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CALIFORNIA ENERGY COMMISSION

In the Matter of:

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CALIFORNIA ENERGY COMMISSION

ROSENFELD HEARING ROOM – FIRST FLOOR

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

THURSDAY, OCTOBER 5, 2017

9:00 A.M.

Reported by:

Peter Petty

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P R O C E E D I N G S

9:04 A.M.

SACRAMENTO, CALIFORNIA

THURSDAY, OCTOBER 5, 2017

MR. BOZORGCHAMI: My name is Payam Bozorgchami. I'm the Project Manager for the 2019 Standards. Some quick housekeeping rules. I think all of you guys that were here yesterday, you've heard this already, but I guess have to go through it again.

Restrooms, out the doors to your left. The snack bar is upstairs on the second floor. And in case of an emergency, you hear the alarms going off, please follow Mazi to the Roosevelt Park and he'll take care of you.

Some of the discussions for today is general going to be mainly about residential. There's a copy of the agenda today outside -- right around the podium there. If we finish the two topics early today, we will not go to lunch. We will do the third topic, the one -- what is it, the 150.1, the prescriptive requirements, then we'll take a quick lunch. I just want to get you guys out of here before the afternoon

Thursday traffic, if possible.

So a quick history. The California Energy Commission, the Energy Commission, started in 1975 through executive order by and funded by our dear friend Jerry Brown. Some of the policy drivers for us developing the Standards, with the help of our utility partners, we developed the Standards on a three-year cycle. And I'd like to give thanks to the partners that have been helping us out dramatically here, Pacific Gas & Electric, Southern California Edison, SoCalGas Company, San Diego Gas & Electric, Sacramento Municipal Utility District, Los Angeles Department of Water and Power, Southern California Public Power Authority, who, with their consultants, have helped provide the proposals that we have today for the 2019 Building Codes -- Energy Codes, excuse me.

I also want to thank Heidi Hauenstein and Kelly Cunningham, whose been the key communicators between the Energy Commission and case team to make sure everything's flowing properly and getting the job done. And also Marshall Hunt who has really been there to help us out and has never said no whenever we needed a

studies done or information needed.

As you guys know, California is divided into 16 climatic zones. When we develop the Standards we look at every climate zone on its own. All of our measures have to go through a rigorous lifecycle cost analysis.

And the schedule for the 2019 Standards. This is -- this will be the 11th pre-rulemaking workshop that we've had here at the Energy Commission thus far. Previously the utility companies have had the case meetings within their organization where they've also done the same proposals. These are the workshops where they've taken feedbacks from the public prior to them submitting their reports to us.

We're trying -- we're shooting for January, mid-January to go into the -- to present the 45-day language here at the Energy Commission. And we're trying to -- with that, we're going to be posting the 45-day language on our website come November, mid-November.

So for today's workshop the comments are due on October 20th. But if you can, please submit your comments sooner, so we can actually start a dialogue sooner with you guys to make

sure that we have the proper information for our 45-day language. That's very important to us.

The final case reports done by the utilities can be found on title24stakeholders.com. The -- as soon as the staff reports are completed, when we get all your comments back, those all will be developed and submitted or will be posted on our website, hopefully soon. I'm not sure exactly what timeline that looks at this time, but there will be a notification sent out to everyone when that is available.

And if you have comments on today's workshop, please submit it to our third link right there and we will respond to all comments at this time.

Key staff, as you know, Mazi Shirakh, myself, Larry, Peter, Christopher and Todd Froess. And then we have the other Building staff office members here who are the key people that you want to communicate if you have any questions or comments. There's quite a few of us here.

With that, yesterday we kind of missed discussing the ACM Approval Manual. So I asked

Larry Froess, who's the Senior Mechanical Engineer in charge of the ACM Manual, the Alternative Calculation Manual method, to give us a quick description of what's happening with that and what's -- and what's going to be posted online coming up soon.

MR. FROESS: Yeah. Good morning. My name is Larry Froess. And as Pay mentioned, I'm the Project Manager for the Commission compliance software known as CBEC Comm and CBEC Res. So we're proposing changes to the Alternative Calculation Methods Approval Manual, otherwise known as the ACM Approval Manual, which is the document that describes how compliance software is approved and decertified by the Energy Commission. This is not the ACM Reference Manual that describes the functionality requirements of the sw.

So there's a few changes. One of them was we just added some clarifying language regarding major and minor software changes. And then the second one is we clarified the ability for nonresidential software vendors to use an alternative simulation engine to produce their TDV, so we added a new section called -- in the

manual, Section 1.1.5. and below is the wording for those that would be interested in what it entails. So that's basically pretty simple changes.

And if there's any questions, I can help answer them.

MR. BOZORGCHAMI: Today's -- you'll see a lot of presentations being done today by different people. We're not presenting the non-substantive edits that we've done to the Standards. If there's a punctuation missing or there's a grammatical error that we did in 2016 where we fixed in 2019, we're not going to present that today. But if you feel that there is something that we missed when that section comes up, please, please come up to the podium, present yourself, and we will -- we can discuss it at that time.

Any questions?

With that, I'm going to pass it on to our first presenter, and that's Peter Strait. And he's going to be talking about Sub Chapter 1. Oh, that's not the right --

UNIDENTIFIED MALE: The admin section.

MR. BOZORGCHAMI: Yeah. You got it? You

can take care of it. I'm not sure which one that is.

(Colloquy)

MR. STRAIT: Sorry about that. As I begin, I'd like to reiterate what Payam said. We're not perfect. There are going to be some areas in the code where we might need some help. There was actually an item yesterday that we fixed based on feedback from the public that caught -- that some change that we had made to the Lighting Section 130.1 had left out a small level of nuance. So we're absolutely interested in your feedback.

I'm just going to -- and also, this is just going to be a very quick flyover view of what the code does, what these changes. It's not going to a line-by-line walk through. That way it gives you the most time to get up at the podium and tell us what's going on. But we also highly encourage people to download and read the expressed terms and give us written comment and feedback, hopefully by October 20th.

So starting off, in 10-103, this is the language that talks about the Lighting Controls and Mechanical Controls Acceptance Test

Technician training and certification. The ATEs acceptance test employers, and ATTCP, the Acceptance Test training and certification providers -- or, I'm sorry, Acceptance Test Technician certification providers. We standardized the use of those terms throughout this section. We actually are using those abbreviations and we're not -- we're referring to them -- referring to them consistently.

We added some criteria related to decertification. The certification providers must track decertification status of ATTs and ATEs and must not admit individuals to their programs that have an unresolved decertification from another ATTCP. This prevents bad actors from just jumping ship and getting a second and third bite at the apple when they're not performing as good ATTs.

Staff are still working internally on resolving issues of onsite audits from Mechanical Acceptance Testers and an overlap of residential HERS requirements for the nonresidential Acceptance Testing. This is not shown as changes in the code currently. This just needs more development time, so we're working internally.

We hope to have that for the 45-day language. But if you're concerned about there not being changes to that effect in the code right now, we just are -- need to continue working internally and with stakeholders to develop those.

So we've provided the Energy Commission with the authority to rescind the threshold findings. This is the minimum threshold necessary for ATTs to be required on job sites. And this is in the event that that total number falls below what's required, that it gives us a logical amount of flexibility if situations change.

As I mentioned, there's new restrictions for decertified ATTs and, you know, what they have to do to regain a good standing, requirements for recertification training curriculum, and there's no proposed changes currently to the quality assurance.

More of the same. We've got -- we added "and ATE" to certification status. If ATEs are going to be certified, much like with ATTs, we need an ability to verify the certification status and it should be subject to the same. If for whatever reason someone gets decertified, if

there's a problem with someone, there needs to be something they have to do about that. And then, too, we updated the requirements for the reporting to include these decertification reports.

Moving on to 10-111, this is certification labeling of fenestration products. We inserted new language in 10-111(a)1A to clarify that,

> "Temporary labels from manufactured fenestration products shall meet the requirements of 10-111(a)1B and that no other values shall be allowed."

We really need people to pay attention to these requirements and follow them closely. There was a little bit of gamesmanship going on and we wanted to put a stop to that.

We also replaced the term "certification" with the term "rating" in Section 10-113 relating to labeling of roofing products, to clarify that the CRRC does not certify cool roof products but rather rates them. We also replaced the term "accelerated age" with "rapid rating" because the CRRC program has now adopted an accelerated age test called Rapid Rating, so it's for

consistency.

In 10-115, this is a new section we've added for community-shared solar-electric generation systems. We've established criteria and processes for entities to apply to the Commission for approval to administer a community-shared solar or community-shared battery storage system. An exception is proposed to be added to section 150.1(b) that will enable a community-shared solar or battery storage system that is approved by the Commission to substitute in whole or in part for onsite solar or battery storage requirements. This serves a need that's been identified for, you know, planned residential communities, not to have a solar panel on each and every roof. But if they want to set aside a block of that land for an installation that's going to serve all of those residential homes, that they can do so. This is the first cut at trying to establish a framework by which these relationships can be established. We hope this starts a productive dialogue with the stakeholders that are affected by or might which to participate in these kinds of programs.

And that's it for the admin sections.

These are the sections in Part 1 that also govern what we do in Part 6.

If anyone has any questions, please.

Microphone.

MR. RAYMER: This is Bob Raymer representing the California Building Industry Association. And I'd like to start off with the language, and sort of going through relatively quickly paragraph by paragraph. And I'll just reference the subsections here.

In the first subsection, community-shared solar-electric generation, subsection (a), there's a reference to "may be approved." And this kind of seems at odds with the final sentence which states "to be approved." We're be providing some suggested tweak language that could help out. Ultimately, it probably should read shall be approved if you meet the following requirements.

And CBI is strongly supporting what the Commission is doing here, particularly whether you can set up a program for partial or total offset. We've got several production builders who have access to significant roof areas or unbuildable land. And, quite frankly, it could be

more cost effective to build a small solar farm than it would be on -- you know, put two or three kilowatts on each roof.

Moving on to the enforcement agency, I'm assuming the enforcement agency for the most part is the building department; is that correct? Thank you.

Down the road we'd like to see you give some examples of what you're going to consider development entitlements, but that will get more into my comments in just a minute, and sort of why does the documentation of development entitlements need to be completed prior to the initial permit inspection? Since the CEC is already going to be requiring the community-shared system to be up and running in time for compliance inspection, why do you really are about getting the entitlement documentation well before initial permit application submittal date, which is usually the first part -- the first administrative action? So once again, we'll be thinking of some language to tweak there.

Moving on, the dedicated -- item three, dedicated energy savings benefits, the second sentence in this, which is worded very well,

seems to negate the need for subsection (2). And so once again, we'll be making some suggestions. I suspect the word "un-offset" is a typo. I think it appears in the third line there. It says "otherwise have been required to have an un-offset onsite solar." I'm not quite sure what you mean by that.

Moving on to durability, this is where we've got some, I guess, at least questions or concerns. Under durability you're suggesting that we demonstrate a 20-year productivity for this system. And number one, we're going to be asking why was the period 20 years chosen? How does one go about demonstrating a useful life of 20 years? Is this through a warranty or whatever? And no matter what, if this is the case this seems to establish sort of a precedent in Building Standards that has been largely left to statutory provisions. You know, we already have, in home building, a ten-year obligation that's set up in statute. And we're kind of wondering, is this required anywhere else for like HVAC, windows or whatever? It just seems an odd placement. I realize this is sort of a new system, but it seems in the Building Standards,

why would you necessarily be putting this there?

Under additionality, it seems pretty clear that you want, you know, the power from this particular solar farm going to a particular project. But keep in mind, large production builders may have access to some rather significant areas of unbuildable land and, quite frankly, they could put together a solar farm that could basically be used for multiple projects. Obviously, they're still going to have to do all the documentation for each individual project. But I hope the Energy Commission doesn't limit each little solar farm to one particular project if they can demonstrate that you're going to have enough for Project A, Project B, maybe even Project C, just looking down the line.

Onto application and Commission approval. This is under little (b) and little (c). This is just a request. As we go through the adoption process and get into the development of the ACM Manuals and all that, it's really going to be useful for us to get a clear idea of the type of documentation that the CEC is going to want so that by the time we actually get to somebody

actually submitting their approval package to the Commission, that we know what it is you want it in. Going back to the 1980s, I realize it's ancient history, but there were some other things where the Commission was given the option or the ability to approve certain things. And it was kind of left up to the first two applications to figure out what was considered to be completed documentation. And so that extent that we can work all this out before people start submitting the documentation so they know what that submittal package is going to look like, that would be great.

And now for a moment, I'm not going to be here for the afternoon. I'll be taking off, and Mike Hodgson will be taken over for me. And if I could I'd like to deviate a little bit and just give you some very quick comments on our concern with the wall proposal.

MR. PENNINGTON: Bob, should I respond to your comment --

MR. RAYMER: Sure.

MR. PENNINGTON: -- about --

UNIDENTIFIED MALE: Pennington, can you use your mike?

MR. PENNINGTON: Sorry. Bill Pennington, Commission Staff.

Just to have a teensy of dialogue here, Bob, on the community solar comments, thank you very much for your comments.

One of the things that's quite clear related to community solar is that, at least for IOUs, the only statutorily allowed approach that works through the IOUs and uses the grid to deliver the energy is the GTSR program.

MR. RAYMER: The what?

MR. PENNINGTON: Okay.

MR. RAYMER: Gotcha.

MR. PENNINGTON: And that has, as we presented at workshop, quite significant limitations on what is possible. And some of the things that you described are -- don't sound possible under that program. So we should discuss that for sure.

There is a possibility, you know, one item that we presented at workshop was that the builders could potentially put solar on another building they own and get energy bill benefits through the NIM program for that program, and then administer a program to allocate those

energy bill benefits to individual homeowners. And that's a legal possibility, in my opinion, but would require substantial effort over the life of the home, actually, for the builder.

So just wanted to alert you that -- of those things. And I'd love to spend some time to --

MR. RAYMER: Sure.

MR. PENNINGTON: -- dial in on that.

I appreciate the comments related to durability and why is this unique compared to other kinds of things that may fail during -- fail early, and the Standards kind of don't protect against air conditioners failing early or whatever.

The thing that's radically different about this approach than measures installed in a building is this is some alternative that exists somewhere else that's not part of the building. It's not sort of normal, you know, potential failure. It's the granting of an alternative to allow the benefits from solar to be provided offsite through some, you know, administrative process. And we think it's really important to make sure that those benefits don't disappear

after one year --

MR. RAYMER: Uh-huh.

MR. PENNINGTON: -- or two months or, you know, name a date, but actually last approximately the same length of time as if the solar had been installed in the building. And we appreciate that that's a challenging thing to try to establish an approach in regulation, so we took an early shot here of maybe an approach. But we do think it's radically different and it needs to -- it needs the protection that normally doesn't occur for protecting it against equipment failing early.

MR. RAYMER: And I'm inclined to agree with you. That makes sense. This is sort of a significant deviation from past practice. And so I guess going forward we just need to kind of work out what you're going to want to see in terms of, you know, durability --

MR. PENNINGTON: Yeah.

MR. RAYMER: -- and demonstration. Yeah.

MR. PENNINGTON: Yeah. And one other. This thing about the entitlements prior to permit, in the IEPR policies that have been describing the potential for this approach for

several IEPR cycles, there was strong emphasis on making sure that any kind of alternative here, administrative alternative that's allowed here is not disruptive to the normal building department's process for taking plans, checking them, making sure it got installed. And we don't want to be in a situation where, if possible, this alternative actually doesn't exist at the time that the building department is trying to make a decision about whether or not to approve this building. And so that's the idea for why we would want all those development entitlements wrapped up, ready to go --

MR. RAYMER: As you start, right.

MR. PENNINGTON: -- you know, as you start.

Now maybe there's some flexibility there that you would have some insight into how we might do that. But, you know --

MR. RAYMER: I think the fact is that they're going to have all this put together anyway, you know, because they're already gone through the planning and land use development process. And so I think, as opposed to saying it shouldn't be done, that's not what we're saying,

I think we need to find a way to sort of encapsulate this into sort of a common submittal, because there's probably going to be a number of entities that are going to want to be looking at this documentation.

MR. PENNINGTON: Right.

MR. RAYMER: And so we agree.

MR. PENNINGTON: Okay.

MR. RAYMER: Good.

MR. PENNINGTON: Thanks for your comment.

MR. RAYMER: Thanks. And getting back to the comments that sort of Mike will be providing later on today, just in general, and I know I've said this to Staff on a number of occasions and we've mentioned it at previous workshops, it goes without saying, this update, the 2019 regs represents the single biggest and most costly change to the Residential Building Code in the history of the Residential Building Code. This is a quantum leap from where we've been in the past.

The renewable energy component, coupled with the changes to high-performance attics and QII, will propose a significant challenge to industry like no other update to the codes in the past 40 years. And that's why we're asking the

CEC to reconsider their proposed change to high-performance walls.

Unlike the high-performance attic proposal and the QII proposals, the wall proposal, as it stands today, is, number one, an extremely high cost efficiency measure. It's an extremely difficult design measure to implement. And most importantly, it has very limited, if any, benefit to the consumer over the 30-year life of the dwelling. Even given the best cost considerations, as the case team has done, this proposal barely squeaks by the benefit cost analysis.

So that's why at this point we're asking the CEC to revisit this proposal and consider holding onto it until the 2022 update.

But once again, we're still going to be available to have a dialogue on this as we go forward. But this seems to be the one particular issue in the efficiency component that we've got our greatest concern with.

So thank you.

MR. SHIRAKH: May I ask you a question?

MR. RAYMER: Sure. Sure.

MR. SHIRAKH: So your proposal is

basically leave 2016 there?

MR. RAYMER: We'd prefer that at this point. But once again, we're open to discussion, yes.

MR. SHIRAKH: I'm Mazi Shirakh, by the way. I'm sorry.

MR. BOZORGCHAMI: Any other comments on the general provision section Part 1? Okay.

MR. WALKER: Good morning. So I'm actually here to comment on the 10-103.1, the ATTCP. My name is Chris Walker. I'm representing CAL SMACNA, the California Association of Sheet Metal Air Conditioning Contractors, representing 300 contractors throughout the State of California. Again, I'm going to direct my comments to 10-103.1 -- or excuse me, .2 on the Mechanical Acceptance Test Training and Certification Program.

Our contractors and our partners have invested well over $2 million into this program since it was conceived in 2012. In the last ten months there has been a lapse in any recognized ATTCPs on the mechanical side by this Commission because there has been a major stumbling block when it comes to the QA, quality assurance, with

the onsite audits. When it comes to lighting, the onsite audits are one thing. When it comes to the mechanical side it's a complete different world. And because of that problem, we have seen decertification of all of our technicians and the, basically, lack of recognition of our ATTCP programs that we've invested in so much.

Resolving the QA, and I appreciate the fact that it remains an issue of discussion with stakeholders, we will continue to meet with Staff. But this issue needs to be resolved in a way that doesn't result in huge cost drivers and practical concerns for both the industry and the end users, owners of buildings. Certainly, it can get out of hand real quick where it outgrows the actual energy benefit.

So we look forward to resolving the onsite audit question. And hopefully the Energy Commission will consider the alternative that was proposed in the workshop in July.

That concludes --

MR. BOZORGCHAMI: Mr. Walker --

MR. WALKER: Yes?

MR. BOZORGCHAMI: -- let's have a discussion offline on this and maybe try to see

what we can do to resolve the issue.

MR. WALKER: Great.

MR. BOZORGCHAMI: Okay.

MR. WALKER: Thank you.

MR. BOZORGCHAMI: I'm willing to listen and talk.

MR. ENSLOW: Good morning. Tom Enslow on behalf of behalf of CALCTP. I'm also talking about the ATTCP regulations. I have just have three comments.

The first is a concern with the amendment that makes a provision for making the requirements to u/se certified Lighting Control Acceptance Testers no longer a requirement if industry coverage requirements fall below the threshold. We're concerned about that for a couple reasons.

First, we think it's a little unusual. I'm not sure that HERS raters have the same requirements that, you know, if they don't reach a certain threshold then suddenly that program is no longer in there. And we have all these technicians that want to make sure that they can rely on this program going forward as they've invested in it, and they'll continue to invest in

it as they get recertified.

And at the same time, it seems like a solution in search of a problem. There's over 1,000 -- I believe there's over 1,000 Lighting Control Acceptance Testers now. It's not -- we're not in a situation where we're at risk of falling below a number that's needed to serve the needs of the state.

But on the other hand we have a real issue with the fact that these acceptance tests -- the requirement to use a certified Acceptance Tester is not being enforced across the state. You know, we still have -- I mean this year alone, we still see at least 20 counties where there hasn't -- which haven't used a single certified Acceptance Tester. And we reported that, you know, even a few more counties in that last year, plus numerous jurisdictions where, you know, we've been, you know, reporting projects that aren't using certified Acceptance Testers for lighting control projects that they should be using them for.

So this is -- you know, when we are telling, you know, a certified Lighting Control Acceptance Tester Technician in Modoc County to

get recertified and he hasn't gotten a single job because no one's enforcing it in his region, that's undermining this program. And then on top of this, it gives some sort of indication that maybe this requirement may go away altogether. We believe it further undermines the confidence that the technicians have in this program, and we need them to have confidence if this is going to move -- continue to move forward, if they're going to continue to recertify every three years and, in many cases, have to take additional training to get up to speed on new requirements.

So for us the bigger issue here is enforcement. We just haven't seen enforcement by the CEC or the local jurisdictions to make sure that this is actually going to be required everywhere, and so that's our bigger concern there.

Two other comments.

One, you add a provision that we -- that the ATTCPs need to describe their process for recertifying technicians that have been decertified. We just want to clarify that the Commission is not suggesting that if someone's been decertified for fraudulent activity or

something like that, that we have to have a process to bring them back. I mean, there's different ways someone can be decertified. They might not take the training. They might just lapse, and we want to process for that. But we want to make sure, you know, if someone has been decertified for more substantive reasons --

MR. BOZORGCHAMI: That's a good point and we need to clarify that.

