feedback from stakeholders.

For JA7 I'm going to turn it over to Jeff Miller.

MR. MILLER: Reference showing Appendix JA7 was revised to update and clarify the existing requirements throughout and generally that was done.

The document registration numbering convention information in Section JA7.5 will be moved into the Data Registry Requirements Manual.

Section JA7.7, that's information on data exchange, was clarified and revised to include new information on external digital data source services that may be approved for use for filling out compliance documentation in data registries.

JA7.8 was revised to incorporate approval procedures previously given in Section JA7.9 and to delete Section JA7.9. Thus Section JA7.8 now includes approval procedures for data transmittal services between data registries and cloud-based data services such as those used by diagnostic tool manufacturers. These external digital data sources are expected to be used as

an alternative to keyed-in data entry for completion of certain parts of some compliance documents.

MR. STRAIT: Okay. Thank you, Jeff.

For JA8, the changes proposed are intended to provide clarity and updates requirements to align with current federal and ENERGY STAR requirements, the most significant changes updating the lumen maintenance and graded life tests to latest ENERGY STAR tests and no longer requiring any modifications to those tests. We are also removing the more strict Du'v' rating and we're moving the need for Title 20 lamps to meet two separate CRI requirements. If there is a CRI standard in Title 20 then meeting that CRI standard will count as meeting the CRI standard for JA8.

Lastly, based on requests from stakeholders we've added consideration for an off-like standby mode. This is for devices that don't use a break and a circuit to turn lighting off and thus may use a negligible amount of power to elicit for a control signal.

So and now for the new Appendices here is Mazi Shirakh.

MR. SHIRAKH: It’s Mazi Shirakh, I'm going to be talking about JA11 and JA12. These are brand-new appendices and JA11 is the qualification requirements for photovoltaic systems and JA12 is for battery storage.

And these are the highlights of both appendices and you should really download them and take a look at them. But briefly, a system orientation PV system, must be within 90 to 300 degrees. This is consistent with the orientation in the prescriptive requirements that I described this morning.

The minimum shading criteria, for systems that are going to comply either prescriptively or using a simplified approach in their performance, they must be free of all and any shading. So that needs to be verified first by the installer, and then by the building department. If there is any problem, like you have got chimneys, skylights, mechanical equipment, adjacent buildings, trees and so forth, then you should go to the performance approach.

Solar access verification, again at the time of module installation the installer measures the shading condition with a solar assessment tool. Again, this is part of this verification that if you're using prescriptive or simplified performance of course there is no shading problem. And if there is you should go to the performance.

System monitoring requirement, this is important. It's basically giving the builder or the building owner or whoever is operating the PV system the

tools to be able to verify the performance of their own system. This is typically a computer based, a web portal or and in addition to that, a smart phone device where the homeowner can actually log in and look at the very performance of their system, kilowatt hours on an hourly basis, daily basis, monthly basis and so forth. So this is a tool that will enable the homeowners to make sure that their system is operating satisfactorily after it's been installed.

Interconnection requirements, the installer, the installed inverter must meet UL 1741 and CPUC Rule 21 for smart inverters, so in short, they need to be smart inverters.

And enforcement agency, an enforcement agency must verify that all certificates of compliance installation for the PV system are submitted and valid. I mean, basically they need to make sure that all the forms have been submitted and they're read. And enforcement must also verify minimal shading of the PV and array by using an online satellite mapping tool. So what this is, is the Bidding Department will have two choices. Once they receive the CF2R they can either pay a site visit and make sure that the compliance document is reporting accurate information. Or they can actually log in using something like a Google Earth to verify if

there is or there is no shading at that site.

JA12 is qualification requirements for battery storage. It's again the new appendix and it has the minimum qualification requirements for battery storage systems that are installed for a compliance credit with the standards.

Minimum performance requirements, these systems must meet some minimum requirements. The first one is it has to have at least a usable capacity of 5 kilowatt hours. So if you're installing a battery storage system to get an EDR credit it must be 5 kilowatt hours or greater. It must either have round-trip efficiency or charge/discharge efficiency is another term, of at least 80 percent. Now, you can put up a battery storage that's less than 80 percent, but you'll get a penalty for that. If you have a storage system that has a better than 80 percent charge/discharge then you get a credit for that.

And it's also energy capacity retention must be 70 percent after 4,000 cycles or 70 percent under a ten-year warranty.

General control requirements for all JA12 compliant batteries, these batteries must have the capability to be remotely programmed. Again, we're talking about the capability. It must have the capability to be a program to change the charge/discharge

periods. It must be programmed first to meet the load of the dwelling with the capability to discharge to the grid upon receiving a demand response signal from the utility or an aggregator or some third party.

And these systems are required to do a self-check four times a year to make sure that they are not left in the back-up power mode. And they're actually in a program mode. And they're actually in a program mode. And the reason for that is the system that is left in a backup power mode brings little value to the grid or the homeowner. So four times a year they need to a do a self-check.

At the time of inspection, the battery shall meet one of the following control requirements. So there's three control requirements that the batteries must be able to provide. And given the operation, they will have to defer to one of these controls.

One of them is called the basic control. This is the control strategy when the battery gets charged when the output of the PV system, the generation, is greater than the building load. So if you have excess generation then they'll go into the battery. And then they'll discharge when the reverse is true, is when the load of the building is greater than generation, then the battery will start discharging rather than buying from

the grid.

So the time-of-use controls is a little bit more sophisticated than that and that allows charging of the battery during nonpeak TOU hours. So in the morning, in the evenings and midday when it's not a peak-TOU hours the batteries could get charged from the PV or the grid. But they discharge to the dwelling or the grid only during the peak hours from July 1 through September 30th.

And the remainder of the year, that's all in the winter time, spring, anything other than they'll be operating in the basic control.

The advanced demand response control, that probably is the highest level. It's the most sophisticated. So this is a system where the battery is either programmed as a basic control or time-of-use, but it will discharge to the grid upon receiving a DR signal. And these signals will come probably from the utility or a third-party aggregator. And the difference between this and the TOU is that this is more of a precision approach where they identify the highest value hours of the day. And the battery will hold back the charge and will only discharge during those highest values, so that's why this is a DR signal that requires some interaction with either the utility or a third-party aggregator.

So that's it for JA11 and 12.

MR. BOZORGCHAMI: Okay. Any comments?

MS. HERNANDEZ: Good afternoon, Tanya Hernandez with Acuity Brands. I have some comments and questions about JA8 that I alluded to before. A couple of things, first is the treatment of luminaires in this particular specification, particularly the integrated type, we'll call inseparable. I know that there's been some cleanup there, but there are a couple of questions that have been left there.

For lumen maintenance, products like that have been able to use the IAS LM-80 TM-21 path for lumen maintenance and for radiant life. And it appears that's the direction that the Commission is going in, based on the updates. However, the way it's written it basically points to the scope of ENERGY STAR, meaning if you're a luminaire that falls under the scope of ENERGY STAR you can use that pathway. But what if you're a luminaire that does not fall under the scope of ENERGY STAR, but is still meant to be or can be used in a residential setting? So that's one thing that appears not to be clear there.

There's also the -- so the cleanup language is helpful as far as clarifying that those products do not have be tested again, using 6,000 hours, which is nine

months of testing for lumen maintenance. However, there is a survival rate requirement that has been historically applied to ENERGY STAR lamps and not to luminaires. And it is not clear if the Commission wants to move forward with making the luminaires that are able to use the somewhat reduced path of LM-80 TM-21. Will they still have to go through the 6,000 hour testing in order to determine whether there's a 90 percent or a 100 hundred percent survival rate per JA8.