MR. STRAIT: Yeah. Yeah.

MR. BOZORGCHAMI: That's a good point.

MR. STRAIT: Our intent is for those, the cases where there's not a reason not to recertify them. So, yes, we would be -- we would agree with that comment.

MR. ENSLOW: Oh, great.

And then the last point, just to touch on what Chris Walker spoke about, we think it's really important that the HVAC Acceptance Test Certification Requirements become mandatory. They put a lot of money into it. And we think that will also help enforcement in the lighting control side. And we feel, you know, it has the same policy implications that you have Acceptance Testers that don't know what they're doing, these

acceptance tests are kind of useless, so you need to make sure people are trained.

Now we strongly support the quality assurance requirements in lighting control. We exceed the one percent requirement. We found it to be very useful to do onsite testing. And it's been feasible for us. We've been able to make it cost effective in our program. But it's very different. You know, we don't have to shut down systems. It's less costly. We understand it's a different animal. And if it needs to be treated -- we don't want a situation where Staff feels that they need to treat lighting control exactly the same as HVAC. It is different. Let's require what is feasible.

But if it's -- the problem is seeking perfection on the HVAC side, the bigger issue is having people who aren't trained at all, so let's get that program going, maybe address the QA with that after it gets a little more mature and has been going on for a couple years.

But we want to keep the QA the same, you know, for lighting control. But we recognize there are some difficulties in HVAC that maybe need a little flexibility.

MR. BOZORGCHAMI: Yeah. We did get some comments on that previously, that it's easier for the lighting QAs to be done versus the mechanical systems. And I would also like to have a dialogue, if possible, offline on that and see what we could do.

MR. ENSLOW: Great. Thank you.

MR. BOZORGCHAMI: Thank you.

MR. NESBITT: George Nesbitt, HERS Rater.

In the past workshop on the ATCPs, and as well as now, we've heard a lot of things we hear in the HERS industry. Providers say it's too hard and too expensive to do QA, although they only have to do one percent, and I think HERS is two percent. We hear about technicians not actually testing things but just filling out paperwork and passing things. And, of course, the whole issue of building department lack of enforcement undercuts our industry. We're losing jobs or you lose competitiveness because other people aren't doing it. They're getting away with it. Then people, you know, don't want to pay for it.

So we have very common, I think, issues between the two systems. Also, the complaint about the cost of becoming a provider. So it's

just interesting.

And as a HERS Rater, I have had my HERS provider decertified, which forced me to go back and spend more money and time to get reapproved with another provider, as well as to go through the whole house training, essentially, for a third time. So it's quite painful as a rater or tester to -- you know, when we're tied to that provider, and then when you have providers with that provider, you punish us for their problems. Where, you know, if we have been tested and approved by a provider, we should be recognized by all, I mean, so that it's easy -- you know, that we're not punished for their problems.

Anyway, and then just on the community solar, I mean, you're defining a product that I think does not exist in the marketplace currently. I mean, currently in a multifamily project you have virtual net metering, and it's easy to allocate. And I think there's a couple different ways you can allocate the output to all the different individual meters. I believe there's also a virtual net metering that allows adjacent partial parcels to have net metering, but it's based on the parcels actually being

physically adjacent to each other, and probably the system has to be on one of those. But I don't think current we really have a structure for a system built offsite in the regulatory.

So I can see, yes, I think what you're trying to do is provide for something, but it doesn't exist yet; is that correct? Essentially, that's what --

MR. BOZORGCHAMI: That's correct.

MR. NESBITT: Yeah. Yeah. And, I mean, I think also the issue, you know, Bob talking about it, being entitlements, I think, you know, even there, just because you have a contract, it doesn't mean things happen. I mean, you know, that's, I think, going to be a difficulty. Yes, you could have contracts that this community system is going to be built, but how many times have we seen PV farms that have been approved not get done or they've changed from a thermal to a PV and whatnot, so there's no guarantee that it gets built until it's built.

MR. MCHUGH: John McHugh, McHugh Energy.

We've heard a couple times here, and also at the earlier acceptance testing workshop, about the problems associated with sort of

retrospectively coming back and validating, you know, a certain percentage of mechanical systems have been tested correctly.

In 2013 when a lot of this started, the ASHRAE Commissioning Standard, Standard 202, 2013, had yet not been developed because, of course we developed the 2013 Standard back in 2011. Since that time, ASHRAE does have a ANSI Standard for commissioning. And as part of that commissioning standard is a requirement that the commissioning agent -- there's Section 12 of it where it talks about developing the checklists and test procedures, but more importantly it requires that the commissioning agent witness, you know, a sample of the tests. And, you know, if the commissioning agent is essentially doing their job as per, you know, the ASHRAE Commissioning Standard, you'd actually have, basically, a validation of the acceptance test on every single project, rather than one percent.

Also, in addition, the commissioning agent is usually, you know, directly hired by either the design team or the -- or by the owner. And so it reduces the amount of conflict of

interest of, you know, someone who's hired by the mechanical contractor to witness those tests.

So I suggest that potentially you actually already have something in place that then sort of takes the burden off of the mechanical acceptance testing providers, places it directly on, you know, on someone who's hired by somebody who has a financial interest in having that equipment being correctly tested. So it's something to consider.

Thank you.

MR. STRAIT: Actually, I've got a quick follow-up question on that.

If there's a situation where the commissioning agent is not also an ATT and therefore is not necessarily intimately familiar with the tests being performed, what is their ability to spot when a test is performed incorrectly?

MR. MCHUGH: You know, that's a good question.

First off, the acceptance tests are published. So we have the acceptance test described in both the NA-7 document, as well as in the Nonresidential Compliance Manual. There's

actually quite a bit of description of the overview of those tests. And my understanding is, is that then all the training that, you know, flows down to the acceptance testing agents are also -- you know, are in compliance with those two documents.

MR. STRAIT: Right. But I mean, there's no requirement for the commissioning agent to familiarize themselves with that body of knowledge?

MR. MCHUGH: Yeah. So -- but as a commissioning agent, you know, especially if they're developing a commissioning plan in compliance with the ASHRAE Standard 202, that's actually part and parcel of their job. That's kind of what they do for a living is understanding these tests and actually making sure that it's performed and witnessing those tests.

MR. STRAIT: All right. Thank you.

MR. MCHUGH: Sure. Thank you.

MR. BOZORGCHAMI: Are there any comments online? Okay.

As there's no comments online -- yes, ma'am?

So if there's no comments, let's move on to the mandatory minimum requirements for residential low-rise buildings, or low-rise residential. Jeff Miller is going to start off on this.

MR. MILLER: Hello. I'm Jeff Miller. I'm an Engineer in the Buildings Standards Office. I'm presenting changes to Section 150.0.

Section 150.0(d) is proposing simply to clarify by adding the word "framed floors," so that it's clear that the requirement is applicable to wood framed assemblies.

Section 150.0(i) for thermostats, the change that's described in this slide is, actually, I don't think shown in the language. It was supposed to. Staff is discussing whether the term "setback" is still relevant. Perhaps the word thermostatic controls is more appropriate.

Section 150.0(m)12 deals with air filter requirements. Section 12(a) -- subsection 12(a) is applicable to air filter efficiency. We're proposing MERV 13 for all systems, so it's applicable to duct and mechanical space conditioning, also for supply ventilation systems

and the supply side of balanced ventilation systems.

Subsection 12(b) describes the requirements for systems design. And essentially this states that the pressure drop across the filter must be accommodated in the design. And I'll say here, I'll also repeat it later, these requirements diverge from some of the requirements in ASHRAE 62.2.

And so when we list the amendments to our reference to ASHRAE 62.2, we'll say that the requirements that are stated in Section 12 here are to dominate.

Subsection 12(c) -- well, this is a repeat, so we're increasing from MERV 6 to MERV 13.

So I think we're getting started with the amendments here. It's a little awkward. I didn't write these bullets.

One of the requirements in 62.2 is to establish a default value, establish a value for the required ventilation airflow, and there's a basic value that's determined. And then when it's applicable, an infiltration credit can be applied. For single-family dwellings, our

proposal is to determine a default value for infiltration credit, rather than determining that value with a blower door test. And so the proposal is to use the CFM 50 for that dwelling that would result in 2 ACH 50 for that dwelling. So it requires understanding that the goal is that we expect the default to correspond to 2 ACH 50 leakage for the dwelling, but it's, in fact, the CFM 50 for the blower door that's used in the equation to determine the value for the ventilation that's required. Okay. All right. Okay.

So now we're in 150.0(o), and moving through the amendments. So I'm just going to read this.

> "All multifamily attached dwelling units shall have mechanical ventilation airflow rates in accordance with ASHRAE 62.2, Section 4.1.1, and comply with one of the following alternatives."

So Section 4.1.1 is the basic equation for ventilation airflow, and it does not include an infiltration credit. So what this means is that multifamily buildings don't qualify for an infiltration credit.

Multifamily dwellings will have an opportunity to comply one of two ways. They either choose to use a balanced ventilation system, or if they verify that the dwelling enclosure leaks less than 0.03 CFM per square foot of enclosure area using a blower door test, then they're allowed to use continuous exhaust only or continuous supply-only ventilation systems. And the emphasis here is on continuous. This is -- this excludes intermittent strategies for multifamily buildings. Balanced systems could be intermittent; they could operate intermittently.

So this is the last slide, and this is actually sort of out of order, but we're back into 150.0(m). We're proposing to change the fan efficacy for gas furnaces only, reduce it from the current 0.58 watt per CFM to 0.45 watt per CFM. There's no change to the existing 0.58 watt per CFM required for air handling units that are not gas furnaces, so there will be two different targets depending on which system that you've installed. It's a mandatory requirement in 150.0(m)13. It's also a prescriptive requirement in 150.1(c)10. That's where the requirements for

central fan integrated ventilation systems is located.

There's no change to Table 150.0(b), 150.0(c), return duct design compliance alternative, which is available as an alternative to doing the HERS verification for fan efficacy. I anticipate that Staff is going to discuss the information in those tables. And it seems to me the pressure drop across the filter grills could be reevaluated, but we haven't don't that work at this point.

And there's an addition for small duct high velocity system. The value for fan efficacy compliance is 0.54 watt per CFM for those systems. And the airflow rate for the verification is 250 CFM per ton.

I think this is the last slide. I'll take questions now, anyone.

MR. SHIRAKH: Actually, I just wanted to add something about the thermostats, which is not in the language but we're considering. The setback thermostat, I believe they're required to have two on-off periods. And the proposal is to actually increase that by one or two to accommodate time-of-use rates. Most -- all NIM

customers are going to be on time-of-use by having more time periods on/off. The homeowner can actually program the thermostat to take advantage of the time variation that the TOU offers. So that is the proposal that we're considering.

MR. MILLER: Cool.

MR. SHIRAKH: Most thermostats, I think, actually accommodate more periods, so we're just going to put it in the code.

UNIDENTIFIED MALE: Do they write instructions for seniors?

(Colloquy)

MR. NESBITT: George Nesbitt, HERS Rater.

First, on the thermostat, I guess rather than using the term "setback," I think the term we probably want to use is programmable. But I guess it also raises a question about thermostats, like the Nest, that are not programmable directly by the user, but are sort of programmed automatically. I think our intent has always been that -- I mean, you know, a lot of programmable -- I use mine mostly as on/off, but anyway, thermostats, yes.

According to the agenda, I guess there's

a couple things you didn't go over. But you also sort of went into the next section as part of this section, so I'm not sure what to talk about. So I'm going to talk about the 150.0(j), the pipe installation and aligning it with the plumbing code. I don't recall at the moment what the current spec is, but I'm not sure if it wasn't already one inch. I've never installed one-inch pipe insulation on any of the pipes I have ever installed.

The problem with specifying the thickness is -- and I think the way the charts and the code have been written, and I've raised this probably for two code cycles in a row, is you're based on thickness with an assumed value that you could actually convert to an R value, because when you go buy pipe insulation they're usually labeled with an R value. And the R value and the thickness varies, depending on the type of material that the pipe insulation is made out of. So while I may have never installed a one-inch pipe insulation, I have probably always installed pipe insulation that has had an R value equal or greater than what the code has assumed.

So I'd really highly recommend that you

convert pipe insulation to an R value, a minimum R value. Let people decide what material they buy and what thickness to meet that R value. Simplification.

Are you going to talk more about residential lighting elsewhere?

MR. MILLER: Lighting? That wouldn't be me.

MR. BOZORGCHAMI: There will be. We're going to take a ten-minute break right after the comment period of this.

MR. NESBITT: Okay. Because --

MR. BOZORGCHAMI: And then -- yeah.

MR. NESBITT: Because you've mixed up -

MR. BOZORGCHAMI: Yeah. There was a --

MR. NESBITT: -- the agenda, so --

MR. BOZORGCHAMI: There was a mess up -

MR. NESBITT: -- you'll have to --

MR. BOZORGCHAMI: -- in the presentations here.

MR. NESBITT: -- forgive me.

MR. BOZORGCHAMI: Yeah. There will be a presentation on lighting.

MR. NESBITT: Then I'll put that off. Where -- okay.

So the multifamily compartmentalization blower door test if you install continuous supply or exhaust ventilation, great, let's just put in a control that turns off the fan for one minute every hour; it's no longer continuous. Now we don't have to do the blower door test.

So, I mean, even if -- people will probably install them continuous. They'll probably run them continuous. And chances are this is another section of the code that will never get enforced, and that you can easily work around.

We either need to recognize that multifamily compartmentalization is primary and important for energy reasons, comfort reasons, health reasons, odor reasons, fire control reasons. You know, we expect that it happens, but it doesn't really happen. So as written, having it only apply to continuous is really easy to get around.

MR. MILLER: Well, I think continuous would be the requirement. If you go that route the requirement would be to operate it continuously.

MR. NESBITT: And no one will be saying

they're going to do it continuous, although they may end up running it that way.

So kind of getting into the fan and the -- well, MERV 13 air filters, and then the whole issue of the fan efficacy.

So I don't remember in previous workshops, but apparently now the proposal is that only a gas -- a ducted gas furnace would have to have a 0.45 --

MR. MILLER: Yes, if it's the --

MR. NESBITT: -- threshold?

MR. MILLER: -- air handler for a cooling system.

MR. NESBITT: Well, that's not what -- I mean, you can have a gas furnace without cooling. So my point -- okay.

So I put in a hydronic air handler. I put in a heat pump. I don't have to meet the 0.45.

MR. MILLER: You have to meet the 0.58.

MR. NESBITT: Why? It's a fan and it's airflow. I mean, there's nothing unique about a gas furnace, an air handler with a gas heat exchanger that says it can meet 0.45, but none of these other technologies can, with the exception

of the high velocity duct system and, of course, ductless mini splits. Those are different technologies and do have limitations.

MR. MILLER: We've been advised that air handlers that will not be required to comply with the new federal rule may not be able to meet the lower fan efficacy rate. And if that's true, even if they weren't attached to duct work, then we're facing the possibility of a preemption challenge. That's my understanding.

MR. NESBITT: Okay. Was 0.58 actually previously a federal standard, or was that something --

MR. MILLER: No.

MR. NESBITT: -- we came up with?

MR. MILLER: No. No. No. The fan efficacy target is reflection of both the efficiency of the fan and also the quality of the duct system that the fan is attached to. And the value of 0.58 was chosen, as I understand it, to be something attainable by all systems.

MR. NESBITT: Yeah, 0.58 is readily attainable. And the 0.45 is readily attainable by non-ECM motors with a reasonable duct design. And I --

MR. MILLER: I advise that it may not be true for all fans, yes.

MR. NESBITT: Fans are fans. I mean, these are all -- you know, whether you put --

MR. SHIRAKH: We're not going to be debating, and I have your comments.

MR. NESBITT: Yeah. Anyway, it makes no sense. I can understand if the federal government is coming up with a standard for gas furnace and not something else, that maybe now you can't preempt it. But other than that, technology-wise, air handlers are air handlers.

The ventilation requirement for 62.2. So you're assuming a 2 ACH 50, and then you're giving credit, in quotes, "credit" if someone does a blower door test and does worse. It's not a credit. It's a penalty because it means their house will be more drafty, they'll have higher bills, they'll be less comfortable, and maybe they'll have worse indoor air quality because we're going to reduce the amount of ventilation they need. And nationally the goal is 3 ACH 50 or less. So if you're going to give credit, you should not give credit beyond 3 ACH 50, because really that's where we should be anyway.

MR. MILLER: Maybe I should just do a reality check to clarify this. The term "infiltration credit," as I've used it, doesn't have anything to do with the ACM credit for -- are you -- would do that.

MR. NESBITT: I understand that.

MR. MILLER: Okay. So it's --

MR. NESBITT: You're doing it to adjust the amount of required -- minimum required airflow --

MR. MILLER: Yes.

MR. NESBITT: -- to meet 6.2, I understand that.

MR. MILLER: With the idea being that if the envelope is leaky, it provides some ventilation.

MR. NESBITT: Yes.

MR. MILLER: Okay.

MR. NESBITT: I just think --

MR. MILLER: All right.

MR. NESBITT: -- the idea of giving something that's called a credit based on that is a really bad idea.

MR. BLUNK: Hello. I'm Scott Blunk from SMUD.

In this section there's talk of the main electric service panel has reserved space for a circuit breaker for PV, and I support that. I would like to see, in future updates, a place where there's reserve space in the panel to convert a home to all electric. I think, like most people think -- agree -- will agree that in the future they will not be able to buy a car with gasoline, I think in the future that's going to be true in buildings, where you won't be able to buy a new building that has gas in it. And I think the more houses we build that are not able to easily be switched to an all-electric, it's just going to hurt the efforts down the road.

So I'd love at least one for maybe the space heating or the water heating, maybe all three, including the cooking, but to have space available in the panel for those in the future when the state or the country is transitioning to an all-electric future I think would be a really nice added piece in here.

Thanks.

MR. BOZORGCHAMI: Thank you. That was a good comment.

UNIDENTIFIED MALE: (Off mike.)

(Indiscernible.)

So is there a problem with the existing panels having space for an additional end use --

COURT REPORTER: Speak up or pull the mike a little closer.

MR. PENNINGTON: All right. So I'll obey the recorder.

MR. BOZORGCHAMI: Okay. Good boy.

MR. PENNINGTON: So my question is: Is there a problem with the existing panels not having the ability to add another electric function? Is that really a problem?

MR. BLUNK: It is a problem. I have a fairly newly built home. And once the pool and water heater are added I've used up my panel space. And I don't think that's unusual. Certainly in older homes or smaller panels, it's a large concern. So anything in a retrofit situation where a new panel is going in, making sure that there's enough space for that down the road is important. And apparently it was important enough to include in the Standards for PV, so there obviously was a concern at some point that there wasn't enough space for PV. And like we're prewiring for EVs and PV, like I think

we should be doing the same thing for space heating and water heating and, ideally, for cooking, as well.

MR. PENNINGTON: Okay. So you'll present an argument for that in your written comments?

MR. BLUNK: I will do written comments --

MR. PENNINGTON: Okay. Thank you.

MR. BLUNK: -- about that. Thank you.

MR. BOZORGCHAMI: Thank you.

MR. RAYMER: Bob Raymer with California Building Industry Association.

It's an interesting proposal. I can tell you, as some of you who are familiar with the Green Code are aware, we did amend the Part 11 provisions for residential where all new homes starting July of 2015 are required to have panels with enough empty slots for the later installation of EV charging equipment. And this may be something that the CEC may want to consider for, you know, one of the voluntary tiers for CALGreen, at least to kind of kick it off, but it's an interesting idea. The state seems to be heading in that direction anyway and this is sort of a way to make sort of a transition.

But interesting idea. Thank you.

MR. HODGSON: Mike Hodgson, Con-Sol, representing CVIA.

Hi Jeff.

MR. MILLER: Hi Mike.

MR. HODGSON: A bunch of questions for you.

MR. MILLER: Oh, great.

MR. HODGSON: I guess I should cite, this is 150.1(c)10, which is the fan watt draw.

MR. MILLER: Okay.

MR. HODGSON: I understand the federal requirements. But the reality is when we look in the databases of the HERS registries there's very few systems that are in the 0.45 to 0.50 range; 0.58 is the standard currently. And people are typically in the mid-0.50s. So the caution is, is we have a fairly good percentage of market share with condensate furnaces, and they do have ECM motors, but we're not testing at the level that this is a mandatory requirement for.

And so I think there's other influences on this requirement. And I think we should probably talk about how it can get implemented in the field. But what I read as a mandatory

feature, and a pass/fail, basically, is a HERS rater comes and it doesn't meet 0.45, then this house would fail. And in my experience is that's 99 percent of the homes that we have right now, so that's a concern.

So there's something here that we need to figure out when I'm trying to preempt whatever the federal government is doing, but maybe the implementation of it could be looked at. And I think I would recommend talking to both CHEERS and CalCERTS, who actually have this data, and some of the large rating companies who work with production builders and figure out what's going on.

MR. MILLER: Are you saying that the data in the registries discloses that 0.58 cannot be met?

MR. HODGSON: No, 0.45.

MR. MILLER: Okay.

MR. HODGSON: They're meeting 0.58 and that's not an issue. But the 0.45, we looked in our database and we have none. That's not a good representation to market because we don't have market share.

Ross King's comments to the docket

earlier from CalCERTS kind of also represent this issue. And so I'm just saying I think it is a significant issue. And as a mandatory feature it could be a real potential hazard in the field for home building, so we want to kind of figure out what's going on. I'm not saying to change it, we just don't know what to do with it yet.

MR. MILLER: We should say at this point that a research task is underway now to do laboratory testing of these types of air handlers and expose them to the types of static pressures that would be expected in the field to determine whether it's correct to expect that those systems will comply -- will be able to comply with the 0.45. And there will be a report made available to you, probably not until sometime in November, however.

MR. HODGSON: Okay. So it will before 45-day language?

MR. MILLER: Yes. Uh-huh.

MR. HODGSON: Okay. Great. Good. Look forward to that.

MR. MILLER: Okay.

MR. ALATORRE: Mike, I wanted to comment on this.

Granted, this is in response to a federal government rule on furnace vents, which most likely will take effect on the manufacture date of a furnace vent -- of a furnace. So it may be even more appropriate to attach a manufacturing date to this rule; right?

MR. HODGSON: Right.

MR. ALATORRE: Is that what you're trying to get at?

MR. HODGSON: Yeah. Yeah. Let's just dig down into that data --

MR. ALATORRE: Yeah.

MR. HODGSON: -- because I honestly don't know the answer. And I don't know even the date of when did the -- when was the manufactured date? When is the rule effective?

MR. ALATORRE: I think it's going to go into effect in 2019, that new rule.

MR. HODGSON: Yeah.

MR. ALATORRE: So we've done that in the past for like EER --

MR. HODGSON: Right.

MR. ALATORRE: -- for systems that are manufactured after a certain date, they have to comply with the new EER requirement. And that

might be the way to go about requiring they perform at 0.45.

MR. MILLER: Yeah. I think we can get kind of an inkling of what's going on because we have so many condensate furnaces and they have ECM motors, which is really I think what's driving this requirement of 0.45. So we should be finding those answers in the field, I mean -- those results, I should say, in the field and we're not. And so, you know, what other issues are coming up to prevent us from getting that? And I just want to -- and if you have a research project, that's great to hear, and we'd love to understand what the issues are.

MR. HODGSON: Okay. Just a clarification on duct leakage. You did not mention this, I don't believe, Jeff, but it's in Section C. There's too many numbers to mention. But I pointed this out to Staff a few days ago. For multifamily, it says in C -- this would be 150.0-something C, it's on page 281, that it mentions duct leakage for multifamily cannot exceed six percent. But in the table it references, which is RA 3.1.2 -- actually, excuse me, 3.1.4.3.4, it says a six percent, strikeout five percent.

MR. MILLER: I was talking with Mark about this yesterday. So I think the five percent was implemented for 2016 Standards. And then there's a disconnect as of the 2016 Standards, and so we have an opportunity to correct that now. The question is whether we're justified in doing that for newly constructed buildings for multifamily or not? I think there was justification. Mark might be able to talk about this more.

MR. HODGSON: Okay.

MR. MILLER: It was clear, I think, for single-family, but maybe not for multifamily. I'm not sure.

MR. ALATORRE: Yeah. I need to go back to the analysis we did under the 2016 and see if it included multifamily. It might have only included single-family detached. That's why we didn't make the change.

MR. HODGSON: Okay.

MR. ALATORRE: If it was just an error and the analysis did include it, we'll make the update.

MR. HODGSON: So either the table will

change or --

MR. ALATORRE: Or the standard.

MR. HODGSON: -- the mandatory feature?

MR. ALATORRE: Yeah.

MR. HODGSON: Got it.

MR. SHIRAKH: But do we have any data in CalCERTS or CHEERS to see what kind of --

MR. ALATORRE: Well, that's what we used for the 2016, which --

MR. SHIRAKH: Exactly.

MR. ALATORRE: Yeah. I need to go back and look it over to see if it included both.

MR. SHIRAKH: Okay.

MR. ALATORRE: Yeah.

MR. HODGSON: And I can be happy to make the inquiry, but we didn't do that. We weren't looking for that.

MR. SHIRAKH: And that's how we justify five percent for single-family.

MR. HODGSON: Okay. Well, I'm sure it was cost effective, too, Mazi; right? Okay.

On Section H, on the ventilation indoor air quality, Jeff that you've so elegantly explained --

MR. MILLER: Oh, thank you. That was

nice to hear.

MR. HODGSON: -- and I still don't get it --

MR. MILLER: Yeah.

MR. HODGSON: -- but I'm one of the slow guys here, but -- so I just want to -- so what you're doing here is setting a default based on an envelope leakage of 2 ACH 50. And that default is going to be used where?

MR. MILLER: So there's a basic equation that defines the amount of ventilation air required by ASHRAE 62.2 based on condition floor area and number of occupants or number of bedrooms.

MR. HODGSON: Uh-huh.

MR. MILLER: That's your basic value. There's an allowance for single-family dwellings to reduce that value if the envelope leaks. And so it's the value from a blower door test that's used to determine how much that value can be reduced.

MR. HODGSON: Okay.

MR. MILLER: And so the --

MR. HODGSON: But this says --

MR. MILLER: -- proposal is to --

MR. HODGSON: Two.

MR. MILLER: -- use what that blower door test airflow rate would be for that dwelling if the result from that blower test was 2 ACH 50.

MR. HODGSON: Okay. Well, we have no buildings -- well, I should say this, very few buildings tested 2 ACH 50.

MR. MILLER: It's pretty tight, yeah.

MR. HODGSON: It's incredibly tight.

MR. MILLER: It's not a big credit. It's not a big reduction.

MR. HODGSON: Okay. But this is in the mandatory features section. And the verbiage in front of it says "shall." So I'm trying to figure out where this default value will be used.

MR. MILLER: It's --

MR. HODGSON: Is it used in the prescriptive package to general performance results? Is it used as a pass/fail for a HERS rater? I don't get that.

MR. MILLER: So it's the specification for what the expected ventilation airflow rate is for that dwelling.

MR. HODGSON: Right. Okay. So this is single-family and, I believe, attached single-

family. So there's now going to be a mandatory ventilation rate based on 2 ACH 50 that you have to pass/fail; is that correct?

MR. MILLER: Yes.

MR. HODGSON: Okay. So then the building industry will strenuously object to this because it's impossible to do.

MR. ALATORRE: The requirement isn't for the dwelling to be sealed to leak no more than 2 ACH 50.

MR. HODGSON: Okay.

MR. ALATORRE: It's -- that's a default value to assuming you're calculating your ventilation rate.

The second part where it says "when the dwelling unit envelope leaks less," that when you intentionally take credit in the software to have a lower than 2 ACH 50.

MR. MILLER: There's a disconnect, intentional decoupling of the credit for envelope leakage, which is performance compliance --

MR. HODGSON: Yeah.

MR. MILLER: -- which does require a blower door test.

MR. HODGSON: Okay.

MR. MILLER: That's not expected to be done to establish ventilation airflow. A blower door test is not required to establish ventilation airflow.

MR. SHIRAKH: I think this is just an assumption for calculation of air flows for IAQ.

MR. HODGSON: Well, I get that.

MR. SHIRAKH: This is not --

MR. HODGSON: That's my preference and that's what I'm trying to figure out. If it's an assumption, than it should not be here. It should not be in the mandatory features section.

MR. PENNINGTON: So why don't we discuss this offline.

MR. HODGSON: Okay.

MR. PENNINGTON: I think this actually is to the benefit of builders -

MR. HODGSON: Yeah.

MR. PENNINGTON: -- do this.

MR. HODGSON: Okay.

MR. PENNINGTON: Otherwise you would have to be doing blower door testing on every house to figure out how much leakage you have that you would be able to use to determine how big your fan exhaust fan has to be, your ventilation fan.

And rather than do all that and impose that kind of cost on every house, this assumes a pessimistic infiltration level in the house.

MR. HODGSON: Pessimistic?

MR. PENNINGTON: Pessimistic, you know, very, very low infiltration in the house.

MR. HODGSON: Okay.

EXECUTIVE DIRECTOR SOBECK: And it says, okay, you need to actually make the ventilation up with the fan. And so that has a marginal increase on the size of the fan, not huge, but it avoids having to do blower door testing on every house. We would think that the building industry would very much appreciate that.

MR. HODGSON: Okay. I would agree with that statement.

MR. PENNINGTON: Okay.

MR. HODGSON: But the way -- it's, I don't think, very clearly portrayed in a mandatory feature. And it --

MR. PENNINGTON: Okay.

MR. HODGSON: And the words in that section say "these buildings shall comply with." And the way it can be read potentially --

MR. PENNINGTON: Okay.

MR. HODGSON: -- is that there's two air (indiscernible).

MR. PENNINGTON: Okay. Well, we can work on the wording.

MR. HODGSON: Right.

MR. PENNINGTON: And I'll have a conversation with you and --

MR. HODGSON: That would be great.

MR. PENNINGTON: -- to make sure you understand.

MR. HODGSON: Well, yeah, I would love to understand it, but I'm not the only one here that needs to understand it.

I think the issue is if it's really going to be how to define a modeling assumption on a base case, then it goes in a different section, not in the mandatory features. But we can discuss that too.

MR. PENNINGTON: Okay.

MR. HODGSON: Thank you.

MS. CUNNINGHAM: Kelly Cunningham, PG&E.

In support of the 0.45 watts per CFM question, we've received input from stakeholders that further information would help gain confidence in this measure. So the case team has

embarked on a study where we are, in an accelerated study, testing furnaces to provide additional data. So to just make clarification, if you have questions about the study or you want to dialogue about it, to contact Marshall Hunt or myself at PG&E. We can provide you with some information. And we are working as fast as we can to get that information in a timely manner and intend to add it as an appendix to the final residential HVAC case report.

The report, as it stands now, does include information in support of this measure. And we do hope that you will take the time to read that as it stands now on title24stakeholders.com for download. But this should supplemental the case that we've already built in support of this number. So now you have your contact to continue after today on this topic.

MR. ROY: Aniruddh Roy, Goodman.

Jeff, thank you for your presentation. I have one question regarding the 350 CFM per ton, and that is was any consideration given to the rated capacity, accounting for the rated capacity, within the 350 CFM per ton instead of

how the current language, you know, kind of portrays it to be the nominal capacity?

MR. MILLER: Yeah. We received comment, I think last workshop, to that effect. And the compliance scenario becomes very complex if you go down that road. It requires, you know, getting rating documents and doing calculations based on rated values. It's not clear that there would really be a different outcome or a significant change in compliance requirements.

The complexity alone is, I think, a good reason not to go down that road. Yeah.

MR. ROY: Okay. I'll discuss those details with you offline --

MR. MILLER: Okay.

MR. ROY: -- after this meeting.

One other aspect regarding the 0.45, as everyone's spoken about here, including Mark, is, you know, the compliance date for the FER Standards is July 3rd, 2019 under DOE. And I think this building standard goes into effect 01/01/2020; right? So that's about five months. And since we are looking at new construction, I guess, with the measure, you know, builders, typically they need like a 12-month lead time, at

least from manufacturers, when they're procuring products, 12 months or more.

So I kind of like the idea that Mark raised regarding linking it to the date of manufacture, which will give builders time to plan, our customers time to plan. Because the July 3rd and the 01/01/2020 date, that's just five months, so just something to consider, at least.

MR. NESBITT: George Nesbitt, HERS Rater. Just a couple things.

Since Mike brought up the issue of duct tightness on multifamily, if I remember right, in 2016 single family went to 5 percent and multifamily went up to 11 percent; correct -- 12 percent? Okay.

MR. MILLER: It remained at 12.

MR. NESBITT: High bidder. Sold.

MR. MILLER: It remained at 12.

MR. NESBITT: Twelve percent. I mean, it just happened. It made no sense. While we don't have a problem getting multifamily units below six percent, I'd still say is percent, at times, people are barely scraping by. And even in single family, where you have a larger duct

system, more connections, more ducts, getting to six percent can actually then be a little harder. But anyway, five percent, six percent, no problem.

Just to comment on blower door testing, so I have, just off the top of my head, and I double-checked, 80 unit project, 19 buildings, 80 units, anything from 4-unit buildings to 8-unit buildings, every building achieved a 3 ACH 50 or slightly less. So -- and this was a project where we had a hard time getting the builder to understand that fiberglass stuffed in cavities was not an air barrier. Even though we did QII, I'm sure we failed miserably in actually getting it done properly.

MR. MILLER: Those are whole building tests?

MR. NESBITT: Those are unit by unit with an assumed connection.

But the point is, we're doing reasonably well on airtightness. I would agree, a lot of people probably don't get below two. And there's just not a lot of blower door testing in the HERS world.

So then the last thing is getting back to

the fan watt. That same project, I actually did the manual. Manual J and Manual D is on that project, so all ceiling air handlers, ducts either in dropped soffits or in attics, and anything from one-bedroom to four-bedroom units. They're hydronic on the heating side, so hot water, with an air conditioner. So the air handler actually has two different coils in it. The fan motors were all just the standard PCS motors, no ACM motors. One hundred percent was below 0.58. Only 14 percent of the units didn't get below 0.45. And then on the air flow side -- so it was like 14 percent, I think, didn't get below the 0.45.

And the return grill, you know, which is mounted on the ceiling right below the air handler, the first company has two versions. They have one version with one filter grill, and what they call an indoor quality version which has two filter grills. Of course, we only had one filter grill. Thirty-two percent of the units did not meet the 350 CFM per ton threshold. And the correlation between those that didn't meet the 350 and those that didn't get below say 0.45 is not -- does not line up. But -- so 0.45

is achievable with standard motors, but it all comes down to duct design and installation. And just because we have ACM motors, I can tell you, I've tested units, ACM motors, because they had oversized equipment, undersized ducting, not enough registers, wrong registers, they can barely meet or not meet the 350 CFM target.

So as we all know, I'm just stating what I think many of us have known for 15 years is it's not just technology, it's design and installation too. So 0.45, achievable, but it takes a little bit of intelligence.

MR. MILLER: Okay. Thanks for the comment, George.

MR. BOZORGCHAMI: Any more comments?

MR. MILLER: We have a comment online.

Laura, I'm going to un-mute you now. Go ahead and state your name and affiliation.

MS. PETRILLO-GROH: Yes. Hi. This is Laura Petrillo-Groh from the Air Conditioning, Heating and Refrigeration Institute.

I have a question regarding what I believe is a new proposal regarding the two-inch-minimum filter depth. And I did a brief check of the final case reports for indoor air quality and

residential HVAC. Thank you for posting those. So -- and I didn't see any reference to filter depths or, you know, rationale behind this proposal. Perhaps -- and it does appear that there are one-inch MERV 13 filters on the market.

Can someone in the room perhaps speak to, you know, where this proposal comes from, the justification behind it, a little bit more color to what seems a little arbitrary, when you also have the ratings and labeling requirements for filters?

MR. MILLER: So I think you're asking me, why did we specify two-inch depth filters. The purpose of that requirement is to make it possible to have a lower pressure drop using the same size filter that people are accustomed to using for one-inch filters. Reducing the pressure drop across the air filters is very important, and that's the reason.

MS. PETRILLO-GROH: Thanks. Perhaps it might be a little overly prescriptive. I'm just speculating that there may be some instances where a one-inch filter would be -- a one-inch deep filter would be required and there wouldn't -- there isn't, perhaps, a justification

for banning that application.

MR. MILLER: I'm unsure how to respond to your comment.

MS. PETRILLO-GROH: I'll make sure to include this in written comments. But I don't think that this two-inch deep requirement is necessary from a Building Standards perspective. You've already specified MERV 13. And it's up to, you know, the manufacturer and construction community to ensure that the proper filter is used for the appropriate system.

MR. STRAIT: So this is Peter Strait with the California Energy Commission.

I'll say, please just send -- we appreciate that feedback. If you could send that in to us? I know our concern in specifying a two-inch filter grill was to accommodate having a MERV 13 filter with a low pressure drop. If there's -- if there are filters that provide a MERV 13 benefit at a one-inch thickness with a low pressure drop, that would be good information to have, so thank you for that information.

MS. PETRILLO-GROH: Thanks, Peter. I'll include that in written comments.

MR. STRAIT: Thank you.

MR. WALKER: Good morning. Chris Walker on behalf of the California Association of Sheet Metal and Air Conditioning Contractors.

Just to follow up on that last comment, at the workshops, June-July time frame, you did hear some testimony from a residential HVAC contractor, Bob Tuck, that did talk about the concern about a two-inch slot. And has the Energy Commission looked at how many existing homes would actually have the space to accommodate a two-inch filter?

COURT REPORTER: Microphone, please.

MR. MILLER: What location on the system are you describing right now? Are you describing a filter grill in the ceiling or --

MR. WALKER: No.

MR. MILLER: -- a slot in a piece of equipment?

MR. WALKER: A slot in a piece of equipment.

MR. MILLER: So for that instance you would need to go to a filter grill, a return duct to a filter grill, to accommodate -- to accommodate the two-inch.

MR. WALKER: That's how --

MR. MILLER: Yes.

MR. WALKER: -- you would comply with that?

MR. MILLER: Uh-huh.

MR. WALKER: Okay. All right. Thank you.

MR. STRAIT: Yeah. Correct me if I'm wrong. These are -- the requirement is for ducted equipment. I think for -- like if you have a non-ducted mini split heat pump kind of an arrangement, those terminals aren't required to have a MERV 13 filter on those, if I remember correctly.

MR. MILLER: That's correct.

MR. STRAIT: Yeah. So thank you.

MR. BOZORGCHAMI: If there's no more comments, we're going to take a ten-minute break and we're going to upload some slides for the lighting measures for residential. We kind of missed those.

(Off the record at 10:39 a.m.)

(On the record at 10:51 a.m.)

MR. STRAIT: All right. If people could take their seats please. I know we jumped straight into Part N. We went a little bit out

of order because, obviously, there was a lot of public discussion there, and not at all because of a technical difficulty involving these two slides. But this is just going to be very quick.

We did make a significant number of changes to section 150.0(k), the mandatory requirements for residential lighting systems. This was like what we did in the nonresidential sections. This was partly a redraft for clarity to make this language easier to read and easier to understand. But at the same time we knew there were other elements that we had to address in the residential sections, so I'm just going to walk through those really quick, then open the floor for commentary.

So the first bullet, we redrafted the section language for clarity. We moved color temperature and dimming requirements from JA8 to section 150.0(k). Both now apply only to general lighting and habitable spaces, which means we were not concerned about the color temperature in bathrooms, walk-in closets, garages or utility rooms. We heard from people, for example, some wanted cooler temperatures in bathrooms, and some folks, obviously in a garage, may or may not care

specifically about having a warm color temperature.

The color temperature now is a uniform 3,500k limit, rather than a split 3,000-4,000k limit. We'd like some commentary and some feedback on that. The split limit that we had for different types of lighting that was being installed just was more cumbersome than we'd intended. So we know there's a lot of 3,500k product. It's cool without being too cold, so we felt that was an appropriate place to have a single number.

We've added language to exclude low wattage nightlights, step lights and path lights from lighting requirements. The 5 watt limitation is really to make sure that this exclusion only applies to nightlights, step lights and path lights, and that there's not like, you know, 20 watts worth of lighting being cast over the floor called a night light. But this means that they don't have to comply with JA8. There's no confusion about whether they have control requirements that apply. If you have a set of stairs and you want to have them illuminated because it makes them easier to

navigate, we're not going to get in the way of that.

We allow occupant or vacancy sensors to provide auto off. This was -- the way our language was read seemed to preclude, like you could have certain types of automatic behaviors and not others. And similarly, with auto on, we're trying to get away from saying you can have this and you can't have that.

So an occupant sensor, to let people know, a vacancy sensor means it's automatic off but manual on. An occupant sensor could also provide an auto on function. And we've heard that this is often requested by people for their buildings. They would like to have auto on, for example, in bathroom where they might have -- need to wash their hands before touching a light switch, just rooms with things.

We also added language in Table 150.0-A, excluding lighting internal to drawers, cabinetry or closets, other from walk-in closets, from needing to comply with JA8, provided that they have controls to automatically turn the lighting off when the drawer, cabinet or closet is closed. This was a former case that came up that we had

some questions about. Are we actually requiring JA8 in a two watt LED that's inside of a drawer that only comes on when the drawer is opened? And the answer is, no.

So that's essentially it. There are additional changes we've made to JA8 that we'll talk about later when we go through the appendix language. But does anyone have any comments on the proposed changes for section 150(k)?

MR. SHIRAKH: I have one. Using an occupant sensor in the bathrooms, what was the basis? I mean, was there any public comments that were received to make that change?

MR. STRAIT: It was -- now outside of the rulemaking process, we've had several folks ask why we're prohibiting automatic on, and have had public -- this has been driven by builders calling our hotline, where they've had buyers once express an interest in having an automatic on function in spaces in the homes that they're building. This is for custom homes. But also in two cases I can think of, they were production builders. They wanted to have a set of automatic on controls in some areas, or to have controls at least offer an automatic on function. And the

question was: Are we intentionally banning automatic on controls in California, and do we have a strong enough basis for that?

So that's what this was driven by. This wasn't driven by, I think, comments on the record in this proceeding.

MR. SHIRAKH: I think we need to be careful about this, because when we originally came up with this idea, that was in 2005, it was based on research that many people would be unhappy with automatic on as pets, kids can walk around, you know, in the middle of the night and all the lights will start coming on. And the results would be, basically, the activation of those devices.

I don't know, Gary, if you have any --

MR. FLAMM: Gary Flamm. Just a historical perspective.

You can think of residential as operating off hours, that nonresidential doesn't. In nonresidential, you're in the space because you're fully dressed and you belong there, or you belong at home anyway. But if you get up in the middle of the night in your underwear and the lights -- and the shades are up, we felt that

there would be a persistence problem with lights being a nuisance that are coming on when the occupant didn't want them.

So I agree with Mazi that we should be very careful. There was a reason why we went vacancy sensor instead of occupancy sensor in homes, basically because of nuisance, turning on, so --

MR. STRAIT: Thank you.

MR. FLAMM: I have -- while I'm up here, I have a question about the nightlights. And I haven't read, I confess, I haven't read the language. Is there an assumption now that nightlights in residential are only outdoor step lights?

MR. STRAIT: No. Actually, this -- there was existing language for nightlights. And we were asked regarding step lights and outdoors, but also path and -- I'm trying to remember what the case was that came in through the hotline. The case that had come in was one of a senior -- I don't think it was an assisted living building, but it was a senior citizen home that they wanted to illuminate the steps that were actually between the first and second floors, internal to

the building.