I did also want to comment that again, we were happy to see that the 3,500 Kelvin had been put into I guess I think it was Section 150.0 had been pulled out and has been now made across the board, 4,000 Kelvin for both luminaires and lamps. And I was actually a little surprised to see lamps get a break on that one, but I did want to acknowledge that one as well.

And I think that's my comments for JA8.

MR. STRAIT: Thank you very much. To answer two of the questions here, the first about the survival rate? The survival rate language simply says, "For tests using a sample group of ten units, 90 percent of tested units shall be operational at the completion of the test. And for tests using a sample size less than ten, all tested units should be operational at the completion of the test." And this is just to prevent cases where if it

was taking one of those shorter tests that the unit failed during that test, it's saying you're going to have to restart with a new unit. You can't just swap in a fresh unit and then can pick up where you left off, which makes sense. But if we don't say it somewhere someone will ask.

MS. HERNANDEZ: Okay. So to be clear, when you use LM-80 data, that's chip level or package data, there's no survival test for that. You won't have any data for that. If you do survival testing it will have to be on an end-product, not that level data. That's why it's not in the ENERGY STAR luminaires packets and the lamps pack.

MR. STRAIT: Okay. We'll look at narrowing that to units that pass through the lamps specification if that's appropriate.

MS. HERNANDEZ: Okay.

MR. STRAIT: So you had, I think one other question, oh about the extension between whether you would pass through the luminaire to the lamps test procedure. We tried to make the language more direct in saying if you fall within the scope of the ENERGY STAR test procedure for luminaires, you use that test for everything else. Regardless if you're outside of that luminaires' box use the lamps test. We found the lamps

test to be the more generally applicable of the two, it's more able to accommodate a wider variety of potential products. But otherwise the intent is simply to align as closely as possible with the ENERGY STAR when it comes to determining these particular aspects of the devices.

MS. HERNANDEZ: Okay. So I guess my comment is, and then having worked on the ENERGY STAR Program is that the lamp spec is supposed to be more I guess really more stringent. And to cover more applications, because you expect a lamp to go into something, right? And so luminaires, integrated luminaires, you expect the design of the luminaire to actually take care of all those issues. So you're not taking something and throwing it into something and hoping that it performs in a particular way.

So the comment about luminaires that don't necessarily fall under ENERGY STAR scope, I mean we all know the ENERGY STAR is really just defined however they wanted it defined. So down lights are in there, but then sort of strip lights aren't even though those are lights that would go in your garage, right? But they would still get the same type of treatment except they are of course not under that scope. They are under another program scope, which is not (indiscernible).

MR. STRAIT: Sure, just as a -- it would be

helpful to us to identify the specific products and those features that put them outside the ENERGY STAR luminaire specification, that you feel the luminaire's test would be more appropriate for. And identify why the lamps test would not be appropriate. That would be useful to us in your comments.

MS. HERNANDEZ: Okay. And my real issue is that any long-term lumen maintenance testing for a luminaire that's integrated is redundant, because you've already had all this testing done in applications that you should not expect to be more stringent like (indiscernible) lamp and a luminaire. Thank you.

MR. STRAIT: Sure, thank you very much.

MS. HERNANDEZ: I

MR. BERELSON: Serj Berelson, Nest Labs, good afternoon. So I want to talk about JA5. So nest appreciates the Commission's efforts to streamline and clean up Joint Appendix 5. JA5 is now cleaner and clearer. What is missing is new language that advances the energy efficiency capabilities of occupant controlled smart thermostats, OCSTs.

Title 24 is at its core, an energy efficiency program. Through energy efficiency measures like those available on OCSTs demand can be avoided all together. Therefore we suggest that the Commission consider adding

features to the OCST requirements that enhance a building occupant's ability to function with greater energy efficiency rather than focusing solely on the demand response capabilities of OCSTs. For example, JA5 should be revised to require that OCSTs include features designed to save energy such as the ability for the customer to set a schedule or even have the thermostat create one for them, occupancy sensing so that the thermostat can automatically shift to a more efficient setting if no one is home, the ability to control the thermostat remotely, the ability to provide users with information on their HVAC energy usage in a way that positively reinforces energy efficiency behavior. And finally, that all smart thermostats should work as a basic smart thermostat in the absence of connectivity to an Internet service provider.

Revising JA5 to incorporate these requirements will create a greater focus on energy efficiency to go along with the current focus on demand response. Smart thermostats can be a powerful support to both EE and DR. Let's take maximum advantage of this dual benefit. We thank the Commission for providing this opportunity to provide these initial comments and we will submit them in written form as well.

MR. HARING: Good afternoon, Rick Haring,

Philips Lighting. Again, I'd like to thank the Commission for allowing us to participate in this rulemaking.

At this time we'd like to respond to recent comments, docket comments, that the Commission received on its pre-rulemaking proposal to include NEMA 77 as a test method for flicker in JA8. Philips Lighting fully supports the use of NEMA 77 as a test method for flicker in California. It is perhaps the most robust test method for flicker that has been developed to date and it is a real-world approach with scientific backing and support to validate its metrics and approach.

We believe that NEMA 77 is a substantial improvement over JA10. The so-called low hurdle of NEMA 77 is orders of magnitude stricter than JA10 over much of the frequency range. In particular, there range where features are most likely to occur. NEMA 77 is much closer to the IEEE 1789 specification rather than the present metric.

The NEMA 77 SVM and PSG metrics are being examined by the IAS, the IEC, the ENERGY STAR and CIE for using their specifications and requirements. And it is becoming the de facto standard for the lighting community.

To address the assertion that flicker that

occurs at 100 to 200 hertz, and the serious negative impacts on specific segments of the population, which cause migraines, headaches, reduce visual performance we site the IEEE 1789, which states that migraines have not been proven to originate from frequencies as low as 60 hertz. In fact, it is noted in 1789 that increasing the frequency of a monitor to 72 hertz was sufficient to remove the occurrence of migraine headaches. As the Philips comments previously submitted to the Title 24 docket show a value of SVM less than 1.6 voids the regions shown in the literature to be associated with headaches and performance effects.

It has also been commented that roughly 50 percent of the population is able to detect the stroboscopic effect of an SVM of 1, which means that flicker is just barely perceptible. The study referenced was conducted in a laboratory atmosphere with a single light source, the viewer instructed in what to look for and with motion present. In real life, there are multiple light sources and there will not be consistent motion. In contrast, the present specification in Title 24 allows light at 30 percent modulation. That's below 50 hertz at which flicker is visible for nearly 100 percent of the population without motion.

NEMA 77 allows about 40 percent modulations at

120 hertz with an SVM of 1.6 if the modulated light source is a pure sine wave.

However, the allowed modulation depths is lower if the wave form is more complicated. Changes in the frequency and in the wave form are accounted for in this method, because it is based on human sensitivity. Title 24's specification is not based on human perception, it allows light modulation at roughly six times the recommended limit to avoid seizures in people with photo-eleptic sensitivity.

In all cases, we would strongly urge that the Building Efficiency Standards reference nationally recognized standards whenever possible. It provides clarity for consumers and professionals alike.