MR. FLAMM: Okay. Okay. So to add to that discussion, I've had discussion with a manufacturer who was concerned with meeting the JA8 requirements because nightlights typically have a louver on them, and so very little light actually gets out, very little functional light gets out. So I want to agree that there is a technical concern with nightlights meeting JA8, so --

MR. STRAIT: Okay.

MR. FLAMM: -- especially the efficacy. Okay.

MR. STRAIT: Thank you.

MR. BLUNK: Hi. This is Scott Blunk with SMUD. Thank you for your presentation. I just want to go on the record of support for occupancy sensors in certain circumstances. I've retrofitted many homes, and even in my personal home, like my walk-in closet, there's no window in there. I rarely go in that room and want to be in the dock. My dogs and cats rarely go in there to get dressed. There's almost never a time I'm standing in my master walk-in closet and don't want the lights on. I think it's a perfect

example. You can have a one-minute delay off because I rarely sit in there and meditate or do any other activity. I'm doing my business.

Similarly, I think for laundry rooms, another great example where there's rarely a window. I rarely go in there and don't want to see anything.

So I think in certain circumstances they make great sense. And I'm less concerned about the dogs and cats. Thanks.

MR. STRAIT: Thank you. And thank you for that commentary. We can certainly look at is there an appropriate box to draw on them so they're not everywhere, but there are important cases.

Laundry room actually reminds me that there was an example were given before of, you know, somebody walking in with all their hands full because they're carrying the laundry basket and having to hit the light switch, so --

MR. STONE: Nehemiah Stone, Stone Energy.

I haven't taken a look at your new definitions. If path light is not defined in your definitions, you might want to do that or add a clarification to that section that this is

not included exit signs.

MR. NESBITT: George Nesbitt, HERS Rater.

First on the occupancy, personally, I have no interest in occupancy sensors. Personally, I'm not even going to install any manual on sensors in my house either. But, you know, so I have learned to turn lights on and off. And there are times, yes, that even any room that may not have a window, I may not want to have the light on, just because I walked in. And the problem with lights that go on automatically or the manual on/automatic off is you don't then turn it off. And if it's set to run for 30 minutes or an hour or two hours, that's a heck of lot more time than it ever needed to run.

So on the one hand, I mean, the reality is people will do whatever the heck they want. They'll put in the occupancy sensor, even if it violates the code. If that's what they want, that's what they will do.

So on the one hand, maybe we don't want to outright ban them in all situations, but I'm not sure if occupancy sensors are really a good idea in most.

And then on the dimmer switch, so what you're saying is a dimmer switch would be required everywhere, with the exception of like bathrooms, utility rooms and garages, or something like that, essentially living rooms, dining rooms, kitchens, bedrooms --

MR. STRAIT: Yes.

MR. NESBITT: -- and whatnot?

MR. STRAIT: And that's -- 2016's language required dimming on all lighting that had to comply with JA8 or had a much more broad application. So we're trying to say is it appropriate to require a dimmer in each and every space that some of that light might be in?

MR. NESBITT: I don't think we should require dimmers everywhere. I mean, not every light needs dimming. And there are other solutions and it requires bulbs that are dimmable. And especially with the replacement bulbs, screw-in bulbs, not every bulb is dimmable. You know, there's dimmable, there non-dimmable. And, you know, so it's -- dimming is not something I personally use, or it would be very rare. It should be more of a choice.

And then color temperature, quite

frankly, I don't think we have any business telling people what color their light should be. Lately I discussed Phillips has a bulb that has three color temperatures. I mean, you know, obviously different (indiscernible) outputs and different wattages. It does not work on a dimmer switch, but it's a great technology. And, I mean, I understand, I know, you know, I've heard, you know, the whole thing, color temperature and, you know, rhythms and all the other stuff. I understand that.

But I like brighter. I like the brighter temperatures most of the time. And I've been using them, and I have it, like especially in bedrooms and whatnot, set on the low light as my default so that, especially when it's dark and I go in and turn on the light, I don't get blasted when I don't want to be, so -- or if I'm not doing tasks.

So think that, you know, to give a color temperature and not allow people -- or to eliminate potential technologies that can meet people's needs as they want is not -- I mean, I'm going to ignore that, I mean, personally. I mean, you know, so there are -- you know, so I

just don't think it's appropriate. Most people do not like the high color temperatures, but I just don't think we should restrict them.

MR. MCHUGH: Hello. This is John McHugh from McHugh Energy.

In the last code cycle the residential lighting measure, I believe, was the largest single measure, at least for residential. It was around 70 gigawatt hours. So there's a lot of effort that went into the design of the changes in 2016. And I think, you know, this is all new to me, so I haven't heard about other -- you know, any other part of the pre-rulemaking that described this.

So, you know, we're looking at it carefully and trying to figure out, you know, what are sort of the unintended consequences, as well as the intended consequences. So I thought I'd just share a little bit of my thoughts on some of the things that are in here.

The first thing is, is that the 2016 Standards was really sort of qualitatively different in terms of how we've regulated residential lighting where rather than essentially trying to force people into dedicated

fixtures with, you know, hard-wired ballast and that sort of thing, the idea was actually to provide a better product and trust that, in most cases, people would want that better product. And that really was the basis of the whole JA8 standard.

And the other thing was simplicity. And so the idea was is that many were aware there was a removable lamp at the time of inspection, so, you know, because we're trusting the people, you know, people can decide what they want to do. They can put an incandescent in there if they want to later on. But at the time of inspection the limitation on the builder, rather than the occupant, was that at time of inspection that you'd have these JA8 lamps that are labeled. It would be easy to enforce. You don't have to think about, oh, is this is an inhabitable space, an uninhabitable space? What is my, you know, what is my bonus room? Is that inhabitable or not? You know, what is the definition of inhabitable? So it was a single, unitary requirement for any sort of removable lamp.

The other thing was, was that -- was the idea of color temperature. And part of why JA8

has that warmer color temperature is sort of this logic model. Some people like colder lamps, as we heard from George. Some people like warmer lamps. If I put in a warm high-efficacy lamp, they're likely going to keep that warm high-efficacy lamp in there, you know, as you're staring, if they like that. If people like cooler color temperatures, if I start out with a warm high-efficacy lamp, they really don't actually have a choice of putting in a cool color temperature or a high color temperature low-efficacy lamp because all the high color temperature sources are high efficacy, you know, because tungsten melts. As a result, you can't buy a 4,000k incandescent.

So that was the logic model behind it. It was, you know, very carefully, you know, developed. And so, you know, in reviewing this, I think it makes sense to, you know, take a look at those case reports and the rationale behind this.

And then for the drawers and that sort of thing, I actually didn't see that there was any requirement for those light sources. So theoretically, you could be putting the little

peanut lamps in there, which are incandescent, in drawers, just as long as they have a little light switch on it.

So, you know, those are just initial thoughts. But, you know, we'll be more carefully taking a look at it.

Thank you.

MR. STRAIT: Thank you. To provide some clarification, the reason that we moved the color temperature and dimming requirements out of JA8 and into 150(k) was so that we could continue to label all lamps with that, with the marking that the inspector is going to look for.

Color temperature, again, we're not removing the color temperature limit, we're just -- instead of having a split limit on the bracket is 3,500k, we're having a single limit that's 3,500k, so we're not proposing that goes away. We are saying that we probably don't need to specify a color temperature in certain spaces because we've received a lot of criticism for saying, yes, you have to have warm lighting in your garage. And also keep in mind, this does apply just to lamps. It applies to permanently installed fixtures that are not so easily changed

by the occupant once they move in.

So that's our -- where we're at for how these were developed.

MR. MCHUGH: So am I hearing it right, though, there still is multiple color temperatures in the house potentially; right? And is that correct?

MR. STRAIT: Correct.

MR. MCHUGH: Yeah. So there's 3,500k, but for the inhabitable spaces. And the thought is, is that people will -- see this goes back to that earlier issue, talking about the rationale, which is if the builder puts in cold color temperature lamps in these other spaces, then for people who like warm color temperatures, now there's a decision point of, okay, I actually want warm. I want it to match my other lamps which are required in those other spaces and I don't want to -- you know, it's sort of more reddish, and then I walk into a more bluish room. They actually -- in terms of that logic model, there is that opportunity now that all those cold color temperature spaces end up being incandescent or using some sort of warmer color temperature source. That's just the rationale.

Thank you.

MR. STRAIT: Thank you.

MR. FLAMM: Gary Flamm.

At the time the Energy Commission adopted colder temperature, it was an appropriate thing to do because the baseline lamp was an incandescent at 2,700k. And at that time, very early in the LED development, most LEDs were in the 5,000k range. And there was concern that the LED would enter the market with only 5,000k lamps. And florescent lamps were, you know, 3,500 to 4,000k.

So to incent the industry, the LED industry, to bring warmer lamps, I believe it was appropriate at that time to have a warmer lamp in the code. And now that the LED industry is much more mature, there are, indeed, many warm lamps available.

And so my recommendation at this point is that I don't believe the code needs to say anything about color temperature anymore because the market has already been transformed. Warm light, warm high-efficacy lamps are readily available. And so the code served its purpose, earlier versions of the code.

I think that what's being recommended now is overly restrictive, that it really, you know, limits customer choices, specifically for outdoor. I don't think there -- if the Energy Commission does -- wants to continue indoor color temperature, I don't think there should be any color temperature for outdoors.

MR. STRAIT: Yeah. This proposal is to only specify color temperature in the indoor habitable spaces, so outdoor lighting would not be subject to color temperature req.

MR. FLAMM: Okay. Thank you.

MR. STRAIT: Do we have any comments online? All right.

Thank you very much for all of your comments.

MR. BOZORGCHAMI: Should we move on to the afternoon measures now, the 150.1s? I see a couple of people nodding their heads.

I'm going to take a quick, like a two-minute break, to get Danny readjusted, and probably do that. And maybe we might have to take a little bit later lunch. Instead of scheduled at 12:00 to one, we might have to go 12:30 to 1:30, if that's okay? Any objections?

Okay. We'll take a two-minute break real quick and have an adjustment.

(Off the record at 11:14 a.m.)

(On the record at 11:17 a.m.)

MR. BOZORGCHAMI: Okay. So we're doing the performance and the prescriptive requirements for low-rise residential building, 150.1. Danny Tam is going to lead this. I'll be presenting changes to 150.1.

First, in 151.(b), the Performance Standards, the whole section was revised for clarity. The biggest change was that we change the energy budget to be expressed in terms of EDR, or energy design rating, which is still based on TDV energy. So there's three main components of EDR. There's the energy efficient EDR component, there's the solar-electric generation and demand flexibility component, and then finally you have the total EDR. So the energy efficiency EDR comes from the energy efficiency features of the house. And the second component comes from the benefit from the PV's generation and any battery storage or demand response benefits, and then they combine at the total EDR.

So in order for the house to comply for Title 24, they need to meet both the energy efficiency EDR and the total EDR. And at this point we going to keep EDR just only for newly constructed buildings. So for additional and alteration, it's going to be continuing using TDV energy.

Okay, moving on to the prescriptive standards, 150.1(c)1A, we're proposing to delete the high performance attic Option A, which is the above-duct insulation. And if you want to continue to use the option, you can always go performance. And then in (c)1B insulation, this section was edited for clarity, basically easier to read. We separate the language for frame, unframed and mass walls.

Okay, there's some new language for quality insulation installation, or QII. So we're proposing to have QII as a new prescriptive requirement; (c)3A fenestration, we're adding glazed walls to this sections -- I mean glazed doors to this section. So glazed doors will have meet the same U-factor and SHGC (phonetic) requirement in this section.

Just a note, we also changed the

definition for glazed walls, so it changed from 50 percent to 25 percent glazed area.

MR. BOZORGCHAMI: So Danny means glazed doors. We changed the definition to match the NFRC. NFRC says any door systems greater than 25 percent glass is a window or a fenestration product.

MR. TAM: Thanks. Okay, (c)5 is a new section for doors, so there's a new U-factor requirement for doors that separate conditioned space and outdoor conditioned or unconditioned space. There is an acceptation for doors that's required for fire protection.

Okay, moving to refrigerant charge, there's some new language added for small- to high-velocity systems, so there's some new airflow targets which is, at minimum, 250 CFM per ton for these system.

Okay, moving on to water heating, (c)8A is water hearing systems serving single-dwelling units. So we're proposing to delete Option (i)I (phonetic) for gas storage below 55 gallons. Currently that option requires QII. And since QII is becoming a prescriptive requirement, this option becomes obsolete, so we're proposing to

delete that. You can always, again, go to performance is you want to use a gas source under 55.

And then for the option for gas storage above 55 gallons, we're proposing to add the drain water heat recovery as an option. Currently you can use that water heat, plus a compact hot water distribution or a verified pipe insulation. So this is an additional option in addition to those two.

So we're proposing to add a new option for electric water heaters above 55 gallons, which is essentially a heat-pump water heater. So you have to have additional PV on top of the prescriptive PV requirement in (c)14. So for Climate Zone 2 to 15, you need an additional 0.3 kilowatt, and for Climate Zone 1 and 16, you need an additional 1.1 kilowatt. So we added two exceptions for this option. So if you install a heat pump water heater that meets the new advanced water heater specific Tier 3 or better in Climate Zone 2 to 15, you'll meet the prescriptive requirement for water heating. And for Climate Zone 1 and 16, in addition to the new Tier 3, you need to have the additional 0.3

kilowatt of PV.

Okay, moving on to water heating system serving multiple dwelling units or central systems, we're adding a new prescriptive option for drain water heat recovery system that allows you have reduced solar fraction requirement. So currently it requires a solar fraction of 0.2 from Climate Zones 1 to 9, and 0.35, 10 to 16. So if you have a water heating system installed you can reduce the solar fraction requirement to 0.15 in Climate Zones 1 to 9, and 0.3 in 10 to 16. And when you have one of these installed it has to at least meet a minimum of 42 percent effectiveness and have to recover heat from at least half the shower above the first floor.

Okay, (c)14 is a new section. It describes the photovoltaic requirement for low-rise residential buildings, so this applies for newly constructed buildings. This requirement does not apply to addition and alteration. So the intent is for the photovoltaic system to equal the dwellings annual electricity usage. So there's a number of exceptions to this requirement. So there is an exception for limited roof space due to obstruction if it's

less than 80 continuous square feet. That would requirement at Climate Zone 15, reduce requirement for three story or above single-family spaces. There's some accommodations for plans that were approved prior to implementation date of January 1st, 2020. Also reduce the PV size if you have a battery storage system. And finally there's some exception for development connected to constraining local utility grid. Okay.

We also made a slight change in the footnotes on Table 150.1(a) and (b). Mass wall used to expressed in terms of heat capacity. We're changing that to density. So mass wall now has a density greater than 45 pounds per cubic feet.

Okay, so that's the changes in 151. Now we're open for comments.

UNIDENTIFIED MALE: Whoever gets here first.

MR. STONE: Age always wins. So Tehemiah Stone, Stone Energy.

First off, I can't tell you how happy I am to see that you've addressed multi-family separately from single-family in a lot of these

things and have a table. I'm really pleased. Thank you very much.

MR. SHIRAKH: We had you in mind when we were doing it.

MR. STONE: Yeah. I'll bet you probably did. You got tired of me complaining.

I have a number of comments on the solar part. I made a comment once before about the exception being restricted to single-family and asked why that exception was limited to single-family, and I didn't see a change here. So if you can explain to me, I'd appreciate it. Do you want me to tell which exception I'm talking about?

MR. TAM: Yeah.

MR. STONE: That would help, wouldn't it? All right.

So it's Exception 1 to Section 150.1(c)14, "within any available solar-ready zone that's restricted to less than 80" -- oh, is that -- I'm sorry, that's the wrong one, it's the next one.

Exception 3 to 150.1(c)14, "In all climate zones for single-family homes or three story the PV size shall be the smaller of" --

yada, yada, yada.

So there's -- I don't -- I didn't see any reason why that should be restricted to single-family. And I asked the question, both at the podium and in written comments. And I'm wondering if, since it didn't change, if you came up with a reason?

MR. SHIRAKH: We could potentially extend it to multifamily.

MR. STONE: I'm sorry?

MR. SHIRAKH: We could probably put -- extend it to multifamily. Is that what your comment is?

MR. STONE: Yes.

MR. SHIRAKH: Yeah.

MR. STONE: Yeah. And, you know, since it didn't change, I thought maybe there was a reason that you had that it didn't change.

On the first exception there, I'm wondering if you've considered the potential unintended consequence of builders -- let me read the exception, so you know what I'm talking about.

"Within any available solar-ready zone that's restricted to less than 80 contiguous square

feet by existing permit or natural or manmade barriers external to the dwelling, including but not limited to trees, hills, adjacent structures."

I'm wondering if you've considered the unintended possible consequence of builders sequentially building out of subdivisions so that each building they build allows them to take advantage of this exception on the next building, rather than planning the subdivision in a smarter way where they could have solar, the adequate amount of solar, throughout.

MR. SHIRAKH: Well, these are conditions that are exterior to the building --

MR. STONE: Right.

MR. SHIRAKH: -- and it's not under --

MR. STONE: Right.

MR. SHIRAKH: -- the building's --

MR. STONE: Well --

MR. SHIRAKH: -- the builders control --

MR. STONE: Right.

MR. SHIRAKH: -- when there's like existing --

MR. STONE: Well, it doesn't say --

MR. SHIRAKH: -- buildings.

MR. STONE: -- not under the building's control, Mazi.

MR. SHIRAKH: Well, you know, I mean, what is it? I need to look at what it's talking about. I mean, problems that are external to the building.

MR. STONE: Right.

MR. SHIRAKH: And so presumably a builder has no control over those. It is an existing building or there's existing trees.

MR. STONE: No, I understand, Mazi. So what I'm saying is as soon as a builder builds a building, it's an existing building. Then he goes to build the one next to it and he says, oh, well, I've got this exception. I don't have to put as much solar on this because that building I just built that's now existing shades this one.

MR. SHIRAKH: No, they don't generally do one building at a time. There's a master plan. I mean, they're -- I mean, I --

MR. STONE: What you're telling me is you did consider it. That's all I'm asking --

MR. SHIRAKH: Yeah.

MR. STONE: -- if you considered that potential --

MR. SHIRAKH: Yes.

MR. STONE: -- consequence. All right.

Also, Mazi, when you and I talked before about the storage requirement, you know, you assured me that the storage was not going to be just limited to battery storage, but that thermal storage was going to be weighted equally, it had equal weight in the code. And then there's this Exception 5 to the section that says PV -

> "PV sizes from equation 150.1(c) can be reduced by 25 percent if installed in conjunction with at least an AKWH battery storage system."

If the design of the building is such that they're making use of hot and cold water storage to be able to avoid on-peak system operation, why would that not allow you the same exception?

MR. SHIRAKH: So let me correct one thing that you said. I promised --

MR. STONE: Okay.

MR. SHIRAKH: -- I would look into it. I never promised it would be exactly equal. If I said that, then that means that I don't know what I'm talking about because each one of them has

different -- it's all driven by cost effectiveness and TVD and so forth.

MR. STONE: Right.

MR. SHIRAKH: And within the software, I think our team has accurately implemented credits for thermal storage. It just turns out that battery storage is incredibly effective when it comes to load shifting the TVD benefits far surpasses thermal storage at this point.

But if a builder wants to do that, they can use performance and they can actually put in a heat pump water heater with a capability to super heat it to 160 degrees and get a credit, and they can downsize the PV that way. It's all driven by the value that each strategy brings to the table and gets the corresponding credit for it.

MR. STONE: One last thing, a very minor thing on this section. I notice that in one place in this section you deleted "multi-family" and replaced it with "multifamily." I'd like to see consistency throughout it. And the --

MR. SHIRAKH: Yeah. That should read with a dash, a dash.

MR. STONE: No. The industry typically

does not do it with a dash. The federal government does and a lot of other folks do. But, you know, consistency and -- you know, it doesn't matter that much which way you go, but I'd recommend that you just eliminate the dash. As I said, it's a minor issue.

Thank you.

MR. SHIRAKH: Thank you, Tehemiah.

MR. ALATORRE: We can handle that proposal.

MR. BLUNK: Hi. Scott Blunk of SMUD.

Thanks, Danny, for your presentation.

I am in favor of no dash in multifamily, just to go on the record for that, but I've been advocating that for years, just to get us all consistent.

MR. SHIRAKH: Are there any pro-dash people here?

MR. BLUNK: All right. So to get to my comments, in 150.1(b)1, it talks about newly constructed buildings and how the energy budget is created and such. And this is more of a call to attention to others listening, but the battery storage is in discussion to be used as an energy efficiency credit in 2019. And I'm not -- I

haven't figured out whether I'm for or against that yet, but that's in discussion. And I think Mazi can speak to it, but there's a meeting next Friday where it will be discussed further. But I think that's kind of an important topic for us to be aware of.

Moving on to Section 150.1(b)4V, or five, it talks about -- it's talking about heating systems, but the title of it is Heat Pump Rated Heating Capacity, and then it says how to check verification. But to talk about it as a heat pump rated heating capacity, it's a space heating heat pump as opposed to -- I assume this verify requirement does not apply to heat pump water heaters or heat pump dryers for that example. So just the language around it, it's talking about space heating, but it's talking about a technology heat pumps. So that would be great to just clarify that.

So in Section 150.1-8A(iii) (phonetic), Exception 1, if I got that right, and in your presentation you even said it's basically that this piece is for heat pump water heaters, and I appreciate adding those in. But instead of making heat pump the exception, and it's just an

optics, but can we make heat pumps the standard in that and make electric resistance and the more onerous requirements of electric resistance the exception? It's just an optics change. But as you said, this piece of it is actually for heat pumps. So instead of making an exception, that would be great.

And then right below that in B, so 150.1, Section 8, I think it's (b)1, it says, and this is about water heating again, "gas or propane water heaters, boilers or other water heating equipment." It seems like you basically said gas, propane, water heaters or everything else. Why can't we just say everything else, or just get rid of the section and say water heating? Because you basically called out every possible type of way to call -- to heat water, but specifically mentioned gas, propane, and then everything else. So just a tightening of the language.

And then in Table 150.1-A, component package for single-family, and this also applies to multifamily, the refrigerant charge verification is under space conditioning -- or space cooling, excuse me. And as we move to more

heat pumps it would be great that that requirement extend to heat pumps, and so maybe it moves out of cooling and just to some -- to change it around, or maybe there's an absolutely separate requirement per climate zone on refrigerant charge for heat pumps, but it would be nice to have that called out, as well.

And that's it. Thanks.

MR. PENNINGTON: Thank you.

MR. NESBITT: George Nesbitt, HERS Rater.

Actually, to tag on Scott's last sort of comment on the refrigerant charge, so, I mean, a heat pump does both heating and cooling. But I think perhaps what needs to be made clear is that if you are installing a heating -- a heat pump space conditioning system, that it requires refrigerant charge check because it has cooling. It just -- because I'm sure, like so many other things, I mean, people are putting in heat pumps in the Bay Area. And is anybody doing refrigerant charge? No, even though they're putting in air conditioning. So I think that would be, you know, maybe explicitly say cooling system and/or heat pump, because the heat pump --

MR. MILLER: It's in the standards

specification. It's explicit that it applies to heat pumps.

This is Jeff Miller.

MR. NESBITT: In the standards where?

MR. ALATORRE: 150.1(c)7. So the table says Space Cooling, and that's the title of 150.1(c)7, it's called Space Heating and Space Cooling. It specifically calls out air-cooled air conditions and air source heat pumps as requiring refrigerant charge.

MR. NESBITT: Okay. Then maybe it's to just be consistent --

MR. ALATORRE: We can clarify --

MR. NESBITT: -- with --

MR. ALATORRE: -- the table to be more --

MR. NESBITT: Yeah, that --

MR. ALATORRE: -- and to clarify the label of this section, perhaps.

MR. NESBITT: Are we covering all of 150.1, or are you going to present more on some other areas, or are you --

MR. ALATORRE: Good thing you brought that up. I noticed that on the agenda we have --

MR. NESBITT: Because the --

MR. ALATORRE: -- two sections that

weren't presented yet.

MR. NESBITT: Things have been mixed around a little and, I mean, just --

MR. ALATORRE: We don't have slides for it. I was just going to mention it. I could do it now, if you want, and then you can comment on it, or after we take comments on what's been presented, I could speak to it.

MR. NESBITT: Yeah. I can just comment on what's out there now if --

MR. ALATORRE: Okay.

MR. NESBITT: -- just -- there's not a lot in this section.

But one thing that jumped out on me was the electric water heater section. And I believe currently code says you can -- the prescriptive requirement is a gas water heater, although we allow you to put in an electric water heater. But I think currently it's only if it's in conditioned space and has a solar fraction of a certain amount. So I'm not seeing that if you install and electric resistant water heater that it would have to be in conditioned space, although what you are saying is if you install an electric water heater -- and, actually, the

language is not necessarily clear in this sense, because a heat pump is an electric water heater -- but what you're saying is you need to add PV.

So the question would be, should an electric resistant water heater have to be in conditioned space? And you may want to clarify that that's an electric resistant water heater versus the heat pump because then the heat pump does not require the added PV; correct?

MR. TAM: An electric water heater above 55 gallons is essentially a heat pump water heater because of the federal standard. I mean, that's why we word it that way.

And just to add, currently we don't have a prescriptive package for electric water heater. You might have to refer -- be referring to previous code, but 2016, we don't have the option for heat -- electric water heater.

MR. NESBITT: Okay. So you can buy 80-gallon electric water heaters that are electric resistant.

MR. TAM: That would be commercial.

MR. NESBITT: They're often called solar storage tanks, but -- so now you've got me

completely confused, but -- and that's --

MR. PENNINGTON: So we can look at it, George.

MR. NESBITT: Yeah. The other thing I want to talk about right now is the EDR. So you said EDR is not going to apply to additions and alterations, if I read and heard right. Why not? Because may I remind you, Public Resource -- I'm not even going to try to remember what section -- a long time ago, back in the '90s, directed the Energy Commission to come up with a rating system for both new and existing homes. And in 2008, under Title 20, we revised the HERS Regulations and created the HERS Rating System, which applied or applies or applied to new homes, as well as additions -- existing homes, as well as additions and alterations.

So my -- let me finish my -- so my point is you're required to have a rating system. We have a rating system that allows us to do that, yet in all the iterations of the energy design rating and the CAP score in the multifamily program and whatnot is you've created a HERS Rating System. It's a HERS score. It's a HERS scale, 0 to 100. You've changed the baseline to

meet resonant. But, of course, A, you're not requiring a HERS Rater to actually to it, even though it's required under Title 20.

But the point is you're not building in the functionality you really need to implement the law that requires you to have a single rating system.

MR. PENNINGTON: So, George, I don't want to debate, you know, the full scope of your comment there. Similar to what Mazi said earlier, we're not here to debate with you, but just to explain where we're at, why we're at where we're at.

The goal for ZNE was always for newly-constructed homes by 2020, and that's what we're working mightily to accomplish within constraints, obviously. And, you know, we want to work through all of the issues of accomplishing that and doing it well, and understanding maybe unintended consequences and dealing with them and, you know, fully focused on that, accomplishing that goal. We think it's much more complex to try to achieve something like a ZNE goal in existing construction, particularly through the Building Code where

you're only dealing with part of the building, often with an addition or an alteration.

Likewise, we have a fairly popular compliance option which is existing plus additions plus alterations. That is a quite complex situation. And trying to create and EDR that kind of makes sense for situations where we would be combining different pieces of buildings or establishing an EDR for a part of a building only seems like a quite complex problem and something that we think we need to take time to focus in on that by itself.

So quite possibly in future rounds of the Standards we would look for extending the idea of an EDR in a Building Code context to parts of buildings. We don't want to have such a difficult challenging question to be potentially disruptive of our accomplish our overall goal of getting to ZNE for newly-constructed low-rise residential buildings.

So that's were we're at. We don't know exactly what we'll do in future rounds, but we don't see that within the scope of these standards.

MR. SHIRAKH: I'm going to ask Ken

Nittler one question.

The software currently calculates EDR for new construction and uses the 2006 IACC. Can it also calculate the EDR if you go to additions and alterations?

UNIDENTIFIED MALE: (Off mike.) Right now the answer is, no.

MR. NESBITT: But, I mean, they -- calculating additions and alterations is more complex than a new house, and it has been, but that's been in the software forever. And in the Title 20 HERS software we have it for existing homes and additions and alterations. It's all -- it's -- EDR is just math with TVD based on standard, budget and proposed design. So it's just really -- I mean, the hard work of calculating existing and --

MR. SHIRAKH: I think the answer is here, you know --

MR. NESBITT: Pardon me.

MR. SHIRAKH: -- we've got to do what we have to do first which is, you know, get ZNE and all that --

MR. NESBITT: Yeah.

MR. SHIRAKH: -- squared away for --

MR. NESBITT: Yeah.

MR. SHIRAKH: -- new buildings. And then, you know, we can talk about existing buildings.

MR. NESBITT: I just remember when we started the whole public domain compliance software issue, I think at the first meeting I said, "Well, we're going to have to address all the HERS things." And I was told, oh, no, we wouldn't have to do that, but --

MR. SHIRAKH: Thank you, George.

MR. HODGSON: Mike Hodgson, Counsel, representing CBIA.

I'm not sure if you skipped a couple sections, so I'm going to cover something and if I'm off base, let me know, okay?

But to start with 150.1(c)10, which is in -- this is just a reiteration of the 0.45 watts per CFM on gas furnaces, that's in play and we want to talk about it. We're not arguing, we just want to understand how we can achieve that in new construction.

But Section 12 on ventilation cooling for whole-house fans, that area, you did not address.

Is that something that's covered in this section?

MR. BOZORGCHAMI: Actually, Mark -- I don't have the slides for that, but Mark is going to do a quick presentation -- description in that --

MR. HODGSON: Okay. All right.

MR. BOZORGCHAMI: -- in two seconds.

MR. HODGSON: So skip that for right now.

And how about the Tables 151-A, are those going to be presented today or were they presented?

MR. BOZORGCHAMI: Those tables, no, not in -- really, there's nothing much to say about it.

MR. HODGSON: Okay.

MR. BOZORGCHAMI: What we did was for simplifications, to get ready for 2022, we separated the residential single-family from multifamily and updated the values a little bit for high-performance walls and attics, attic QII. And because of the complexity of above-duct insulation, we removed that Option A.

And with -- the problem that we're having is when you do tables in a track change format and you delete a table, it's pretty much gone.

We're trying to figure out a way to put the previous table back on there so everyone could so, and I'm still -- we're trying to figure that out.

MR. HODGSON: well, a general comment then, just for people who are actually reading these, just what Payam said, is the table is not track changed, so you do have to pay attention to what's new and what's not new, so just as a heads-up because the rest of the manual is, and I understand the issue.

But since these are not being covered in great detail, I just wanted to reiterate Bob Raymer's comments from earlier today, is the building industry opposes the 0.043 you value for walls and would like to go back to 0.051, just for practical and cost effective rationale.

And then when you have comments about whole-house fans, we'll come back and talk.

Thanks.

MR. HAACK: Charlie Haack with the North American Insulation Manufacturers Association. I'll keep this quick because we are going to submit written comments, as well, but first, just thank you to all Commission staff. This is a

large undertaking. I know it's a lot of work. Thank you for all your hard work.

This section, we did definitely support the recommendation of cost-effective increases to the wall efficiency that were actually just discussed, as well as prescriptive QII. We are strongly -- strong support of both of those.

We also support the separation within the EDR. We're really happy to see that the efficiency aspect is separated from the renewal aspect, that they work together to achieve the goal of net-zero energy. We're really happy to see that the EDR is divided that way.

Again, we'll submit written comments, as well, but wanted to come up here and say what a great job you're doing. Thank you.

MR. SHIRAKH: Thank you, Charlie.

MR. CUBANO: Good morning. Abe Cubano with Owens Corning. I'd just like to read a letter we've prepared, and we will be submitting some comments here in the future.

"We'd like to begin by thanking Commissioner McAllister and the Commission staff for their efforts thus far on the development of the 2019 Standards. Owens Corning acknowledges

that there's a variety of perspectives regarding the Standards, and we continue to advocate for continued dialogue during this process.

"In regards to what has been proposed to date, Owens Corning supports existing CEC staff recommendations, including the prescriptive language relative to attic and walls and U-factor increases in both those, and quality insulation installation as a prescriptive measures, and the EDR, of course, in the proposed path of both energy efficiency and renewable.

"Owens Corning has extensive knowledge in applied building science. And it is from this perspective that we continue to promote policies and practice that look at buildings from a systems perspective. Given this perspective, we believe that energy efficiencies, renewable and power storage are scenarios where we -- where power storage are inherently complimentary when appropriately balanced. When this balance is skewed we risk scenarios when we over-promise and under-delivery in regards to energy policy

electricity grid management and consumers long-term benefits. We believe there are case examples to support this concern.

"In the coming weeks we expect to submit additional written comments which will further details the science and economics behind our reasoning that energy policy should start with a foundation of optimized energy efficiency, which is then supplemented by renewable storage and other technologies.

"Owens Corning has teams across the country that work every day with this -- every day with various stakeholders, including the Builder Committee, to deliver on this optimization promise. We work collaboratively with various industry suppliers from a wide spectrum of categories. And we are sensitive to the builders and first-cost concerns and look forward to demonstrating that the right recipe of energy efficiency, renewables and other technologies can strengthen a builder's business without sacrificing on sound energy policy. We continue to be open to direct dialogue with other stakeholders involved in this process

for the purpose of finding common ground."

Thank you.

MR. SHIRAKH: Thank you.

MR. BOZORGCHAMI: Abe, I just want to make a clarification to your letter.

Energy Commission did not increase the U-factor. Actually, we decreased it.

MR. CUBANO: Oh, sorry. Yes.

MR. BOZORGCHAMI: So I just wanted to make sure that --

MR. CUBANO: Correct. Yeah. Yeah.

MR. BOZORGCHAMI: -- the public understands that we --

MR. CUBANO: Thanks very much.

MR. BOZORGCHAMI: -- what we did.

MR. CUBANO: Yeah. Thanks very much.

MR. SMITHWOOD: Brandon Smithwood, Director of California State Affairs for the Solar Energy Industries Association. I'll work with my colleagues to comment on the insulation issue.

But I wanted to -- can we flip back to the PV requirement? So a few questions, and I'll just -- I'll rattle them off.

The first is why the PV size would be

reduced if you installed it with a battery? Because, presumably, that's -- you're increasing the load and might want to oversize that battery system. I'm just curious whether you -- there's a modeling reason, of if that's just --

MR. SHIRAKH: t's all driven by time-dependent valuation, TVD. And what storage does is it enhances the value of a PV system because what it can do is store relatively low value kilowatt hours that are generated in the middle of the day, like right now there's little demand for it, and it can make it available to the home or the grid during high TVD values. So it's all driven by time-dependent valuation.

MR. SMITHWOOD: It's just valuing self-consumption --

MR. SHIRAKH: It's the same way --

MR. SMITHWOOD: -- on a TVD basis?

MR. SHIRAKH: Yeah.

MR. SMITHWOOD: Okay. Now I get it.

MR. SHIRAKH: And thermal storage also works the same, and all of these are demand flexibility, demand response strategies that can enhance the value of a PV system by storing it at a time when it has low value and making it

available when it's high value. And EDRs are also -- energy design rating scores are based on TVDs, so you can take advantage of that mechanism.

MR. SMITHWOOD: I know

MR. PENNINGTON: Maybe I could add a little bit to that, Brandon. So this is strictly with respect to the Part 6 requirements for PV. And there isn't any prescriptive requirement for batteries, maybe, arguably, not cost effective yet. Maybe we'll see that in future standards, but in this round there's no requirement for batteries.

So batteries is a powerful compliance option, then, for applying towards the PV and demand flexibility EDR. And so you could use that battery to reduce the size of the PV system that would be required by Part 6.

If you turn to what will happen with Part 11 with local ordinances adopting standards that are moving towards ZNE, batteries will probably become a powerful way to reduce your EDR down towards zero, in combination with the PV system.

And so that may be a little confusing, that there's sort of two worlds and two different

things that are going on. In one case, you would want to probably double up batteries and PVs to get as close to ZNE as possible, but that's a Part 11 local ordinance world. In the Part 6 world, we're just talking about a PV requirement with a battery option out there that's a pretty powerful tradeoff. And in the Part 6 compliance world the battery can help you reduce the size of the PV system that's required.

MR. SMITHWOOD: Yeah, and that's helpful. I was just wondering how we were getting to this, the tradeoff? Obviously, we're very supportive of having the storage as an option within the code.

MR. PENNINGTON: Well, as Mazi said, we've done extensive work to try to properly model batteries, so that's within our modeling.

MR. SMITHWOOD: Okay. The --

MR. SHIRAKH: And the other thing this does, if you have a roof that is space constrained, it still allows the builder to comply, putting a smaller PV system with battery and still, you know, get to the --

MR. SMITHWOOD: That's a good segue to my other question which is, you know, when we have

discussed potential offsite options for the Building Code it's been seen as not as in lieu of installing a system on a home which could accommodate a system, it's in lieu of -- or it's to accommodate for the home which is unable to either accommodate -- either have a properly sized system, a large enough system, or can't host a system at all. And so I look at the three-story single-family homes as, you know, there should be this interplay between the community-solar option within the code and the prescriptive requirement for PV where if you can't meet it onsite, that's your opportunity to use an offsite option. And I think those -- I mean, I'm envisioning the three-story home with the small amount of roof space for a lot of square footage and load. And I -- to me, that's an ideal opportunity.

MR. SHIRAKH: So we need to add another exception here for community-solar. We haven't done that yet. But the problem, and I think Bill can speak to that, is this is the first time we're doing this. We have to be cautious that we don't create a situation that's impossible to comply with. And currently we haven't found, you

know, one community-solar strategy that, you know, we feel it can work in every other -- in all circumstances. And not having that bulletproof option, you know, we can't really rely on that strategy. That's why we crafted these exceptions.

MR. SMITHWOOD: Right.

MR. SHIRAKH: Now, again, if by 2022 things change and, you know, some of these community-solar strategies become more realistic of commonplace, then we can revisit, you know, some of these exceptions. But for this time around I really don't think we're there.

Bill, do you want to add something to that?

MR. PENNINGTON: The only thing I would say is that the way I've envisioned the community-solar kind of getting called out in Part 6 is as an exception to the Performance Standards, so that you could use it in a performance approach. I think if you actually were going to go that way, almost all of your compliance cases would end up performance approach. So I think it's a little superfluous, whatever that word is, to have it in the

prescriptive section, particularly since it's an opportunity that doesn't exist at the moment.

So I think having it in the performance path as an exception is the logical place for it. But anyway, that's my opinion.

MR. SMITHWOOD: The last question, and then I will stop hogging the podium here.

How are you envisioning limitations? So we have a solar-ready roof requirement. And I'm looking at this first bullet which makes exemptions. Well, now that I'm reading this, I'm assuming this is just shading. But when I read it initially I was thinking this was for if there was, you know, a pipe or some obstruction within that area of the roof, so maybe I've answered my own question as I've reread this bullet here.

But what -- I mean, how -- I guess how does this align with the solar-ready roofs requirement?

MR. SHIRAKH: So what we were envisioning is that the builder would have to think hard about their roofline and all the, you know, chimneys and pipes and so forth, because we haven't provided an exception, you know, if you have a chimney or a vent or something. There is

no exception for it, so the builder has to think about that. That's not going to be an acceptable argument.

So all the -- the first exception that you see is for, you know, shading or problems that it's beyond their immediate control. So, you know, they need to understand that it might take a little time, but they have to come up with a roofline that works.

So there's an argument that we've heard that since PV is going to be a requirement now, do we even need to have the solar-ready language in the code? And so we have to think about that. And we probably don't need that anymore because you either have to put in the solar, the PV, that's prescriptive required, or by performance, or you fall under one of these exceptions. So we may not need that solar-ready language in there anymore, but there may be unintended consequences. We haven't really talked through it yet.

MR. SMITHWOOD: Okay.

MR. SHIRAKH: So that's our next --

MR. SMITHWOOD: Yeah. No. This answered my question, I think. In rereading the bullet

yet again I -- anyways, thank you.

MR. WICHERT: We have a comment online, Danny.

Eric, I'm going to un-mute you now. Go ahead and state your name and affiliation.

MR. DEVITO: Hello. Thank you. This is Eric DeVito with SMXB Law. And we've participated in the past several code updates related to the fenestration issues. And I apologize, I couldn't be there in person.

My comment today is related to the prescriptive tables, specifically for the U-factor and SACC requirements in the new tables. And they're the same, both for single-family and multifamily, so I just wanted to raise them first.

You know, we fully support the slightly tightening on the U-factor for all the zones. Lowering it, those are achievable, and that's a good move for California and we support it. And we support the same SACC, sort of the tightening of the SACC requirement in the cooling-dominated zones, again, achievable and the right move.

My comments really today, and we had filed written comments in June, and my comments

now are pretty consistent with those, are with regard to the new minimum SACC prescriptive requirement. Conceptually we understand the desire to do something like this and the need for the better modeling for the high solar gain options in some of these heating-dominated zones or low-cooling or no-cooling zones, so we don't quarrel with that. And, you know, we'd welcome the opportunity to work with you on alternatives that get you to that goal.

Our primary concern is overdoing it as a prescriptive requirement. And the reason behind that is just, you know, there are a lot of things that go in behind it. There are orientation issues. There are other factors, like comfort and things that go along with the solar gain on other orientations, whereas really the solar gain issue is more predominantly a south-facing sort of benefit. And to do it prescriptively in all four orientations we think misses the mark of it.

You know, it's sort of a mirror image. You have the max west-facing -- max west-facing glazing area with a five percent requirement in the prescriptive table for a reason. I mean, you know, conceptually I think you might need a

minimum south-facing glazing area, you know, percent to actually make this -- make this to hit the benefits that you're maybe going for. I'm not necessarily suggesting that, but really pointing out as to, you know, one of the reasons why we think, you know, doing the -- setting a minimum prescriptive SACC requirement may be the right way to do it.

We would prefer you just do it either in the performance path through the baseline or the ACM Manual. And I think the final version of the case report sort of noted that doing it in the ACM Manual might be an option that might work. That would be what our recommendation is. That's what we would support. We think, you know, there are still going to be modeling issues, even with setting it as a minimum prescriptive requirement in the table. You know, I'm not, you know, sure. I'm assuming you'd model it as a 0.35, but I'm not sure if that's what you were necessarily going for, if not.

But I also think it raises issues on the replacement windows in alterations and additions, you know, for homes that may have solar gain windows in there now. And then you do this as a

new requirement and they're replacing additional windows in the future or adding an addition, there are aesthetic reasons why you might not want to put this minimum SACC requirement on replacement and alterations and additions, so I would raise that point.

And then lastly, I raise just really an editorial comment on the table. In Climate Zone 16, and back to that max west-facing glazing area line, it still says a max west-facing glazing in Climate Zone 16 as five percent, despite the fact that you have the minimum SACC requirement there. I'm guessing you may want to change that to NR, like Zones 1, 3, and 5. I don't know that to be true, but I just raise that. In case you meant to change that to NR, it's still showing as five percent in your proposed table.

And with that, I will end my comments, and we will be filing written comments, similar to what I've just said today. Thank you.

MR. BOZORGCHAMI: Thank you, Eric. This is Payam. Regarding the five percent, I think we may have missed that. I'll discuss this with Ken Nittler real quick afterwards and see if we can fix that edit.