We plan to submit additional comments to the docket in writing and we would be happy to provide additional documentation to substantiate our comments if necessary. In light of these comments, we ask if the Commission can share their rationale to remove the NEMA 77 options in the 45-day express terms. Thank you.

MR. HAMMON: Good afternoon. Rob Hammon, BIRAenergy. I was wondering if I could be nostalgic for a minute and just go back about ten years, Bill, when you and Michael Wheeler were in a room together planning the Strategic Plan and we came up with the idea of zero net

energy home by 2020. I believe that was the start of this whole endeavor. At any rate, we're almost there. Congratulations to all of us who have been working really hard on it.

I just wanted to reiterate for the JA12 the need for controls. And that there needs to be other items that could be encouraged under that portion of the code. I'm particularly interested in thermal mass. I think that there's lots of evidence that a mass in a home can flatten its load curve, reduce the height of the load curve and solve a lot of problems without costing in energy, like batteries do.

I also fear that if we had a big incursion of batteries into homes in the marketplace, we would have to make sure that they don't turn on and off at the same time. It'd be a disaster. And I'm not convinced that we have the controls to do that at this time.

And again, it bothers me to replace efficiency with electric storage credit. And I wonder if it's coincidence that the size of the credit is the same as the size of the credit that you would get for high-performance walls. I'll just that that one hang.

So I'm looking forward to seeing information on how the other features that could be -- for which you get extra credit if you will -- for putting things like more

mass into the homes under this credit for storage. And I do have written comments that are more lucid than my speech.

And I will turn them in now. Thank you very much. MR. SHIRAKH: So we are adding more compliance credits for thermal storage strategies.

MR. HAMMON: Yes.

MR. SHIRAKH: So if it's not in the next revision, it will be in the future revision.

MR. HAMMON: Great. I appreciate it, Mazi. Thank you.

MR. NESBITT: George Nesbit, HERS Rater. Just JA1 on the definitions, thanks for removing all duplicates. I know you explained previously, it seems to me that all the definitions should be in one place. I know you explained some reason, that for some reason the Joint Appendices definitions couldn't be with the rest of the code. It doesn't make sense.

But JA2.1 and 2.2 in removing either all the information or removing, I guess, climate zone from the city weather list it seems that large parts of the state, it doesn't change. Whole county is in a climate zone. It's never going to change unless we change our climate zone boundaries. Same is true of most cities.

Now, there are perhaps a few places that are

split in climate zones and things like zip codes do change. I live in 94608, in Oakland yet I'm serviced out of the Emeryville Post Office, right? Two different cities, the zip code covers it and those things do change. I know you have that interactive thing, but still I think it's nice if you have a chart and perhaps it could just start if you're in this county, you're in this climate zone, end of question. And then go into more details as those cities or zip codes that might change.

Because also when you get to a computer software, how are you going to determine what climate zone when you put a project in? You're putting in a city. I'm not sure if now you're also putting in a zip code. So I mean, essentially, you have to have that kind of a list to know on some of those.

MR. STRAIT: So, just to be clear we are going to continue to publish the Excel file that has all those all, so that table will still exist, it just won't be part of JA2.

MR. NESBITT: Yeah. Yeah. I mean anything that really doesn't need to be part into the code, because it does change, you know that can, better to have it out.

So JA11, the PV systems. So in 11.2, under

system orientation it says, "No PV systems or strings with module pitches greater than blah, blah, blah, because blah, blah, blah doesn't matter at the moment." In the next sentence, or paragraph, in the same section it says, "When CFI is selected in the performance calculation the PV array shall." So you're using multiple, sort of terms, for the systems or part of the systems where I think what you really care about is actually that all of the panels are within an orientation or a tilt.

Although when we do get to shading, the shading analysis is a collection of panels in an array. You can have multiple arrays on a building with different tilts and orientations. So some of that language seems inconsistent or like in the sense of no PV systems or strings. Well, microinverters don't have strings. Yeah, it's a PV system, so it just seems like the right term, PV panels, in that kind of place.

Just like Russ said, "Yes, HERS raters have been verifying these things for a decade," and should be, because we know the building department does such a great job.

So in JA12, the battery requirements, I'll bring it up here. Two things, the 12-2.2 is where you say you want a minimum of 5 kilowatts of usable battery

capacity. It seems to me that that figure should be based on the array size. If I have a half a kilowatt system or a three-quarter, because that's what I need, because my house is small or whatever, 5 may be too big. So and I guess really that capacity is also going to be dependent on how you're using it. What your use case is. How you're trying to offset and shift.

A question under 12.2.3.2, which is the time of use case. When you say and it can only charge during peak TOU and I guess discharge at non-peak, would be that based on each individual utility, because they do have different peak and off-peak schedules.

The other I guess comment about the use cases is honestly a system could be used for multiple. And I don't know how we account for that, because you could have it on a basic control or a TOU control. But if there's a demand response that may just say, "We need you to discharge now even though it's peak." So I don't know to what extent we are trying to limit the use case or we need to realize that multiple use cases can actually come onto play. And honestly, based on season, maybe a different use case is better in different cases. I guess it depends on what problem we're trying to solve.

MR. MORRIS: Hi. Alex Morris with the California Energy Storage Alliance. I just -- some very

high level input. I want to say thank you for your work developing the JA12 pathway to for energy storage to support the goals of these energy efficiency and 224 requirements. I know there's maybe some small tuning we may suggest still in comments, but thanks for including it. And we feel excited to have a pathway to support the goals.

MR. SHIRAKH: And can you send your comments to us?

MR. MORRIS: Absolutely.

MR. SHIRAKH: As soon as possible. Thanks.

MR. RAYMER: Thank you, Bob Raymer with the California Building Industry Association. With regards to JA12, and more to the point to the compliance credit being given for storage, for those of you who aren't aware of why CBIA so strongly supports this storage credit -- quite frankly we were hoping the Commission would give more, but we understand that's push and pull here and this is probably some good middle ground. But there's a number of reasons that have come into play here.

First off, obviously the solar system is making the vast majority of its power between the hours of 10:00 in the morning and 3:00 o'clock in the afternoon. And as we head into time of use rates, it's our feeling that

consumers are probably going to be a little bit more upset when they start getting those bills than perhaps the utilities are believing. But that's just our projection.

We think storage is going to become a far more marketable item in the three to four year time period. And so the ability to capture that solar power during the middle of the day and have it ready for use onsite during peak load periods, when power is costing two to two-and-a-half times more than what it would cost at 10:00 o'clock in the morning is an extremely attractive thing.

We've also looked at, with great interest the staff analysis that shows that with slightly more PV than is currently going to be required in conjunction with the battery can get you to full ZNE, is extremely attractive. We anticipate there's going to be a steady number of jurisdictions adopting zero net energy, or close to zero net energy ordinances above and beyond what the Energy Commission is proposing. And we need to be ready to move forward with something that can be identified and approved by a local building official and having this compliance opportunity with sub storage early on is going to be very helpful.

So we're kind of taking the long view here, but this sort of takes a big step in the right direction. It

just makes all the sense in the world to us. Thank you.

MR. SHIRAKH: Thank you, Bob.

MR. MCHUGH: Jon McHugh, at McHugh Energy. In general, I'm very supportive of all the changes that have been made to the various JA sections. And in particular, with JA8, the harmonization with ENERGY STAR, I think is going to make compliance a lot easier for manufacturers. I'm speaking against though the splitting of the or combining of the split related to the 3,000 Kelvin.