But in reality, the reason we put the 0.35 minimum was because in those climate zones where, I guess, heating is dominant, we had a lower SACC. It's actually not going to be a benefit for the energy efficiency. Those climate zones, you actually need that extra heat from the sun to kind of penetrate.

But we'll look into it, and I'll start a dialogue with you.

MR. DEVITO: Great. Thank you.

MR. WICHERT: We have another online comment.

Joe, I'm going to un-mute you now.

MR. CAIN: Thank you. Joe Cain with Solar Energy Industries Association.

We've issued this in rounds of public comments, but the question of, you know, the benefits of PV paired with storage. And, you know, there's, of course, many benefits and that's been discussed, and the Commission has worked hard to include that. And, of course, we think that's where industry is going with those paired together, and we want to make that as an attractive -- an option that's as attractive as possible.

So the question is -- you know, CBIA has presented some testimony today about the HPA and the wall U value and, you know, their either opposition or, you know, wish for more flexibility. In terms of overall design flexibility, we've also heard about, you know, some are pleased that the EDR is separate for efficiency and for renewables. And one of the things that keeps coming back into conversation is the PV credit against efficiency. Many people are opposed to that. We support it. But specifically PV paired with storage, we still feel, should have some compliance credit and some level of tradeoff allowed. And that may help to mitigate some of the issues about builder concerns, about -- say, for instance, that the wall U value or any other component of the building, if it's allowed, as some form of tradeoff.

So we would still like to see some compliance credit for PV paired with storage. And we've also been hearing that when PV is paired with storage, you know, it has, in addition to all the other benefits, it has the TVD benefit. And so I'm interested to hear from

Staff, you know, is there an argument for why PV paired with storage should not be allowed some compliance credit? Because we've also been hearing that PV plus storage at the meter behaves very similar to an efficiency measure.

So I'd like to encourage the Commission to continue to consider PV plus storage for some compliance credit in the performance approach. And I'd also like to hear, you know, kind of where the Commission is on that.

MR. SHIRAKH: Hi, Joe, this is Mazi. Maybe I can answer that.

So CBIA had submitted comments that basically is asking for a credit along the lines that you just described. That would be PV plus storage. You know, we have started talking to various stakeholders that might be impacted or be interested in this topic. That includes the insulation manufacturers. So what we're doing right now, you know, our goal is to have an efficient building with efficient envelope that would include, you know, elements of high-performance attics and walls, along with an appropriate amount of PV that's grid harmonized, which in most cases would mean a battery storage

system. Now within that there is probably an opportunity to provide a limited credit for the PV system without jeopardizing the energy efficiency features of the building.

So we're working towards that goal. And, you know, we're continuing to negotiate with various stakeholders. And I think in the next few weeks we might actually have a proposal that we can roll out.

MR. CAIN: Great. Thanks Mazi. Yeah, we would be extremely interested in, you know, participating in those conversations.

MR. SHIRAKH: Thank you, Joe.

MR. NESBITT: George Nesbitt, HERS Rater.

So on the PV and the exceptions, I guess what I'm not seeing is -- okay, you don't have to install PV. You don't have to invest the money. You also don't get the financial benefit the system gives you. But what do you do? I mean, our code is really based on a lot of tradeoffs where, you know, you meet a budget. How you get there is, you know, you can choose how to get there, or if you don't do this you have to do that, or, you know, your exception says, okay, yeah, you can do that, but you're going to have

to do this in addition.

So what's stopping someone from designing a roof that has so many hips and valleys and, you know, designing a subdivision from having tall buildings to short buildings and, you know, various things that says, well, solar is just not viable?

MR. SHIRAKH: Having hips and valleys is not going to get you an exception. That's not there. And they need to think about the roof. There is not an exception for hips and valleys.

MR. NESBITT: Some roofs get pretty chopped up and have --

MR. SHIRAKH: Yeah. But, I mean, that's not going to get them --

MR. NESBITT: -- really small areas.

MR. SHIRAKH: -- get them out of the PV requirement.

MR. NESBITT: Right. But so let's say they do invoke an exception, what do they do? Do they have to build a better building?

MR. SHIRAKH: Yeah. Well, I mean, that's why we're putting this out there, so they'll know that, yeah, if there's an external problem to the building, that will -- there's a mechanism for

it. But if it's a poor roof design, there is no exception for it. And, you know, we want everyone to understand that that is not an off-ramp.

MR. NESBITT: Yeah. It still seems kind of vague to me in the sense that, well, what is? I mean, it's one thing to say that if you installed the system, you have a required system size and if you installed it on your building, and maybe if there's no shading there's X output, but because of external shading, whether it's trees or buildings, unless it degrades the performance by more than X percent then it's viable. I mean, it's --

MR. SHIRAKH: It becomes -- I mean, complexity is an issue, you know, trying to explain all that in the code language. And in the end, cost effectiveness becomes an issue. And if you've got -- you know, half your PV system is shaded and your kilowatt production is half of what it's supposed to be, you know, what happens to the homeowner's investment? So, you know, we've got to be, you know, kind of mindful. Again, this is the first time we're doing this and, you know, we need to be cautious and kind of

see how it works.

MR. NESBITT: Yeah. I mean, I'm just worried it's vague enough that then people don't do it.

MR. SHIRAKH: Well, these exceptions, the ones that we've crafted, has more meat to it than what you see here. There's actually some criterias built into them. What you see here is just a --

MR. NESBITT: I did look at -- yeah.

MR. SHIRAKH: Yeah.

MR. NESBITT: But --

MR. MEYER: George, this is Christopher Meyer, the Manager of the Building Standards Office.

You know, Mazi, Bill and I have spent a lot of time thinking about this. And also, as Mazi said, we're trying to be cautious in this first go. We're trying to be very cognizant of nonparticipant costs, other external issues with grid harmonization, because we don't want to end up running up against a lot of, you know, whether it's utilities or other people from the grid side to oppose it. So we're trying to find something that works within those constraints, as Bill

mentioned.

But also what we're seeing is thanks to the work of you others in getting solar to be accepted, and it's sort of, you know, we've seen this sort of market transformation where before our codes even required it there's ZNE communities that, you know, certain places in California, there's local ordinances. So we're starting to see that market transformation. We're starting to see home buyers looking for solar communities. And we're starting to see progress, you know, that's going to by 2020. We're hoping that it keeps going in this direction where, you know, potentially a home developer can reduce the amount of time that houses are sitting on the market and sold in all of those costs of that by adding solar and things of that nature to basically work against home builders who purposely design subdivisions that go towards exceptions.

And also, beyond what we can control, as Mazi said, it's like we deal with buildings on a building by building, which is, you know, the Building Code. You have whole other issues on CEQA-level reviews that are happening that could

potentially take into account how whole developments are designed. We're trying to say, as Mazi said, if a building is designed poorly and it's within the control of that developer to design that roof and the vents and stuff, there's no exception for that. They just have a noncompliant building.

MR. NESBITT: Right. I mean, my concern is individual homeowner or could be development, development is what happens when -- I put solar on my house and my neighbor didn't because, for some reason, they claimed and exception or the building department, you know, doesn't enforce things. There's that. And like I'm saying, there's exceptions, but you're not saying you actually have to do anything because you have the exception.

You're not saying you have to actually now make a more energy efficiency building. But let me -- and PV is not equal to efficiency. Solar hot water, I could argue, is because it directly offsets electric or gas use, whereas PV is just a replacement for where you get the electricity you consume.

But some of the comments you said, my

bigger concern is that you're sizing these system too big. You simply -- you're sizing it based on 100 percent of predicted electrical use for a mixed-fuel home. And then at times you're giving credit if you oversize over that by adding battery and doing this and that. And in CALGreen, you're going to call for even more. And the reality is that we have net metering and there are limits to what you are supposed to put on the grid, and oversizing. And historically the solar industry has probably sold systems based on around 70 to 80 percent of your actually electric use.

According to Aurora Solar, with net metering 2.0 and time-of-use rates, it actually makes sense to put in bigger systems, but we're not talking about 100 percent.

I have seen houses that, you know, had two adults, kids, and their actual electric -- all-electric house and their consumption is half the predicted amount in the software.

So we're going to base the sizing off of a prediction that may or may not be valid. We're going to then size for 100 percent or greater. You may not be able to get an interconnection

from the utility. And we also have grid issues. We have a duck curve problem. And so, you know, there are inverters that will not export to the grid. And I guess Nevada does not allow you to export excess. Batteries can do the same similar thing.

So I'm really worried we're actually headed into a disaster, and we're not being conservative.

MR. MEYER: Okay. Thank you, George.

MR. NESBITT: I mean, we should be starting with far smaller systems.

MR. MEYER: Thank you very much, George.

MR. HILLBRAND: Hi. This is Alex Hillbrand with the Natural Resources Defense Council.

I wanted to say thanks on behalf of all of us for the Commission's effort on this draft language, looking great. And we're happy to see that the building envelope measures have made it this far, as have been considered.

On the issue of storage and PV, we value both of them greatly. We do think at this point that it makes the most sense for an incentive for storage to be in the PV EDR section. If there's a

conversation about that, we'd like to be a part of it, but we do agree with what Mazi said, which is that the principle goal here is an efficient building that then has PV. And if we can start increasing market penetration of storage, both thermal and battery, we'd like to do that, but not at the expense of the efficiency of the building.

Thanks.

MR. SHIRAKH: Thank you.

MR. PENNINGTON: So we would very much like to hear NRDCs comments, not today, but, you know, in written comment related to the electric water heating provisions that are in the prescriptive standards. That would be very helpful.

MR. HILLBRAND: Sure. We can provide those, and thanks for including it.

MR. BOZORGCHAMI: So there's two sections that I guess we missed the slides on Sections 150.1(c)10 and 150.1(c)12 where Mark Alatorre is going to do a quick explanation of what those sections are about. And I think Mike Hodgson from Con-Sol had some comments.

MR. ALATORRE: Yeah. Well, I apologize

that these are not included in the slide deck, but there were some changes to the prescriptive requirements in 150.1(c)10 which is titled Central Fan Integrative Ventilation Systems. And the changes were to reflect the mandatory requirement -- changes to the mandatory requirement for fan watts. So the change includes a 0.45 watts per CFM for gas furnace air handling units that are used to provide outside air for ventilation. All other air handling units still must comply with the 0.58.

Secondly, in 150.1(c)12, which is ventilation cooling or the whole-house fan requirement, there was some cleanup language, but the airflow and the attic vent free area remain the same. It was mainly to be more clear of where to verify the whole-house fan performance. And we accurately called what our database was formerly named, and so that was the extent of that change.

And that was it.

MR. BOZORGCHAMI: Mike, you had some comments on that section?

MR. HODGSON: Well, (c)10, I don't want to be too reiterative, we just have an issue with

0.45. We just want to understand how that's going to incur.

And in (c)12, I just wanted to call the audience's attention to that. It's a whole-house fan. And I think really the meat of it will be in the joint -- in the reference -- or, yeah, the residential appendices where there's a lot of language change on verification. So there's really no change, other than what happens in the residential appendices or the reference appendices, from what I understand.

MR. MILLER: I thin think that the verification that's in the residential appendices is there because there will be an opportunity for performance compliance that's better than the prescriptive requirement.

MR. HODGSON: Uh-huh. Yeah. That's it. Yeah. Thanks.

MR. STONE: Nehemiah Stone.

If you look at the language in that particular section, it still says single-family, but then it references the multifamily table, as well as the single-family table. So if you meant it to apply to multifamily, then you probably should eliminate single-family. If you didn't

mean it to apply to multifamily, you should eliminate the reference to Table B.

MR. BOZORGCHAMI: Good catch. We'll fix that.

MR. STONE: Sorry?

MR. BOZORGCHAMI: We'll fix that. Thank you.

MR. STONE: Thank you.

MR. BOZORGCHAMI: Well, if there's no more comments, let's do lunch, and maybe be back here by 1:30, if that's okay with everyone? Thank you.

(Off the record at 12:28 p.m.)

(On the record at 1:38 p.m.)

MR. BOZORGCHAMI: So good afternoon again. My name is Payam Bozorgchami, Project Manager for the 2019 Building Energy Efficiency Standards.

We're going to start the afternoon with Danny Tam, discussing the Joint Appendix, JA, sections that we have made some changes to.

MR. STRAIT: Nope, 150.2.

MR. BOZORGCHAMI: I take it back. I'm sorry, I'm looking at the wrong thing. I do need new glasses. We're looking at Section 150.2,

the low-rise residential building additions and alterations. I apologize.

MR. TAM: Hi. Danny Tam, Building Standards Staff again. I'll be talking about changes to 150.2.

Okay. So the prescriptive standards for additions larger than 700 square feet, we're modifying the language increasing the insulation and 2 X 6 framing to R-21. This was done to be consistent with the changes in 150.1.

Okay. So for additions less than 700 square feet, on the roof and ceiling insulation we're increasing the ceiling insulation to R-38, for climate zones 1 and 1 through 16. And R-30, for climate zones 2 to 10. We also added an exception for enclosed rafter ceiling, or a cathedral ceiling, to meet just the mandatory requirement in 150.

Okay. For radiant barrier, we added some language to clarify what the requirement is. And we also added an exception for QII. So for additions less than 700 square feet, you don't need to meet the QII requirement.

Okay. Moving on to HVAC. For entirely new or complete replacement space conditioning systems

we added an exception, so you can install a heat pump space conditioner when you replace the existing gas system. Also in 1G, altered space conditioning system, we added a section that allowed the installation of a heat pump space conditioner when your replacing a gas furnace or any other gas heating equipment.

Okay. In 1F, altered space-conditioning system, mechanical cooling. We added some language for small duct high velocity systems, similar to the language in 150.1. This will trigger when refrigerant charge is triggered by the alteration and they have to meet the minimum air flow requirement of 250 CFM per ton.

Okay. Moving on to water heating alteration. So we added a new prescriptive alteration option for consumer electric water heaters above 55 gallons. So it will require an additional PV capacity of one kilowatt. If (indiscernible) if the homeowner is doing something, adding more PV, they can just put in any heat pump water heater.

So I just want to add the word "consumer." George had a question earlier. So the full standards have two different classes for

water heater. There's a consumer class and a commercial water heater class. So it is true that for commercial water heaters, there is like an 80 gallon electric resistance water heater, which is not what we meant. We meant consumer. So under the consumer standard above 55, the requirement is above a 2.0 uniform energy factor, which means basically a heat pump and water heater.

So we added a new exception, so if you install a heat pump water heater that meets NEEA Tier 3 advanced water heater specification or better, in climate zones 1 through 15, then you'll meet the prescriptive water heating alteration requirement.

And that's it.

(Colloquy)

MR. STONE: Can you hear me now? All right.

So first thing is on the water heating on H2, distribution system, it says "manual control pumps," but it probably should say "manual on control," so that manual control could simply be a switch, an on/off switch. You want it to be able to -- you want the demand control to shut

off when it no longer needs to be on. So a minor change, but it can make a big difference.

I'm very glad to see that you made it easier for people to put in heat pump water heaters. I think it's the right thing to do. I question the complexity of the way that it's done. It seems to me that putting heat pump water heaters, just showing it up as an exception, kind of sends the wrong message. And even though it's only commercial electric resistance water heaters that can be up to 80 gallons, Home Depot is not going to ask which set of appliance standards the water heater falls under. And they're just going to continue to sell them. As long as they sell them, people are going to putting them in.

I think in this whole section, and I can in writing send you what my recommendations are on the individual parts, but I think it would make it easier for designers and more particularly for the code enforcement community to be explicit about electric resistance water heating and heat pump water heating. And as I said, I can go through this and make some recommendations on how that language would be, but again I want to thank you for making it easier for people to put in

heat pump water heaters. That was the right thing to do.

MR. TAM: Thanks, Nehemiah.

MR. NESBITT: George Nesbitt, HERS Rater. So for roof and ceiling insulation, I guess you've changed from the package requirements and you've changed the insulation levels a little bit in a couple of the zones, climate zones. So ceilings with attics?

MR. BOZORGCHAMI: So what's happening is that once this section is referring to an addition that's less than 700 square feet, the current section says that you have to only meet the mandatory minimum. Okay? Well, mandatory minimum is only an R-22. So if you do an addition of 700 square feet, you could at least do an R-30 or R-38, depending on the climate zone you are in.

And this really doesn't -- if you look at Option A, the new Option A, or look for your attic's insulation, you have that ceiling insulation plus the roof insulation, in newly constructed buildings.

So what we did was we just wanted people to have attic-type roofs in those climate zones

to have the proper insulation.

MR. NESBITT: Okay. Right. I see, yeah.

MR. BOZORGCHAMI: And then for rafters we just left it as-is. We didn't touch that.

MR. NESBITT: Okay. Right. Okay, so you're saying for additions less than 700 square feet you don't have to meet all the requirements of a new --

MR. BOZORGCHAMI: No. Over 700 you do, but not under 700.

MR. NESBITT: Yeah, yeah. Okay. Yeah, just because I noticed the insulation levels were different in some of the climate zones, but yeah you just don't have to do the high-performance attic type things, is what you trying to also differentiate.

So under -- I don't know where I am -- Section C. So you're talking about new or replacement space conditioning systems. Under the exception where you're talking about fuel switching, so I mean dominant is natural gas or propane and not electric. So you're talking about converting from a fuel space heating system to an electric. And you say the new or complete replacement space conditioning system "may" be a

heat pump. I believe you mean "shall" be a heat pump, because I mean that "shall" makes it more clear that you're not going to put in electric resistance. I think that that's your intent, is that you can fuel switch, but only to a heat pump.

MR. BOZORGCHAMI: Yeah. That is our intent. The only time you can go from a gas heating system to an electric is if the new system is a heat pump. That's what we're trying to accomplish.

MR. NESBITT: Yeah. I'd say "shall" is the proper word than "may."

MR. BOZORGCHAMI: It's not a requirement though, it's an exception. So I think "may" is appropriate there. But I can discuss it and maybe check with our Legal and see which word is the more appropriate word.

MR. NESBITT: Yeah. I mean, yeah "shall" I think has more meaning than "should" or "may" in general.

MR. BOZORGCHAMI: Thanks.

MR. NESBITT: Then under the performance approach, you struck out that it can only be used if you're doing two or more altered components,

so that means we can now go back to altering one component, which was true prior of 2016?

UNIDENTIFIED SPEAKER: That's really a Mazi question.

MR. NESBITT: Well, why does Mazi leave the room?

MR. BOZORGCHAMI: Well, I don't think there was an intention to delete that. I think we need to look at that one more time, George.

MR. NESBITT: Well, I mean I argued against doing this originally. There had never been a restriction. Plus, I think, then the Table 50.2-C -- I think both of these were added at the same time and fairly last minute. I forget if it was 2013. I think it was 2013. I mean, when you do an existing and an alteration, you take the existing conditions. That sets your standard budget, basically. And as long as you make your building no worse, you comply. I think part of the reason you went to wanting to alter one or more components was to maybe try to make it, so you actually had to improve the building. And I think what we really want with an existing building is there be some improvement.

And so I think the table, the intent of the table was to not necessarily allow you to take default values, based on original code year. And are things like oh, it's R-0 insulation here and there and single pane windows. And essentially a) lie, but b) be compared to something so efficient, so that you are trying to essentially make that standard budget tighter, smaller.

So I mean I think that with this there's certainly no reason to not be able to trade off one item. I'm not saying a lot of people are going to trade off only one item. I mean I suspect it's only when people do more. I think what happens a lot of times is there is a lot of electric conversion. Electric resistant water heaters or people have been putting in heat pumps or other things that don't technically comply. And they should show compliance with the performance method, but they don't actually do it.

So I would say leave the struck out language and the fact that you have the table, I think that you're making the building better.

MR. BOZORGCHAMI: Thanks, George. We'll take

that into consideration.

MR. STRAIT: I can speak a little bit to, I think the intent on striking some of that language was inherent in doing something that's below the prescriptive standards. "I'm not going to comply, prescriptively, therefore I need to go performance," as you're not meeting that level. And if you just were installing a component that does not meet the prescriptive requirements, that's says it's just not going to meet that prescriptive requirement. So inherent in the idea of there being a tradeoff is, "I'm going to meet some different improvement that gets me back over that line."

The question we were asked fairly often in 2016 is, "If I've got four different windows on the house and I want one window to be really awesome, so I can have another window be really big," it still trades amongst windows but it's among different windows. So we're trying to say, "That's fine. If you want to do something like that where it's still the fenestration, but it's different components." We didn't want the language to imply that that was off limits. But we can look at restoring that language or seeing

how to better phrase, you know when you talk about what do we mean, even by a single item trade-off?

If we're still improving the building that's probably good. But if we're just trying to install a water heater, for example, that's not as efficient as it really needs to be, and you could just as easily install an efficient water heater that complies with the prescriptive standard we're not saying you get a free pass just to install something that's better than what was there, but worse than what you should really be getting.

MR. NESBITT: Right. I agree. And actually on water heaters, a lot of people install commercial gas water heaters prescriptively. There is no real distinction out in the real world. And I believe typically our language for a water heater or gas water heater has been based on an energy factor. Yet, commercial water heaters are not rated on them. And certainly they go in on a lot of residential various change-outs or additions or remodels. So it's just one of those areas of the code.

And the allowing I guess on the water

heater, so you're saying you can have an electric water heater. And I guess, as Nehemiah said yeah the truth is there are 80 gallon electric resistant water heaters out there. And no one pays any attention to the difference between a residential or a commercial water heater. And so if the intent is that that is a heat pump water heater, it should say so, have an energy factor value that it has to meet or exceed.

And honestly I find just that the blanket requirement, "Oh, just add another kilowatt of PV," is quite arbitrary. As well as like in the exceptions for the PV for new construction to say, "Oh, you have to have a battery storage system of X capacity." Well, some of these things are really based on eight kilowatts may be too big a battery system. And so we've put out an arbitrary thing. A kilowatt may cover roughly its annual use, but that depends.

I think that's really -- I didn't see anything else although there was something, somewhere else I also saw some language about fuel switching and I'm not sure if it made sense. Okay, so there's a page 311 G, "altered space conditioning systems." It says, "Replacement

space conditioning systems shall be limited to natural gas, liquefied petroleum gas, or the existing fuel type." Does that not conflict with the exception that says you can convert from a natural gas propane to a heat pump?

(Colloquy)

MR. NESBITT: Okay, so the next is the -- all right. And there was something about roof replacement, but I don't remember at the moment.

MS. ALEXANDER: Hi. Meredith Alexander from the CEC Renewables Division. I apologize if someone already asked this question before lunch. I didn't know you guys were so far ahead. I was wondering if there was going to be a separate presentation or opportunity for discussion on the document that you posted to the docket with the agenda, which is the E3 Cost Effectiveness Report on the PV requirement.

MR. BOZORGCHAMI: Pretty much that discussion has already happened, but we could have that offline if you like.

MS. ALEXANDER: So there was a workshop, already?

MR. BOZORGCHAMI: Yeah. There was a workshop. Mazi, actually Mazi Shirakh would be

the best person to talk -- you to communicate that way.

MS. ALEXANDER: Okay. Thanks. So nothing on the published report?

MR. BOZORGCHAMI: Not for this one. No.

MS. ALEXANDER: Okay.

MR. WICHERT: There's a couple of comments on line. Actually, we will --

MR. STONE: There's a small typo that can make a big difference. Well, now I've got to go back to the right one. There's a section, well it's under the performance approach in (a) in the -- It says, "The altered components shall meet the applicable requirements in Sections 110 through 110.9, Sections 150.0(a) through (n) and Sections 150.0(o) through (q). Well, there's nothing between (n) and (o), so I was looking at what (n) is. And I think what you meant in that first one is an (m), because (n) would require them to put in piping and gas piping and et cetera for a replacement water heater. And that's I'm sure not what you wanted to do.

MR. BOZORGCHAMI: Thank you. You're right.

MR. WICHERT: Let's go ahead and go to Christine. I'm going to unmute you now. Go ahead and state

your name and affiliation.

MS. TAM: Can you hear me?

MR. ROY: Yeah, we can hear you.

MS. TAM: Okay. Hi. This is Christine Tam with City of Palo Alto. I also missed the discussion before lunch. I thought we would start with the prescriptive options in the afternoon.

So my question is regarding the exception for the complete replacement of space conditioning systems, Section 150.2(b)1C. So for the exception, if the fuel type of the replaced heating system was natural gas or liquefied petroleum gas, the new replacement space-conditioning system may be a heat pump. Can you clarify that maybe under what criteria can it be a heat pump or cannot be a heat pump? Is that discussed anywhere else in these documents?

MR. ALATORRE: Hi, Christine. This is Mark Alatorre, CEC staff. There's no criteria for prohibiting a heat pump from being installed under that exception. So anybody who has an existing gas furnace and wants to switch that out for a heat pump, they can. That's what we're trying to accomplish with that exception. It's

not restricted by climate zone or anything else.

MS. TAM: So no minimum HSPF requirements?

MR. ALATORRE: Well, I mean they have to comply with the federal minimum, but --

MS. TAM: But they have to meet the DOE minimum?

MR. ALATORRE: Right.

MS. TAM: Okay. And I know we're only talking the 2019 Title 24. Is this something that the CEC staff would consider for the current code cycle for alterations and additions to existing buildings?

MR. ALATORRE: It's kind of hard to make it change. I mean, currently the requirement is for that type of fuel switching to go with the performance approach. But we're trying to make an avenue for that to be done prescriptively under 2019.

MR. STRAIT: Oh, actually I can --

MR. BOZORGCHAMI: Do you understand?

MR. PENNINGTON: So, you know, we have had compliance manual information that reported on equivalencies that we determined. And something like that might be possible. So I

think we should talk about it.

MR. STRAIT: Well, actually I can say we do already have published that equivalency table that people can use for a simplified approach to compliance.

MR. HOLLANDER: Water heaters, for water heaters. We're talking about furnaces.

MR. STRAIT: So we should be able to do something like that for furnaces if that's what's being requested. The treating it as "a prescriptive option," there's more language in our code that applies when you talk about what a prescriptive option means. It's part of the standard design building, all those sort of kind of thing happens. But if you're really talking about somebody just being able to take a simplified approach and not have to model the building in order to install that equipment, I think we can do that.

MS. TAM: Okay. Yeah, we can follow up later. Thank you.

MR. PENNINGTON: Thanks, Christine.

UNIDENTIFIED SPEAKER: (Indiscernible)

MR. STRAIT: Oh, I'm not committing that we will find a way. I think we can find a way.

I think it's possible. (Laughter.) To be very clear.

MS. TAM: Well actually, we can talk about this more. But this is something that Palo Alto and SMUD has been working with TRC and we've been doing a managing modeling study to find the equivalencies. And we do have some results that we would like to share with the CEC at some point soon.

MR. STRAIT: Sure. We'd like to follow up with you on that.

MS. TAM: Okay. Thank you.

MR. WICHERT: Joe, I'm going to unmute you now. Go ahead and state your name.

MR. CAIN: Thank you. Joe Cain, with Solar Energy Industries Association. I understand that earlier today, there was some conversation about PV or renewables with additions that the Commission had considered it and has decided not to put in a PV requirement for additions and alterations.

The question I might ask is, is there some upper threshold, or perhaps it should be considered. For instance, from my building department experience know I had cases where

there was some threshold in which a whole building had to be brought up to current codes, for instance exceeding a 50 percent cost threshold or a 50 percent floor area threshold. And so that was a way of bringing older buildings up to compliance with current standards. And I'm talking about other than energy standards right now.

But so I guess I'm asking a question about is there some point where the Commission should consider triggering a PV requirement? I mean if a residential addition doubled the size of a house or tripled the size of a house, is there some point where it makes sense that that thing is behaving more like a new residence that perhaps a PV requirement should be triggered. Or the second part of that might be maybe I want to do some addition or alteration to an existing home that say really opens it up with some new glazing or fenestration products and with an option of using PV to justify more architectural freedoms in the design, so it's a kind of two-part question.

MR. PENNINGTON: So this is Bill Pennington, to take a shot at your question. So

what you were describing as happening does -- you know is part of some local governments' ordinances that they have even varying thresholds on when requirements for newly constructed buildings apply to change-outs or major alterations. So that's a jurisdiction they have to decide that.

We have never considered sort of applying newly constructed requirements to an addition bigger than X. We never had any requirements like that in the past. Our intention is to stay focused on getting PVs, ZNE, battery storage, demand flexibility, all of that stuff up and working well for newly constructed buildings this cycle. And we can look at additions and alterations in a future cycle.

MR. CAIN: Thank you.

MR. BOZORGCHAMI: Are there any more comments online?

Okay, if there is none, we're going to go into the joint appendix, it's part of the Reference Appendix.

MR. STRAIT: Okay. I'll be presenting the first few of these and then Danny Tam will be presenting the back half. So and as before, I'm

going to move fairly quickly through this.

So first, JA7 data registry requirements. There's work on the revisions JA7 that are in progress. They are not shown in the current language we've released. But they will be posted for review prior to the beginning of the 45-day comment period, so they just have a little bit of internal development. We didn't want to hold up the entire pre-rulemaking discussion just for this one piece, but we are looking at changes here.

As noted on the slide JA7.7, the data exchange requirements will be updated and clarified. And then JA7.8, the date registry approval procedures will be updated and clarified.

And JA9, the approval procedures for data transmittal services between data registries and cloud-based data services, such as those used by diagnostic tool manufacturers will be added. We know this is something we've been asked rather than having to pull up this information and key it by hand into a different screen, if it can automatically be uploaded we'd like to facilitate that. Certainly, we know that bit of fat finger

error is something we can completely eliminate if we do so.

Okay. Yeah, so but we are -- yes, sorry.

(Colloquy)

MR. STRAIT: And yeah, so let me finish this topic. And then the data transmittal procedure and alternative keyboard input for information completing registering Title 24 Part 6 compliance documents, so that's something we haven't done and I wanted to get that out of the way.

I'm going to actually switch screens and share my screen here for one change that we're making. So we've got two fairly small changes in JA1 and JA2. But they have a big effect on the number of pages of text that are in the appendices.

JA1 has a lot of definitions that are restated from Part 6. And the intent at the time was to have one collection of all of the definitions that someone would need to know about or be aware of, in order to comply with the standards as a whole.

But what we found is there were some places where the two definitions, the one in Part

6 and the one in the Joint Appendix, were starting to wander away from each other, where one would get updated and the other wouldn't. Or they'd be very closely similar terms that really should just be a standard term.

So what we've done and what we're proposing in this code cycle and we'd like your feedback on, is that we are removing from the Joint Appendix 1, the definitions that are redundant with the ones in Part 6. We simply say, "Go look at Part 6 for these definitions." Or, "Here's the ones that are in addition to the those in Part 6."

For JA2 we're actually facilitating, we're making a change to facilitate the use of a -- oh, this thing's going to get in the way of my ability to look at my tabs -- a GIS tool for determining what climate zone a building is in. So the changes are just two things. One, it specifies that either you can use the actual metes and bounds determinations as what are represented on the screen right now, and what is shown in the document that we have posted online. Or you can use -- a building department can use a single climate zone for a given zip code. This

gives building departments the ability to operate in the same way they are right now. Or if folks would like to use this tool instead, you can literally just type in an address or a location as a little lat/long in case you don't have streets or addresses in yet and be shown exactly where you are, relative to these boundaries.

In addition, we are pulling out the table of climate zones, by zip code. We will still be maintaining that table. We will still make it available, but keeping it in regulatory language had a bit of a problem. Those zip codes change regularly and not on a three-year cycle. So we've always had to have an updated version of that table on our website that was not the official adopted version. That created some confusion. So we're going still have that table. Building departments can still use that table. It's no longer regulatory, so we don't have to worry about conflict when we have to change our update information in that table.

And in addition, we can put this on our website and let somebody -- let's type in my home here. Now, see so it's going to pop me right there. Also, now that you know where I live,

please don't try to kill me. (Laughter.) So you can see that it actually highlights the boundaries I am in. It'll tell me that I'm in Climate Zone 12. It'll show how close I am. You can see my house, in particular is a good example, because it's very near to this boundary here. But we think this will help with compliance. It'll make it easier to determine some of these things. It'll make it easier on building departments to look this up. And so we needed to make the change to the table to allow us to do that. Under the 2016 language, because you are required to use the table, if there was a difference between these, this actually can't be used. It might give you inaccurate results. So also this tool, we don't have it publicly available yet, because we don't want people bringing this in and walk into the building counter and starting arguments. So we have it. It's internally deployed. We can flip the switch on it once the code is adopted, but until that point, we can show it to folks, but we really can't make it available. Again, just we don't want to make the City of Davis guy behind the counter's life hell.

And obviously, if there are any questions about this software tool or this change, you can talk to us offline, you can come to me after the workshop. I'm happy to walk people through some of that stuff.

So getting back to our presentation. So after that diversion we're in JA8. We've actually made several changes to update JA8 and align it with current federal and industry standards. The ones I listed on the slide here are the lumen maintenance and rated life tests. We have updated to point to the current ENERGY STAR tests and not have so much encapsulating language around them. We want folks that make those ENERGY STAR tests can just straight up use that to also show compliance with us.

NEMA has developed a standard for flicker. This is NEMA 77. We wanted to make sure to include NEMA 77 as an option. We're keeping both it and JA10 available. In part, this facilitates folks that have already performed the JA10 testing under 2016. And right now, the standard that we're proposing if you use NEMA 77 is to have a PST and an SVM no greater than 1.0, because that ensures that the

performance is no worse than except in -- it basically is no worse than what we have currently on the books.

We've removed dimming as a requirement for JA8. As dimming is no longer required for all areas in a residential dwelling. So this is going to make it easier for some products to get onto the JA8 list.

We've removed Du'v' as a requirement. We've already got this ANSI C78.377. We've already got the quadrangles and the ellipsis that people are familiar with. Initially, we wanted to draw that tighter circle around it to ensure that when somebody went to Home Depot and bought lamps that were a color temperature, even if they were from different manufacturers they wouldn't look like different shades, once they were installed in the home. But what this has meant in practice when we spoke to some manufacturers, is that they had to comb their own inventory, because the natural variation in products out of the same assembly plant, the same run, might put them outside of the very tight range that we had specified. So we don't want to hamper that kind of a marketplace. We don't didn't want that

unintended consequence.

Oh, I see there's a comment from somebody that's asking what they can do to comment. We'll get to comments at the end of the section and we can help you even if you are having trouble with the interface. Not a worry there.

So that's a change.

So we've also aligned color rendering requirements with Title 20. Title 20 devices must meet Title 20 CRI requirements. This was an interesting case where, because the Title 20 rulemaking occurred after ours, and received different public commentary than ours, their procedure for determining CRI was a little bit different than what we had determined would be appropriate for our standard.

This brings them into alignment, so that if you are meeting that Title 20 specific specification, you don't have to separately meet a Title 24 specification. For everything outside of the Title 20 regulated LED lamps, it's the same CRI 90 and R9 of 50 that has been in the 2016 Code just for consistency. And also for simplicity of application.

We've reduced power factor requirements

to 0.7 for low wattage devices. We're actually looking at whether it might be worth having this just for the low wattage devices or generally. Because we know that for example Title 20 has a 0.7 power factor requirement. So we'd like your comments on that.

And we've allowed testing start times from standby where the standby state consumes no more than 0.2 watts. That is from what we would call an off-like standby mode. This is a request from several manufacturers of advanced types of lighting, a lot of your color shifting lighting and programmable lighting, where if you're going completely from powered off, they have a boot up procedure that they through before they activate the lighting. But if there's even a trickle of power going to the device they can just grab those settings instead of having to confirm everything and put the lighting on at that level. So we wanted to at least enable that when we're not opening the door for always on types of devices. So that's what we're doing for JA8. In JA11, I'm going to have Danny come up and talk about that.

MR. TAM: Hi, Danny Tam, Building

Standards Staff again. JA11 is a brand-new joint appendix that describes the minimum qualification requirement for battery storage systems. So when you take the value storage credit and the performance or meet the exception, these systems have to meet these minimum performance requirements.

So some of the basic minimum performance requirement is it has to be at least a capacity of 6 kilowatt hour, continuous charge/ discharge rate of at least 4 kilowatt, round-trip efficiency of at least 85 percent. And finally after 4,000 cycles it should hold 70 percent of the initial charge.

Some general control requirements, the battery storage should be able to be remotely controlled and programmed. It should be programmed to first meet the load of the building. Also, and then you can have the capacity to discharge back to the grid. During power failures it should automatically switch between backup and program mode.

Also, if the battery has a manual backup mode we want it to automatically switch back to program mode after a certain period. That's an

example like if a hurricane's coming, you want to set it to backup mode to hold the charge. We want it to automatically switch back after a certain period. We don't want it to just stay in backup mode, because it kind of defeats the purpose of the load shifting capability of the battery.

So under CBECC there is different control you can pick. So to qualify for basic control, it's really simple. The battery should charge when the PV production is greater than the load of the dwelling. And it should discharge when the PV production is less than the load of the dwelling. And to qualify for advanced control, the battery should be programmed to charge only during the off peak hours and discharge during the peak hours.

So we made some changes after we posted the document, so I just wanted to highlight some of the changes. The biggest one is probably 70 percent after 4,000 cycles. Also, we strike the language about allowing the occupant to program the periods. There's some pros and cons about that. Right now, we're striking that. And also, instead of "may have the capacity" the battery

"shall have the capacity to discharge back to the grid.

And this is a brand new document that we definitely want feedback from the industry to make this a better document. Okay.

JA12 is another new joint appendix that outlines the minimum qualification requirements for PV systems. When you read the language, it might look a little familiar. We borrowed a lot of language from the NSHP Guidebook.

So system orientation, the systems with strings has to be within 110 to 270 degrees from true north. And for shading you either have to meet some minimum shading criteria or you have to specify and document the shading characteristic using a solar assessment tool that's like SunEye, and it has to be documented.

Some general system monitoring requirement. We want the occupant to be able to monitor the system performance. So we want some kind of monitoring capability both at the dwelling, physically at the dwelling and remotely. It should provide information such as the current kilowatt production: a running daily, monthly, yearly total.

Some system performance requirement for CFI orientation, 150 to 270. It has to produce at least 1,450 kilowatt hours per nominal kilowatt. And from 110 to 149 degrees has to be a 1,600 kilowatt hour per nominal kilowatt. That's it for the JAs. We are open for comments and questions.

MR. NESBITT: George Nesbitt, HERS Rater. So on JA1 absolutely remove redundant definitions. I guess, so but what that leaves in JA1 is that only definitions for things that come up in the anything other than the standards, Part 6. So anything that's in appendices, alternative calculation manual, that kind of thing?

MR. STRAIT: The initial pass that we made is we simply compared all the definitions that were in JA1 to the definitions in Part 6 and removed any from JA1 that were also present in Part 6. Ideally the remainder are terms that are not used in Part 6, but are used in the joint appendices since they do go into a little more detail, for example having all the HERS procedures.

MR. NESBITT: Right.

MR. STRAIT: But there might be somewhere

that's not the case. So if you spot one that that might be the case I would like to know about it.

MR. NESBITT: Why not just put all definitions in one place?

MR. STRAIT: We can't place definitions in Part 6 for terms that don't occur in Part 6. We're prohibited from doing so.

MR. NESBITT: Okay.

MR. STRAIT: If we want to put them all in one place, actually the compliance manuals would be the best part to say we're consolidating all the definitions and having a grand list.

MR. NESBITT: Right. Yeah. Okay. And then JA --

MR. SHIRAKH: I would actually advise against it, because it's good to have definitions in Part 6, because most people don't have the compliance manuals and the standards and going back and forth is going to be problematic.

MR. BOZORGCHAMI: No, but we can't go into the manual, because it's not a regulatory document in the first place. It's an advisory document.

MR. STRAIT: Right, but we can't list a

series of terms in there?

MR. BOZORGCHAMI: You can. But if you want to use that term within the standard, it has to be within the standards itself.

MR. STRAIT: Right. So the question is can we take the definitions -- if I understood the question right -- can we take definitions that are in the appendices, and for terms that do not occur in Part 6, and move them into the definitions sections in Part 6?

MR. BOZORGCHAMI: I don't see the value to that. I mean there's definitions in JA1 that has both definitions for the appendices and it has definitions for Part 6. So to have them in the manual, I don't see the value there. The definitions that are in that document is meant to be used for both of those two documents.

MR. STRAIT: Okay.

MR. BOZORGCHAMI: But now if there's a confusion, or there's redundancy, okay take the one out of JA1 that are pertinent to Part 6 and leave them in their Section 100.

MR. STRAIT: Yeah. That I would agree. If it's a term that occurs in Part 6, then we should definitely have it in Part 6.

MR. NESBITT: Yeah. It's just as a user of these things half the battle is knowing where to look and then having then to look in multiple places. But I can understand that there are things you can and can't do. So just I think just removing the redundancies is a big step forward.

So JA2, I had noticed you had removed that whole list of like counties and climate zones. And then on the weather data for the city you also removed climate zone and you partly answered my question. I had never realized that zip codes actually change. I live in Oakland with a zip code that covers all of Emeryville. And apparently it used to be part of Emeryville, but it's part of Oakland and I'm served out of Emeryville Post Office, but I live in Oakland. But I can see that a zip code would change, but what climate zone a county is in or a city in doesn't change. So --

MR. BOZORGCHAMI: But if you take Solano County, for example, because Solano County is separated in multiple climate zones. Even Orange County per se, you've got three climate zones going through there. So you can't base your

climate zone based on a county or in that matter in cities too. Because if you're looking at the example of Vallejo. Vallejo is divided by Climate Zone 12 and I think 3 --

MR. NESBITT: 3, 12 and --

MR. BOZORGCHAMI: Yeah, so it has to be either by climate zone or the way it just seems it looks very accurate and very good is the way it appeared when we started using the GIS system.

MR. NESBITT: Okay. Yeah. I mean, having a list is easier than having to go online.

MR. BOZORGCHAMI: Well, you could go online and print out the climate zones by zip code and slap it on in a folder in KAO (phonetic) if you need to, George.

MR. NESBITT: Yeah. No, I mean if you're at least maintaining an updated list, so when things do change, that's good.

So JA11, the battery storage systems. For one, I would remove a minimum KW size. If we're talking multifamily, especially, or a very small house, a small system, the size of the battery pack will depend on your consumption and the size of your PV system and what your goal is and/or what the rules are. So to say a minimum

of 6 just doesn't seem necessary.

MR. SHIRAKH: But your concern is for multifamily?

MR. NESBITT: My concern is that you'd be forcing people that -- essentially there are times you're going to force people to buy systems that are more expensive and larger than they need. And it really is --

MR. SHIRAKH: And 6 kilowatt is a no brainer for a single family. It may be an issue for some smaller multifamily.

MR. NESBITT: Smaller houses or multifamily, absolutely. And then there's a difference between manufacturers, Enphase which makes a modular system. It's like 1.4 whereas a lot of systems are 8 or 10. But you --

MR. SHIRAKH: But you've got to have some minimum. You can't just not have it, but we may want to think about different minimums for single family versus multifamily.

MR. NESBITT: Right. At least try to come up with a minimum that is small enough that it's not a problem.

Then I think perhaps you need to think about the difference between battery technology

and what someone is trying to do with a battery system.

So the battery system that you use on an off-grid house is completely different than what we are now using with grid-connected houses, although there are people who have invested in battery backup systems that are more like an off-grid. So it's old lead acid batteries. And so different battery technology is appropriate for different uses, whether you're trying to use it for a backup system versus a grid-tied system.

MR. SHIRAKH: For those criteria that he showed, they were all meant to emphasize that this was not meant for backup. It's for daily cycling.