And I'd just like to note that, staff, this is going to come up tomorrow. But I believe staff has comments about the 3,000 Kelvin limitation for outdoor lighting. And in their proposal for the voluntary standard for outdoor lighting it says, "The purpose of the proposed regulation or limit light frequencies in outdoor lighting applications that have been found to disturb biological systems' diurnal patterns. This change is necessary to avoid an unintended consequence of adding lighting power allowance restrictions, in some cases when it's less expensive to manufacture higher color temperature lamps, which have a higher potential to interrupt biological systems."

So I'm all in favor of saving the turtles and saving the frogs, but I'm also interested in saving the humans. And when we talk about light sources in

buildings the impact on circadian rhythms has to do with lower colored light. There's been -- which is already in the docket. I see that someone had placed some information in the docket about the impact of blue light on sleeping patterns and how that relates to sleep patterns and health and cancer and those kinds of things. And the California Energy Commission has kind of been a leader on protecting human health, through not just its environmental regulations, but also its energy regulations.

And I think it's as far back as 1992 we had requirements for ultrasonic occupancy sensors. You can't hear them, but they actually have an impact. And if you've been following the Cuban Embassy and that there's potentially these sound weapons or whatever, there's a history of trying to protect human health.

But our original, when we proposed the 300 Kelvin limitation for separable and lamps, the purpose was essentially to displace low-efficacy sources. And if we change JA8 so that 4,000 Kelvin sources are now separable sources the potential is, is now someone who likes a -- the homeowner, after they've bought the house, they like a warmer colored source then they have the opportunity of putting in an incandescent source.

Whereas if someone has -- if they're sort of

stuck with, "Oh, I've got a 3,000 or 2,700 K lamp in that same socket that's high efficacy," if they chose -- they really would like a cooler source, the only cooler sources are higher efficacy. And this sort of relates back to the concept of nudging. We're not hitting people over the head, just the home builder puts in a particular light source and it just gives nudge to the consumer. "Hey, is this warm colored LED, is this a nice source?" So I'm kind of in agreement with Tanya that I don't know why we're necessarily changing this rule set here. This is something that's sort of -- it's buried back in JA8 as something manufacturers meet and the building official and the designers, they just need to purchase the JA8 lamp.

Thank you very much.

MR. HODGSON: Mike Hodgson, ConSol representing CBIA. A couple of quick items, Joint Appendix 4 or Table 4.3.1.3, thermal properties of insulating concrete forms. This table has not been updated since the late '90s and there's new information that was presented to staff a few months ago. And I was just hoping that that was going to be incorporated into the appendices, but also the manuals.

MR. BOZORGCHAMI: That will be updated, Mike.

MR. HODGSON: Great. Thanks, I mean they're

insignificant in (indiscernible).

MR. BOZORGCHAMI: I mean they're insignificant changes, but

MR. HODGSON: Yeah.

MR. BOZORGCHAMI: But no, that would be on the third digit, so we have Rob Hammon looking at that right now and it takes him a little bit long to understand.

MR. HODGSON: Great. As soon as he can figure out buried ducts, let me know. Okay?

MR. BOZORGCHAMI: Sure. (Laughter.)

MR. HODGSON: On Joint Appendix 12, JA12.3, on the interconnection requirements, this is to build on a comment I brought in earlier and I got very good clarification from PG&E and other utilities, that they have reviewed the sizing requirements for -- I should not speak for them. They have put comments into the record, which we need to review, but it looks like the sizing requirements that the Commission has recommended would be reasonable.

One of the things that concerns me and I appreciate the battery credit, I'm not trying to be negative at all on that, but on the interconnection requirement if you put in a battery currently in CBECC you get to increase your solar size by approximately 1.6 times. And that's without changing any other features in

the home, other than adding a battery. Perfectly fine.

What I want to make sure is that that does not violate Rule 21. Again, the whole point is we want to meet the standards in the most cost-effective way possible, possibly using newer technology which would be batteries. But then we want to make sure we also can hook up and get a building permit. Thanks.

MR. BOZORGCHAMI: Thank you, Mike.

MR. BOESENBERG: Good afternoon. I'm Alex Boesenberg from the National Electrical Manufacturers Association. Before I speak, if you'll indulge me, Mr. Commissioner, I have a scientist on the Webinar with his hand raised. I don't want to say anything redundant to what he has to say, so if Dr. Nachtrieb could speak before me?

DR. NACHTRIEB: Good afternoon. This is Robert Nachtrieb. I work for Lutron Electronics. And thank you to Alex Boesenberg for taking a place in line for me. I am also the Vice Chairman of the Lighting Systems Divisions at NEMA.

I'd like to thank the Commission for the opportunity to speak today. I'd like to raise a topic that was introduced by Rick Haring from Philips earlier today. This was with regards to JA8 and the exclusion of the NEMA 77 standard for flicker for consideration.

NEMA 77 addresses an important topic, a topic that is already acknowledged by the Commission to be important. LEDs save energy over other light sources and so adoption of LEDs is important for energy savings goals. Dimming saves energy further and therefore adoption by the market of dimming of LEDs is important for achieving the Commission's goals. So we certainly share the Commission's perspective that flicker is an important topic to be included.

The NEMA 77 standard for flicker includes many important improvements. In addition to having a robust method of measurement, it describes details for the synthetic mode that will be used to test the dimmers, the synthetic wave form that would be used to test the LEDs under flickering. There are specific tests in NEMA 77 for testing flicker of phase cut dimmers.

And as Rick Herring, from Philips mentioned, NEMA 77 is consistent with international standards and is similar in many ways to the IEEE recommended practice 1789 and the work performed by the Lighting Research Center at Rensselaer Polytechnic Institute.

The data upon which the human sensitivity curves were derived in the NEMA 77 standard are published. And so as with any published data, it's subject to discussion, for criticism. We and have a good

discussion about sample size or test conditions at the laboratory that were used to generate the data. But that is a legitimate scientific concern. And that is a debate that we should have.

I think that to exclude NEMA 77 as a whole from JA8 is a mistake. And I would ask the Commission to reconsider that. And following Rick Haring, I would welcome the opportunity to review the rationale of the Commission and to work together to find a way that NEMA 77 can be included in JA8. Thank you.

MR. BOESENBERG: One correction, that's JA10. Dr. Nachtrieb is in Sidney, Australia. He's tired. (Laughter.)

MR. STRAIT: That's perfectly fine. I understand.

Actually, I can answer the question of rationale right now. When it was introduced in the pre-rulemaking, we had introduced it with an SPM of 1.0, to avoid having a portion of the standard be below what is currently required. So that would be a roll back of standards. Even then the tail end of it would still have referenced a weakening of standards and we have statute that is very explicit and preventing us from rolling back or weakening standards.

So because we saw that on the one hand NEMA was

not happy with what we had proposed. On the other we had already had a stakeholder saying that even that limit was a was a roll back of standards. It was decided we didn't want to take the risk of moving it forward when it would be easily defeated by calling it roll back. So because it's got that area that is below what we're currently requiring, that's what made it difficult for us to carry forward. And from our perspective, it was a nice to have, not a required to have, for the operation of the California code. And for that reason, we decided not to carry it forward.

DR. NACHTRIEB: Thank you. My only perspective then is that there's a lot of baby in that bath water. And if we're having a discussion about one number or one portion of the curve, there's a lot of value that we lose by excluding the entire standard. Thank you.

And thank you, Alex, for correcting my misspeaking JA10 throughout.

MR. SHIRAKH: We'll be happy to have further discussions with you on this topic. We think flicker is very important.

MR. BOESENBERG: So I have a --

DR. NACHTRIEB: But we agree.

MR. BOESENBERG: -- couple of other points. Alex Boesenberg, NEMA again.

It was a couple of years ago, several of us myself included stood up and said how we were in opposition to Joint Appendix 10 as proposed. There was a long list of reasons. But in the end, effectively, Commissioner, you stated it pretty clearly. You felt the need to have a flicker standard and in the absence of anything else JA10 was approved as proposed. And you ended it with, "If when you've got something better, come to me."

We're back. And I've had a stable of PhD physicists working on this for years. And I understand and I previously heard the comment about roll back. If an overly restringent [sic] requirement was put in, because that's all there was at the time I'd like to think there was some mechanism by which the standard can be improved and made more robust, as Dr. Nachtrieb illustrated. Because in the end we think it's better. And that slide is perfect even though it doesn't say JA10 on it, because you make a point of stating your commitment to harmonizing with ENERGY STAR wherever you can. ENERGY STAR lamps and ENERGY STAR luminaires, both are referencing NEMA 77.

And we have a NEMA dimming compatibility program now launched, and taking applicants. And licensing a mark that we developed through a -- including

focus groups and all kinds of stuff, consumer research. And that mark when used by our partners, identifies, on the box of the dimmer or the box of the bulb. And in so doing means that they work better together.

And those two standards that form the pillars of that program are NEMA 77 and, as already as referenced in Title 20 and 24, NEMA SSL 7. And so you've got 7 in there already. We need 77, so that they form the perfect 777 and we've got good dimming out there.

So with that I'll close. Thank you very much.

MR. SHIRAKH: Thank you, Alex. We'll be talking to you.

MR. CAIN: Hi. Joe Cain with Solar Energy Industries Associations. So now we're making the trip back to JA11 PV. And so we feel there have been some improvements in here. System orientation, just to jump right in. We feel that it is a big improvement to expand the orientation to 90 or 300 degrees. We still have some member companies that have expressed strong concern that orientation is there at all. If my understanding is correct, in the performance approach they're not necessarily stuck with this; is that correct?

MR. SHIRAKH: No, this is for both prescriptive and performance. And the reason is when we ran the analysis -- I mean the value drops off significantly past

about 310. And it gets even worse when you get into the northeast orientations. There's very little value and the timing is off. We're doing our best to harmonize this with the grid and critical peak. And when you've got arrays orienting northeast that's problematic in both grid harmonization and the value it brings to the building and --

MR. CAIN: OK, we'll talk to our members again about that one. Some would like to see that orientation restriction go away altogether and just essentially be guided by a performance approach and the performance of the system. And later in JA11, there's essentially performance modeling, where a solar company designed a system, guarantees a certain level of performance, and then that is monitored. And the customers have the visibility to the performance. But again, I think what you've done is an improvement. And I think there's some that would wish to go further.

Regarding shading criterion, again in 11.3 you've provided the option of 3.1 or 3.2. So in terms of particular shading obstructions we do have some that still feel that again it's just essentially a system design parameter and not necessarily something that should be this prescriptive. We do understand that you have the second option, which is just go to the

performance method. But we still have some that are concerned about the level of work needed to do that shading analysis.

MR. SHIRAKH: If I can I comment on that?

MR. CAIN: Sure, sure. Please.

MR. SHIRAKH: Well, this is as I mentioned up there, if you're doing prescriptive compliance it must be shade-free. There cannot be any shade. You've got to demonstrate that. If you're using performance, using this simplified approach, it must be shade-free. But if you have any other kind of shading issues then you've got to go to the performance shading in detailed approach. But we need a way of understanding whether there is shading in there, or not. And that way you can decide which performance path you want to use and that has to be done.

MR. CAIN: Right, and I understand you're trying to find that balance. But in terms of our meetings with member companies, this is still one of the issue that they continue to bring up.

MR. SHIRAKH: Sure.

MR. CAIN: So perhaps we could discuss that some more. Solar access verification is one that again it brings a strong reaction from the solar companies, our member companies that we work with. And I had mentioned

earlier that it's viewed as essentially a stopping point. And not only a stopping point in the process and the installation process, but also of a limited value, or maybe no value added, just based on the fact that the performance of the system will be guaranteed and the performance of the system will be monitored. And that's under your system monitoring requirement, JA11.5, which we feel you've improved.

So again, still some grumblings from the solar folks. The interconnection requirements, the only comment that we have on that is that specifically stating Rule 21 raises the question about the municipal utilities and how are the munies -- if this is a requirement, how will the munies -- how will this relate to the munies? We just don't know yet.

And then just generally speaking, back to JA12 we continue to hear again the compliance credit question come up over and over, in testimony. And so we can keep talking about that. But one thing I just do want to point out is that in terms of the compliance credit and in terms of this mesh between efficiency and renewables and the mutual benefit of them I mean we've seen, in the state of Hawaii, they are 100 percent supportive of storage right now. They want more storage. I work with the state of Hawaii quite a bit.

We've also, throughout the history of the California Energy Commission, what we've seen is as products become attractive and they're benefits outweigh their costs, is that we allow them to have a compliance option. And the compliance option means that consultants specify those. It means that more are specified, more are installed, more are manufactured. And that leads to economies of scale. And that's pretty much throughout the history of the Commission.

So the compliance credit for storage, paired with PV and of course we'd like to see the compliance credit for PV larger than the minimum install, is entirely consistent with the history of the California Energy Commission. Thank you.

MR. BOZORGCHAMI: Ron, do we have anybody online?

MR. BALNEG: Yeah we have a few online.

Laura Gray, are you there?

MS. GRAY: Yes, I'm here.

MR. BALNEG: Okay. You may present your comment or questions.

MS. GRAY: Great. This is Laura Gray from the California Solar Energy Industries Association. And in general, I wanted to comment that we strongly support the solar plus storage EDR compliance pathway. The addition

of storage can offset both regulated and unregulated loads and is going to be a huge resource as we continue to fuel switch and add EVs to the grid. So we thank the Commission for the forward looking EDR pathway and all the work that's gone into these documents and the improvement from earlier drafts.

So I have a couple of specific comments on JA12. So as JA12 acknowledges, storage has the ability to respond really dynamically to grid needs and demand response signals. And we agree storage should be capable of responding to these calls, but DR might look pretty different in the near future. So I would say that the ADR requirement that's reference in JA12 and defined in Section 110.12, is a little too restrictive. Even with DR the utilities haven't established that this is the sole communication standard. So we'd like to see a little more flexibility in communication standards to ensure storage can participate in different types of DR or different types of grid signals.

And we definitely agree with a previous commenter that the mention that every control strategy should allow for multiple use. The prime example being storage permitted to respond to a DR signal during a TOU or a basic control strategy.

And then similarly, we believe more flexibility

is needed in setting the timing requirements. Customers should have more flexibility in using storage as long as the storage is programmed under one of the outlined control strategies or can ensure grid benefit.

And then, lastly, the 5 kWh requirement might be too large in certain situations. Smaller batteries could provide significant grid benefit in relation to building load or how the storage is operated. So a small energy efficient house might not require a large battery to shift its load or respond to grid signals.

And I'm happy to provide these comments in written form as well. Thanks.

MR. SHIRAKH: Please do give them to us in writing. I'd really appreciate it. Thank you.

MR. BALNEG: Okay. We have Phil Undercuffler. Phil, are you there?

MR. UNDERCUFFLER: Yes. Thank you for the opportunity. This is Phil Undercuffler, with Outback Power. We're an inverter manufacturer focused on integrating energy storage and solar. And we're going to speak in support of adding energy storage. It's we believe a powerful tool to integrate PV and shape both load and generation. And we want to thank the Commission for all the hard work in developing the energy storage option.

That being said though we think the JA12 control options could use some improvement. And we might be trying to or attempting to legislate specific operational details, which might be better left a little more flexible and responsive to changing conditions and pricing signals.

As an example, the TOU control could be read to imply that only charging that's allowed is from grid only during non-peak hours and that solar charging is not allowed. I know that's not what you meant to write, but that's how the words can be interpreted now. The basic control states the battery can only charge when the PV production is greater than load, and that it must discharge any time the PV production is less than the load. That's not allowed to use the storage to hold onto when it's most needed or valuable, which may be a little later in the day. And that's regardless of what's required for the battery health.

And because there's no defined performance objective, it means that you could easily game that. I could discharge 1 watt of power. I would be discharging, but not really meeting the intent. This is where I think that the work that is being done in other venues to create more clear pricing signals for solar and solar plus storage, could really be leveraged. And because

those are more responsive to changing conditions the rates should really drive the operation, rather than trying to legislate them into what will effectively be the rules for the life of this system.

Similarly, the quarterly reset that's written in there can be problematic as it would effectively override any profiles that might be selected under any future improvements. If there were new applications, well these rules would say that I would force the inverter to reset to whatever the factory default was on a quarterly basis.

I would suggest, rather than a reset why not have language saying that the energy management functionality should simple not be allowed to be disabled. That way it's always in an energy management profile, always operating to achieve the goals.

As mentioned by others the communications, the options should be broadened or at least aligned with the other work being done in California for Rule 21, Step 2, smart inverter profiles. It's important to understand even though all of this says the communication to the storage, it's actually the inverter that you are doing the communications with. These are really energy storage systems. The inverter is the device that's actually providing the energy management, the storage is just a

bucket. So there are requirements for standardization of inverter communication, smart inverter communications. It would really be great if we could use that throughout the state of California for all of the energy and inverter control communications, not having multiple parallel or conflicting paths.

Finally, the safety requirements that are specified would disallow any battery technology that didn't require a battery management system. As currently, you require certification to UL 1973, but you don't mention or give provisions for the other corresponding equivalent UL standards for other battery technologies that are perfectly safe and recognized and should be an allowable option. Thank you.

MR. SHIRAKH: So I really tried hard to take notes on everything you said. I have communicated with you before, but could you be kind enough to put this in writing and send it to me?

MR. UNDERCUFFLER: Absolutely.

MR. SHIRAKH: Thank you.

MR. BALNEG: We have Jim Gaines.

Jim Gains are you on the line? Jim?

MR. GAINES: Can you hear me okay?

MR. BALNEG: Okay. I can hear you, sorry about that.

MR. GAINES: Oh. You do hear me?

MR. BALNEG: Yes. You can go ahead now.

MR. GAINES: Okay. Sorry, sorry. I work for Philips, name Jim Gaines for the intro part.

I want to support putting NEMA 77 back into Title 24, JA10. It sounds like the reasons for taking it out are basically a technicality that it can be considered backsliding. And I find that kind of strange since the lower frequency region of the Title 24 spec is a very obviously flickering region that accedes the seizure limits even. So it seems odd to exclude the standard when one part of it is less strict and another part is much more strict and much more visibly a problem.

If you look back at the CEC documentation that originally lead to the 2016 version of Title 24 there were two documents cited supporting the 30 percent limit. But neither one of those scientific papers actually yields a limit of 30 percent. A limit of SVM 1.6 actually would exclude both of those conditions that led to observation of some headaches and some performance.

I would encourage the CEC to look carefully at their reasons for excluding or including NEMA 77 and not make the decision just based on a technicality. Thank you.

MR. BALNEG: Thank you.

And we have one more. Chris Primous, are you on the line? Chris?

MR. PRIMOUS: Yes, I'm here. Can you hear me?

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

MR. PRIMOUS: Okay. So just a couple of things, a couple of comments, Chris Primous from MaxLite. I understand and appreciate the changes to allow grid design in the market and everything for lumen maintenance and light testing. Those are one of the big pain points for us in just trying to get a JA8 product. But one of the things I would just caution the Commission on, with regards to the language, in using the words ENERGY STAR be very specific about which ENERGY STAR specification you're referring to, whether it'd be ENERGY STAR lamps or ENERGY STAR luminaires. A couple of them are aligned to light force with regards to lamps themselves. Of course, in ENERGY STAR lamps, light engine specifications are actually called out in ENERGY STAR luminaire spec. So it would just be sure to be clear to be about that when you're writing about (indiscernible). It's in a couple of places in JA8 it doesn't really call out specifically which ENERGY STAR is being referred to.

Secondly, you have something -- okay. Secondly was the JA8.5 in the marking. I see that the requirements for some smaller lamps have been taken out.

Before, there were some exemptions for smaller diameter lamps to not have to include the markings.

One of the most popular new products that have been issued to the market is a filament lamp, specifically filament candles. Now we've come to a technological advancement with these LED products where we're able to eliminate bases and we have nice beautiful clear glass candle lamps, which are some of the newer JA8 products that are available on the market.

And one of the complaints I've heard just recently is that we don't have it bases anymore, so we have to put all of the markings directly onto the glass. And some customers do not like having all these markings on these nice beautiful clear glass products. So we have to put things like safety listings, date codes, usage markings, sometimes in multiple language, test points, branding logos, etcetera. And this is just eight more characters that we now have to add to these and we would certainly like to not have to do that on some of these products.

Thirdly, and lastly I'd like to just lend support back a couple of comments that were already made about the flicker metrics and going back to including NEMA 77. And we do support that action. That's all I have today. Thank you

MR. BOZORGCHAMI: Thank you.

Any more comments?

MR. BALNEG: That's it.

MR. BOZORGCHAMI: Joe, one more?

MR. CAIN: Yes, Joe Cain with the Solar Energy Industries Association. But this is not about solar and it's not about SEIA.

I just have to say that every time, these days in our political climate, every time I hear ENERGY STAR what pops into my head is if the funding of the DOE is uncertain in the future. And the staffing level of the DOE is uncertain in the future and likewise for the EPA, every time I hear the word ENERGY STAR I wonder whether ENERGY STAR will still exist two years from now.

And I just wonder whether, as much as ENERGY STAR is embedded in the codes and the standards, is there a contingency plan for in the event that something bad happens? Or are we dependent on something that is uncertain?

MR. STRAIT: So, even in the case that the ENERGY STAR goes away of that the DOE or EPA programs have something happen to them in that respect, these reference specific documents that are final published products that exist that people downloaded that we have copies of. So in a sense we're not so much referencing

the program as we are referencing the document. And we're doing so to make sure that our code is aligned.

But if that program were to be ended, for whatever reason, that document would still exist and we would be able to provide public access to that document and people would still be able to us it.

MR. CAIN: Okay. And so are you tracking the criteria that goes along with that in addition to just the names, the standards, the numbers? I guess that's my thing, is the unknown. Looking at the uncertainties, I just want to know that there's some form of belt and suspenders approach in place.

MR. STRAIT: Absolutely. If there was a change to either of the standards, we would look very closely and see if it was appropriate to update our reference to the latest version.

This seemed to be appropriate to be more about giving some flexibility just in recognition of the different technologies evolved in generating light. But it didn't represent any significant backsliding in what was required for products being tested to the use of lumen maintenance standards. But yes, we would look very closely at that.

MR. CAIN: Thank you.

COMMISSIONER MCALLISTER: I'll just say, very

broadly. If the question is, is EPA, ENERGY STAR, if the federal government withdraws support and funding for the EPA and it has no other home like migrating over to DOE, or something my read, having worked with all of the other state energy offices and kind of understanding a little bit about that dynamic in D.C., I think that's highly, highly unlikely.

But many, many states and industry members like many of your members and others, certainly NEMA members, lots of manufacturers of electrical products depend on ENERGY STAR. And so there is a -- it's embedded much more deeply than just support at the Federal Administration. So I'm pretty confident that something would be worked out. I don't want to make that a self-fulfilling prophecy and like get too far down the planning horizon, because I don't think that's necessary. But I'm pretty confident that ENERGY STAR is going to be around in a similar form to the way it is not for quite a while.

MR. STRAIT: Actually, I should provide one clarification. We actually have that level of contingency planning for all of the documents we incorporate by reference. We don't assume that ASTM or ASHRAE are going to go out of business any time soon or that their organizations or documents are going to

evaporate, but in theory we have to consider that for everything we adopt. That all these standards and documents are going to continue to exist and continue to be available to the public. And what we do, if for whatever reason, something makes them unavailable. So in that sense this is not out of the ordinary.

MR. BOZORGCHAMI: Okay. So with that, we're going to transition into the Residential Appendices. So Jeff Miller is going to start us out.

MR. MILLER: There are presently four residential appendices. RA1 contains alternative field verification protocols that are not expected to be available or applicable for verification for most projects.

RA2 contains documentation procedures that HERS raters are required to follow for each project.

RA3 contains the field verification and testing protocols used for verifying that installations comply with the standards.

RA4 contains eligibility criteria for certain efficiency measures installed to achieve compliance to the standards.

There are no changes proposed for RA1. Changes to RA2, RA3 and RA4 will be described in the following slides.

Table RA-2-1, which provides a summary of all available HERS verifications has been updated to reflect the HERS protocols that have been added or removed from appendix RA3. The rated heat pump capacity verification has been added to RA3.4.4.2. Maximum rated cooling capacity compliance credit verification is no longer available for compliance credit and has been removed. The whole house fan verification is a new protocol that has been added to RA3.9. Central fan ventilation cooling system verification is added to RA3.3.4. QII is now a prescriptive requirement. It was a compliance credit. Verification protocol is located in the RA3.5. Verified point-of-use verification for domestic hot water systems is removed. And drain water heat recovery installation criteria is added.

Sections of RA2.4.3 and RA2.7 provide updated and clarified specifications and procedures for third-party quality control programs. The information in these sections is organized into categories. And clarifying details are added in each category. There is a new requirement to automatically confirm the location of the system undergoing testing, using electronic tracking means, such global positioning satellite technology, if it's available.

The RA3.3.4 verification of central fan

ventilation cooling systems determines the system air flow rate and measures the air handling unit watt draw that calculates the fan efficacy at two operating speeds. At high fan speed, or for cooling speed, as required for compliance with the standards in Section 150.0(m)13. And at the speed used for ventilation cooling, as specified on the Certificate of Compliance for the central ventilation cooling system. The measured fan efficacy, that's watts per CFM, must comply at both the high fan speed and at the ventilation fan speed when proposed by the user.

The rated heat pump capacity verification is similar to the verification for higher SEER EER and HSPF. The manufacturer name and model is used to look up the rating information from the matched indoor and outdoor combination, or package unit. And verify the system is rated to provide the heating capacity that is equal than or great to the values proposed on the performance Certificate of Compliance.

RA3.5 is updated, added a few new definitions, made changes to provide clarity and consistency, reduce redundancy and improve readability, inserted new language for verification of insulation installed below the roof deck.

MR. TAM: Hi. RA3.6.5 is the HERS Verified

Compact Hot Water Distribution Credit. The requirement for this credit has been substantially changed with the goal of making it simpler and more attractive option for builders to take. So the changes reflect that and we also renamed the credit to expand the credit.

And RA30.6.9 is a brand new section that describes a requirement for HERS verified during water heat recovery system. And it describes the requirement for this credit, such as minimum effectiveness and the need to certify to the Commission for these systems.

MR. MILLER: The kitchen range hood verification requires use of the manufacturer name and model number from the installed unit to locate the HVI rating information, then to confirm the unit is rated HVI according to the requirements in standards Section 150.0(o), which references ASHRAE 62.2 requirements. And that's 100 CFM minimum air flow rate and 3 sone or less at 0.1 inches of water column.

RA3.8, fuel verification and diagnostic testing of air leakage of building enclosures and dwelling unit enclosures, has been updated to reference the current version of RESNET Standard 380. The options for the measurement method has been limited to only the 1.0 test or the single point test method, which is also referred to as the single point test. And use of the metric, the

CFM 50 per square foot of dwelling unit enclosure area has been added for use when multifamily dwelling unit enclosure leakage measurement is required for determining compliance with indoor air quality requirements. The ACH50 metric will continue to be used for reporting leakage for single family dwellings, for building energy compliance.

RA3.9 field verification and diagnostic testing of whole house fans, is a new protocol applicable only to the performance compliance approach. HERS verification of whole house fans is not required for prescriptive compliance.

The protocol measures the air flow rate and fan watt draw to determine fan efficacy, that's watt per CFM. The air flow may be measured using one of three methods. A pressure matching technique used with a blower door fan flow meter designed to measure air flow rates equal to or greater than the whole house fan air flow. A powered flow capture hood that is designed to measure air flow rates equal to or greater than the whole house fan air flow. And a traditional flow capture hood that is designed to measure air flow rates equal to or greater than the whole house fan air flow.

We plan to make a minor change for the 15-day language to a specification for the whole house setup,

for the pressure matching measurement, made with a blower door. So a change it will make will be that the window opening setup for the test will be required to be the same for both the whole house fan air flow pressure part of the pressure matching technique and also for the blower door pressure and air flow measurements. And thus measurements will be made with the whole house fan dampers closed or covered. And this will attribute the same amount of enclosure leakage to both of the pressure measurements. And should refer to the protocol for additional information.

MR. TAM: Okay. RA4.4, the 4.4.3 section is deleted. It's the pipe insulation credit, because it's now a mandatory requirement in the plumbing code. Just a note, there's still a credit for pipe insulation if you have a HERS rater verify it.

RA4.4.6 is a new section. It's the compact hot water distribution. This is the basic credit that doesn't require a HERS rater. And similarly, 4.4.16, it's nearly the exact same section from RA3.6. This is the expanded credit for a compact hot water distribution. And RA4.4.20, we added IAPMO R&T as a listing agency to the hot water systems.

And RA4.4.21, is the new section. It's the sister section to RA3.6. It describes the requirement

for drain water heat recovery systems.

And that's it for the RAs.

MR. BOZORGCHAMI: All right. Comments, questions?

(Off mic colloquy.)

MR. ROSE: Okay. Can you hear me? Okay. This is John Rose with the Home Ventilating Institute again. RA3, talking about the kitchen range hoods and the air flow and sound requirements. It describes the threshold, but the slide showed at 0.1 inch static pressure. That's not in the draft, so I just wanted to clarify that and say that if we were trying to be more descriptive there, it would be more applicable to list the sound rating at the specified air flow rather than at a static pressure.

MR. BOZORGCHAMI: Okay.

MR. NESBITT: George Nesbitt, HERS Rater. The one real comment on the Residential Appendices is they're really the HERS Appendices. And they contain a lot of information about HERS, HERS registries, data and all that stuff, third-party quality controls, programs. And then a lot of that is repeated in the Non-Res Appendices. It just seems that we should not be saying the exact same thing in multiple places, because there's always the chance you say something different. It's a waste of paper, electrons, so on and so forth.

How much of it is actually duplicative of what's in Title 20, in the HERS regulations where the providers and HERS raters and registries are certainly specified? How much of that actually really belongs in Title 20, versus in Title 24, I'm not sure. Certainly a good explanation of the program and the process is needed, but I'm not sure if this goes into too much detail. Thanks.

MR. BOZORGCHAMI: Thank you.

Anybody else?

MS. RODDA: Gina Rodda from Gabel Energy. I almost feel like I'm bringing up the elephant in the room, but I'm a little concerned with contractors being successful with QII without a lot of guidance, which I'm hoping will happen in the manual.

MR. BOZORGCHAMI: Any other comments? If not, we've got one more presentation then we're done for the day.

Todd, do you want to give us a quick update on the ACM?

MR. FERRIS: Hello. I'm Todd Ferris. I'm Supervisor of the Software Tools Unit. Thank you, Mikie. I'm here to talk about the minor changes that we're doing to the ACM Approval Manual.

We've added a new Section 1.1.5, to basically

clarify that the Commission would consider additional nonresidential energy simulation engines if they would pass the ASHRAE 140 test. So that's really has to do with third-party vendor tools, if they didn't want to use EnergyPlus for nonresidential, we'd consider other tools

And then we had some minor changes to the language for clarification in Section 1.3.1 and 1.3.2, just to clarify what we meant by minor software updates and major software updates.

And then the last thing is in Chapter 2 there was some clarification language. And other than that, the ACM Approval Manual is pretty similar to what you saw in 2016.

MR. BOZORGCHAMI: That's it. Is there any comments or concerns on anything that you heard today? What Todd presented?

Fine then, Emily?

(Off mic colloquy.)

MR. BOZORGCHAMI: Peter is going to do the blue cards.

MR. STRAIT: So folks that have submitted blue cards, if you haven't already gotten up to speak when it was on the a particular section, honestly anyone on the floor can get up and make their comments now. Most of the folks that did submit blue cards actually did get up.

For example, Alex Boesenberg and -- gee, I'm bad with names -- anyway most of the people I remember getting a blue card from have already spoken at the podium.

MR. ROSE: This is John Rose with HVI again. I just had one more comment. It was brought up earlier with the ASHRAE 62.2 labeling requirements. There was some question about how that dwelling unit ventilation control should be labeled. And HVI has undertaken developing such a label, kind of an icon-based thing. And we'll be promoting that soon. I'm getting in touch with CEC and possibly that could be worked into the compliance manual or something. Anyway, thank you.

COMMISSIONER MCALLISTER: Great.

Let's go through the blue cards just in case, see if anybody who has spoken wants to say something else.

MR. BOZORGCHAMI: Sure. I have them right here. Richard Haring? Oh, Emily, go ahead. I'm sorry, Emily Withers.

COMMISSIONER MCALLISTER: Let's do the line first and then we'll check the blue cards. Yeah. People in the room have priority.

MS. WITHERS: Okay. I do have a blue card submitted.

Mr. Commissioners, energy efficiency experts of

the Energy Commission, my name is Emily Withers. I'm Codes and Standards Administrator II for the Department of Housing and Community Development. HCD thanks the Energy Commission for our ongoing dialogue and preliminary assistance with coordination of building standards within the many parts of Title 24 California Building Standards Code.

HCD's goal is to ensure that building standards provide safe, durable and healthy homes, but also to be cognizant of the increasing costs of housing and associated decrease in affordable housing. For these reasons HCD may question proposed building standards that may appear to be not cost effective or may result in conflicts within the codes, resulting in confusion in interpretation or enforcement.

We thank the CEC for the opportunity to comment and will be submitting a written comment later on these technical issues. We look forward to working with the CEC further. Thank you.

COMMISSIONER MCALLISTER: Thanks very much. And also thanks to the HCD for collaboration on CALGreen, which we're not talking about today, but that's a big part of our future as well. So thanks.

MR. BOZORGCHAMI: So next we have Julia Levin with the Bioenergy Association of California. No? Okay.

Jed Gibson with AWEA California. No?

John Rose, did you want to -- you're done? Okay. Good.

And Richard Haring, Philips Lighting.

MR. HARING: No.

MR. BOZORGCHAMI: I think he already spoke too, so I think we're good, sir.

COMMISSIONER MCALLISTER: Okay, great.

MR. BOZORGCHAMI: With that, I think this brings us to the end. I would really, really appreciate it if you folks could submit your comments sooner than later. The sooner we get those comments, the easier and the faster we could start a dialogue with you folks and get the proper standards out.

Again, just give me one second.

So I thank you and I'm hoping that we -- we're hoping that I could get your comments hopefully by February 20th, the day after Presidents Day? You'll get a long --

COMMISSIONER MCALLISTER: A long weekend to work on them?

MR. BOZORGCHAMI: Yeah, yeah. You all have three days to work on this. There's no snow up there, so.

Go ahead.

MR. STRAIT: I'd like to reiterate that, that gives us a little bit of time to review your comments. If we have any questions, we can have an interaction with you before the close or the comment period cuts us off, so yeah please. And again, from my perspective as Supervisor I'm glad the staff was able to put this together and that you're are able to participate. So thank you all for coming.

COMMISSIONER MCALLISTER: I want to actually just wrap up really quickly. So and I want to thank -- first of all, I want to thank staff and I'll just everybody who made presentations Michael, Mazi, Peter, Jeff, Danny, Todd, Bill and also Bill and Payam for running the show, Christopher for managing the office.

I will just point out we need a little gender diversity on this team, okay guys? So Martha is right back there, my Adviser. Martha is right back there, so raise your hand and you're the token today, but hopefully we can make progress on that front as well in future codes.

But you guys do a great job and actually you're very approachable, so I really appreciate that.

(Off mic colloquy.)

COMMISSIONER MCALLISTER: So but really it's a good team and it's a very solid effort. I'm glad of

where we are today. And really it wouldn't happen without all the stakeholders chiming in with their detailed thoughts, concerns, data and input. So we need that to make the process work. So and everybody's just with open arms waiting for that to happen, obviously as quickly as possible so we can really get on the case for each issue and help resolve any dialogue that needs to happen to get to a good place.

So thanks everybody. I'm not going to be here tomorrow, but Martha will be in my stead and we'll be looking forward to a good dialogue then as well and moving forward, so thanks to everybody.

MR. BOZORGCHAMI: Tomorrow we will start at 9:00 o'clock, so thank you.

(The hearing adjourned at 3:45 p.m.)

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REPORTER'S CERTIFICATE

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

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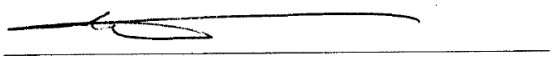

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