MR. NESBITT: Right. Yeah, and there may be different discharge rates depending on those, chemistry and what it's for. And so just don't create a requirement that can't be met or can't be met by certain types of systems.

Then the other thing is my understanding is I think there's really only two says, like Enphase there's only two ways I think their batteries are set up to work. One is, I believe a no net export to the grid, because you have

states like Nevada and I think even Hawaii does not allow net exports now. You also have the newer, smarter Rule 21 inverters, I think also will clip output and not do export. But then the other, I think basic function, is to absorb the excess of the PV, reduce your net export for self-consumption later.

You have three use types. I think you basically describe what I just said is I think basic. And well you could consider the demand, although I guess there are times -- and perhaps SMUD and perhaps others have not so much with residential systems -- where they can control a battery.

But your advanced battery storage system operation mode, you're saying you charge it off-peak and then you discharge at peak. The thing is if you're talking about off-peak, if you're meaning you're charging it overnight and discharging it late in the afternoon in the evening, my understanding is according to CPUC rules in general is that's what they call arbitrage. And you're not supposed to do that. So in theory, the batteries are only supposed to be charged by excess PV and not by the grid as a

means of purely charging with cheap electricity and then discharging it at price.

MR. SHIRAKH: So off-peak here means during the day, middle of the day, from PV. It doesn't mean from the grid.

MR. STRAIT: Also the arbitrage that's being referred to by the CPUC, to my knowledge, is when you are discharging to sell back that energy. If you are charging the battery in the evening at the low power price and then internally using that energy during the day, during peak, but not shipping that exporting during the peak, that that wouldn't run afoul of those rules. So the arbitrage rules are about exporting.

MR. SHIRAKH: So I think your comment is sort of valid, in that is confusing most people. They see off-peak, they think midnight.

MR. NESBITT: Right.

MR. SHIRAKH: But I mean, if you look at the cost of electricity it's actually lowest in the middle of the day. That's what we meant, but I agree it's not that clear.

MR. NESBITT: Well, all the new time of use rates it's not lowest in the middle of the

day, but it's not as high as the evening. And it varies between from the utilities.

I just want to make sure that what we're getting credit for in the code and what you're saying is actually a) allowable according to the rules in the market place, and there's equipment and it's set up and designed to do a certain thing. And that we're not assuming something differently where we come up with a credit for an operational mode that you cannot operate it in and are not supposed to.

MS. CALLAHAN: Sue Callahan, LEDVANCE. I want to go back to JA8. And this is one of those unintended consequence questions. In JA8.3 tests to be performed on sample sizes, you point to the reference test procedures, some of which are DOE procedures. DOE doesn't put the sample size in the test procedure. So do you want me to only test one, or do you want me to test to the sample number in 10 CFR 429?

MR. STRAIT: Well, I think we can update the reference to point to TN CFR 429. Our intent to say follow DOE rules is that sample size.

MS. CALLAHAN: That's what I though and --

MR. STRAIT: Okay.

MS. CALLAHAN: -- that's not necessarily where your pointing.

MR. STRAIT: Okay.

MS. CALLAHAN: In the testing, the light source types that you've listed with the exception of HID lamps, there are now currently available DOE test procedures, rather than the IES procedures though you'll need some sort of work-around for retrofit kits, because DOE doesn't believe they exist. You know how they can be.

MR. STRAIT: Yeah.

MS. CALLAHAN: The other question that I have is DOE has dropped its NVLAP certification requirement.

MR. STRAIT: We could consider doing so, as well, but we see value in the NVLAP. So even if DOE is no longer requiring it, it's still a program that exists is my understanding.

MS. CALLAHAN: Well, let's just say part of industry was as much surprised when DOE dropped it, because we believe that there was value in it. At least in larger companies they had invested in those types of certified

facilities. And no, we're not necessarily giving up that, but there is a cost associated with that and it is no longer -- DOE made a point of changing the requirement as a reduction of test burden.

MR. STRAIT: Sure. I can say that where we pointed to NVLAP was in part -- we were looking at our Appliance Regulations. And our Appliance Regulations require that test laboratories become approved by us. And we said as an alternate to that, let's look at what's already going on out there, that provides that same level of assurance and same level of accountability. And so we were able to identify that that NVLAP certification provides that quality assurance, provides accountability. And thus we found it easier to point to that, then to create an approval structure internally for laboratories testing to Title 24.

MS. CALLAHAN: Well --

MR. STRAIT: That's just is the history.

MS. CALLAHAN: I was going to say DOE has settled on ILAC. It's not that they just left it wide open. And I'm not trying to push this in any particular direction, but just to point out

that the DOE requirement is ILAC.

MR. STRAIT: We would be interested in hearing more public commentary from more industry stakeholders on that, certainly. We hadn't thought about changing the NVLAP requirement to an ILAC requirement. As you said, it was surprising when DOE did it. So as of yet we haven't thought about doing so, but we'd certainly be interested in hearing from industry.

MS. CALLAHAN: Okay. Thank you.

MR. MCHUGH: Hi, Jon McHugh from McHugh Energy. Okay, so first off we've only seen this recently, but the start time test seems to be an improvement, so it'll be interesting to see what the rest of the industry thinks. But it looks like an improvement. Maybe there's some definition of plateau, but -- yes.

MR. STRAIT: The change there isn't in the follow-up that, DOE issued guidance and our own previously issued guidance about the fade-in curve. So we didn't put that out, because that's not a change from current practice, but --

MR. MCHUGH: Great. Okay. Yeah, that seems like a plus.

For the lumen maintenance, are you intending to

something? Again, I'm just seeing this, but the ENERGY STAR, is the idea that you're certifying at 3,000 hours and then they're supposed to recertify at 6,000, like ENERGY STAR used to have? Or is there a -- oh what's the --

MR. STRAIT: Our understanding, currently is that ENERGY STAR provides a 3,000 hour path and a 6,000 hour path. And we're saying whichever path you take there are minimum ENERGY STAR requirements. And it's the minimum rate of life for ENERGY STAR qualification whether you take the 3,000 hour path or the 6,000 hour path. So we're intentionally providing that flexibility.

We're not sure if ENERGY STAR is in practice, going to require the 3,000 hour, which used to be an early certification and you were still intended to conduct the full duration of the test. Or if ENERGY STAR is intending, given the Administration's focus on cost reduction, on allowing a test to be truncated at 3,000 hours.

MR. MCHUGH: Okay. Thank you. And the next one has to do with -- we already talked about color, earlier, so there's no reason to repeat comments there.

In regards to -- so my understanding is you can still now get a JA8 certification even if the lamp is not dimming. Is that right?

MR. STRAIT: That's the proposal for 2019.

MR. MCHUGH: Yeah, and as part of that then is will there still be flicker tests? Because I know like for instance some -- I think it was ENERGY STAR had if it was dimming you needed the flicker test, but didn't require it for a static lamp. Is the intent to require a flicker test still?

MR. STRAIT: The intent is for that language to remain in effect. That is a lamp that is not dimming would test at 100 percent. A lamp that is dimming will additionally test at 20 percent.

MR. MCHUGH: Okay. And just if you're thinking about dimming versus non-dimming, looking back at the 2016 Standards why we had requirements for dimming was the customer dissatisfaction when people put non-dimming lamp in a dimming socket. And so the thought was that maybe someone moves the lamps around in their house, then they've got a problem of either fire

or early failure. And so that's sort of the basis, so I just thought I'd give that background. I assume you guys have thought about that.

MR. STRAIT: So the other issue that we ran into though, is that if we're requiring a dimmable lamp be installed, there's actually not a dimming control on that circuit. Then in theory we're requiring an additional cost where there's no realized benefit. Now, market research shows that there is dimmable and non-dimmable lamps at equivalent prices. But we still didn't want to put ourselves at risk of being accused of requiring something that wasn't cost effective.

MR. MCHUGH: And then the other thing about the -- you're looking at referencing NEMA 77, that standard's non-ANSI, so it hasn't gone through a public process.

And in terms of replacing the use of JA10 I think a fairly significant issue is that when we regulate things in Title 20 and there's a test method, one part of the benefit has to do with the actual requirement. So right now we've got the requirements for reduced flicker operation,

which is less than 30 percent amplitude modulation for frequencies less than 200 hertz. But the other part, that's also very significant, has to do with the market transformation effect of having a rating where you can actually compare between different lamps and compare to different standards. The only ANSI standard around flicker currently is IEEE PAR 1789. That's gone through a rigorous public review process and as part of that ANSI process it has a balanced committee, so there are people with different levels of expertise.

So the current JA10 database that we have, or actually JA8, there's 9,900 products in that database. And it has not just whether or not it passed or failed or a single number, but a description of the amplitude modulation in a format that is directly comparable with the IEEE Standard. And so I think that there is actually a market transformation and information that provides the opportunity for people to select better products.

Back in 2016, when we proposed this standard we received comments from researchers who had worked on the issue associated with

headaches, associated with magnetically ballasted florescent lighting. And essentially back then we didn't have as much information, so we set our standard at the flicker level that's essentially comparable to the amplitude modulation for magnetically ballasted lighting.

And what's being proposed currently is SVM of 1, which relatively comparable, but it doesn't give anyone any information about how close can I get to the actual recommendations of that IEEE Standard? So to me that's a fairly significant environmental impact and consideration.

MR. STRAIT: Could you clarify in what way it's an environmental impact?

MR. MCHUGH: So for instance, the environmental impact is that consumers and designers can differentiate between products of different amplitude modulations. So that for instance, for populations that are sensitive to flicker such as folks that have migraines and that sort of thing; and it's something like 5 percent of the male population and about 15 percent of the female population in the United States. If someone wants to select products that

they appear to have less impact on those populations, they don't have that same information from the NEMA 77 Standard.

MR. STRAIT: So just to make sure I understand the comment, that means that a lower PST score or a lower SVM score that would indicate that they have less flicker amplitude is not sufficient at preventing harm? That somebody that needs to select a low SVM or a low PST product.

MR. MCHUGH: Okay. So first off the PST scores of around visible flicker, and there's a relationship between PST and low frequency flicker, which is related to visible flicker. The PST is not that valuable to the issue of preventing harm, because those are typically products that just don't get sold. If they're visibly flickering, they can't sell the product. And the PST metric is really more used for people trying to evaluate the compatibility of dimmers and light sources.

The real issue around these products has to do with their rectification of 60 hertz power. So you basically take 60 hertz power and you rectify it, so you end up with something that has

a primary harmonic of 120 hertz. And so that's the same sort of issue that was found with magnetically ballasted fluorescents. That you had the ripple associated with the 60 hertz power to those lamps.

Well, the CASE Team earlier in the development of the 2016 Standard did some significant testing of lamps. But more importantly, we now have 9,900 lamps or products that have information about their performance.

MR. STRAIT: But just to quickly interject, we do also have an SVM Standard which applies to the frequencies above the visual range. That's why there's there both a PST and an SVM Standard.

MR. MCHUGH: Right. The SVM Standard though, does not give you the kind of information that you can readily apply to the IEEE standard. It's a weighted --

MR. STRAIT: But in terms of -- I'm sorry -- in terms of product selection by a consumer that might be sensitive to flicker, they could look for a lower SVM score.

MR. MCHUGH: Right. But they don't actually have a direct way of comparing the

results of SVM to the IEEE Standard, because the IEEE Standard is you get a chart that's showing what are the low-risk areas relative to amplitude modulation and frequency.

MR. STRAIT: Okay.

MR. MCHUGH: And the JA10 Standard is set up to present the data in that format. The SVM Standard is based on a weighting, so it's a curve. And it's similar to trying to figure out what are the sound pressures of sound if you've already applied the A weighting. A weighting is useful for certain things, but what you've got to understand about SVM is that it's a very focused test. It was a weighting that was based on looking directly at a rotating disk, directly in your direct line of view. And it does not reflect, for instance, flicker associated from peripheral vision. It does not reflect flicker associated with phantom array effects.

So there's a variety of differences between the full range of flicker effect and what is captured in SVM. So I don't think that it provides as much useful information to the consumer or designer.

MR. STRAIT: Okay. Thank you for the

comment.

MR. MCHUGH: Yeah. Oh, and one last thing. During the 2016 Standards between the 45-day language and the 15-day language, sort of something kind of slipped in or whatever and it was kind of too late to change it.

And that had to do with the issue associated with marking. Earlier on, there were various versions of JA8 floating around. And in earlier versions of JA8, it had a description of providing a variety of different markings on the lamp that included lumens and CRI and these various things. At the end of that process we said, "Well, this is just way too much information to place on the luminaire." And so it was compressed down to this idea of just having a single marking, which was JA8 2016. And then, sort of I think some confusion at the last minute, then resulted in a situation where if you are below a certain lamp size you were exempted from putting on the JA marking. The purpose of the JA marking was for simple enforcement in the field. So that someone could walk up to any fixture, look in the fixture and if the lamp had JA8 marked on it, it complies.

If it didn't have the JA8 mark on it, it didn't comply. So if you're looking at updating JA8 this would probably be one of the desirable things to update.

Then one other thing, the lamps that are covered by Title 20 for the GS lamps, (phonetic) I think they're roughly comparable to the color quality aspects in Title 20. However, for small directional diameter lamps or small diameter directional lamps, I guess it is, there are not those same color rendering requirements. A key purpose of the standard was to assure that there were high quality products in each of these sockets, so that they would be retained. I would recommend that for the SDDL products, at the very least that those retain the CRI of 90 and the R9 of 50, along with the other non-regulated lamps. Yeah.

MR. STRAIT: Yeah, I think we can look at that. I think the intent is for the language to specify when there is a Title 20 requirement for color rendering meeting that requirement qualifies. If there's not a Title 20 requirement for color rendering the JA8 requirement for color rendering applies.

MR. MCHUGH: Oh. Okay. So --

MR. STRAIT: If it's not --

MR. MCHUGH: -- that wasn't clear.

MR. STRAIT: If there's an improvement, yeah.

MR. MCHUGH: But that's -- okay, excellent. Thank you very much.

MR. STRAIT: Thank you.

MR. SHIRAKH: So before we go online I just want to make a couple of statements. One is that we will soon be developing a JA13. We didn't it today. And what JA13 would have is the specification for smart inverters. Part of the 2019 Standards, when PVs are installed we would have this requirements that the inverters must meet the smart inverter specification. And these are based on the CPUC decisions on minimum performance characteristics. And there's a Smart Inverter Working Group and IEEE working to develop these standards. We're probably going to basically repeat those in JA13 and I think Danny just volunteered to work on this JA13.

MR. STRAIT: He's standing at the podium, so --

MR. SHIRAKH: Yeah. And the other point

I want to mention is that the PV industry is being kind of quiet here. But I think for JA12 that has the PV specifications we really want their feedback on some of the stuff we have in there.

One of them is the requirement -- there's a lot of reporting requirements in JA12. And mostly you know, we were thinking whether we should have third-party HERS verification versus reporting. And now we're kind of favoring having this reporting requirement instead of a HERS verification. We think it brings more value. But we want to make sure we haven't gone overboard. The current requirement has both a hardware on this side reporting capabilities and a web portal, so we want to know what you think about that.

And also, we have reporting requirements both on a module level for smart micro-inverters and at string level for string inverters. We also want to know what you think about that. So I just wanted to highlight those because of the important things we want to make sure are -- and Bill Pennington has something to say.

MR. PENNINGTON: So just adding to what

Mazi was saying there's also a strong intention in JA12 to trying to avoid performance impacts due to shading. And trying to address that borrowing from NSHP to a certain extent. What we're thinking now is that these requirement would be certified by the installer on a CF2R kind of basis, rather than requiring a HERS rating. So again, we'd like to have your comments on those.

MR. WICHERT: So we do have some comments from online. Tanya, I'm going to go ahead and unmute you now. Go ahead and state your name and affiliation.

MS. HERNANDEZ: Okay. Hi. This is Tanya Hernandez from Acuity Brands. I'm assuming you can hear me.

MR. STRAIT: Right, your voice is actually fairly muddy.

MS. HERNANDEZ: So sorry, I'm going to try and get through this. Can you hear me okay now?

MR. STRAIT: Yes. Yes, this is better.

MS. HERNANDEZ: Okay. Thank you. So I had a question, a both question/comment on JA8 specifically about the I guess the alignment for

lumen maintenance testing to the ENERGY STAR requirements.

I think that is the intent, but in reading it, it appears that there is the 3,000 hour, 6,000 hour language. The requirements for luminaires are different than the lamps. And so I just want to make sure that actually the intent is to follow the ENERGY STAR requirements for lumen maintenance, not some new requirement or hybrid. And the reason why I ask is because in the 2016 Code, there was the exception to go, basically, with LM-80, TM-21 data as the ENERGY STAR program allowed.

MR. STRAIT: Correct. The language in JA8, proposed for 2019 should allow folks to choose whatever test is available under the ENERGY STAR that's appropriate for their product. The specific values that we've selected as the threshold are the lowest values that are applicable, for both ENERGY STAR sets of requirements. If there's a way in which we can improve that language though, I'd be happy to talk to you offline.

MS. HERNANDEZ: Fantastic, thank you. And then I had a question really about moving the

CCT and dimmable out of JA8. I think I understand the intent back in 150, however I'm wondering if the simplicity or the effort to make closets and garages not have to be these premium light sources. Now, will just create more of a burden on the inspection piece, because now you can actually -- according to JA8 you can certify a source at 8,000 Kelvin if you'd like, because there's no requirement for it. And now, the inspector will have to make sure that the CCT is correct and a dimmable in the right areas. So that's just a comment or commentary that in looking at it and I thought, "Aha!" And that's all my comments. Thank you.

MR. STRAIT: Sure. I can say that our intent is that the mark is still universal to the fixtures. So the inspector can still look for the mark on every fixture in the home. And if the inspector turns on a kitchen lamp and it comes on at 7,000 Kelvin, then they could probably say hey, that's not right, without needing to look at a mark on the back of the product. So that's our intent. I'm not trying to be dismissive, but yeah we can definitely talk about ways in which that can be further improved.

MR. WICHERT: Kelly, you are up next. I'm unmuting you now.

MS. SEEGER: Hi. Kelly Seeger, Philips Lighting. Can you hear me okay?

MR. STRAIT: Yes.

MS. SEEGER: Great. Thanks for the opportunity to comment. We would specifically like to comment on JA8.4.6, which is the section on dimming, reduced flicker operation, and audible noise.

MR. STRAIT: Uh-huh.

MS. SEEGER: First we'd like to thank you guys for recognition and inclusion of NEMA 77. We think it's a positive development. What we're interested in commenting on is the limit of 1.0 that's being proposed for SVM, the stroboscopic effect visibility measure.

So, as we know NEMA 77 is not only about test methods, but also about guidance for acceptance criteria. And it's the most recent standard on TOA. It brings together much of the current research to recommend a method for quantifying visibility of TLA, Temporal Light Artifacts. And hopefully, it's the beginnings of recommendations for broad application.

The photometric recommendations within it and the measurement methods are applicable to any lighting equipment. And with any control system. So in looking at the value of 1.0, the value of 1.0 is really the detection threshold for SVM. That's the value where 50 percent of the observers would indicate that they see the effects and 50 percent do not when they are required to make that choice. So a value of 1 doesn't indicate whether those observers actually find the observation disturbing. Nor does it really indicate whether there's any kind of health-related effect.

We also know that some detection of stroboscopic effect is acceptable, because you have to have motion in order to see it. So within NEMA 77 the application guidance for SVM for indoor application areas is actually a value of 1.6. And that limit is really the real world limit. That's the acknowledgement that even if SVM is detectable under laboratory conditions, it's not necessarily objectionable in or under many normal conditions.

And at Phillips, we would add that also mass production LED lamps have been in the market

with SVM of 1.6 and we don't have any complaints that have come back on that at all. So we would ask that the CEC would consider changing that proposed value from 1 to 1.6. And if you can't do that, we would be very interested in hearing the rationale and better understanding the issue. And I wanted to also just comment on some other sort of things in that area, and Jon McHugh had commented on some of these things. The IEEE 1789, so those proposed limits appear to be overly strict for many applications, which could also add unnecessary cost to the electronics in the LED products. Even some incandescent lamps don't fall within the low-risk or no-effect region.

I think John did mention the IES is also working on a TLA document. And we expect that that's going to be ANSI approved, just in response to the comment that NEMA 77 is not ANSI approved. But what we do know is that current TLA standardization is really being hampered by a lack of adequate metrics. But there's a lot going on. And right now NEMA 77 is really the best we have and that's where the current research is.

So those are my comments. Thanks you very much.

MR. STRAIT: Thank you. Staff did evaluate the NEMA recommendation, I'm sorry, the recommendation on NEMA 1.6 of the 1.6 value for SVM. And we can talk offline about our rational for choosing the 1.0.

MS. SEEGER: Okay. Thank you very much, appreciate it.

MR. STRAIT: Thank you.

MR. WICHERT: And we had one last on line comment from Joe. I'm unmuting you now.

MR. CAIN: Thank you. Joe Cain with Solar Energy Industries Association, commenting on JA11 and JA12. I guess I'll start with 11. And just to let you know that yes, the solar industry and the energy storage stakeholders, we have been having a lot of conversations. JA11 and JA12 have both -- we've been having a lot of conversations on both of those and we do intend to provide some guidance and feedback.

And so we don't have anything prepared so we don't really have consensus on this to deliver today, but I'll just on the some things that we've been talking about. And one is on JA11.

We've been talking about definitions. And as you can imagine there's the regulatory environment for storage systems has been evolving rapidly. And so we have a variety of definitions that are not correlated, one of which is likely to be in California Residential Code in the intervening code cycle, because it was developed for the 2018 International Residential Code, which will be the basis of the 2019 California Residential Code.

But even that definition I'm not particularly fond of, because that definition reads, "The electrical energy storage system, a system that stores electrical energy that can be utilized to power the residential electrical system for providing backup electrical power, electrical load shedding and/or electrical load sharing." So even that, we probably won't be too fond of and may make some other recommendations. Other things that we've been talking about, you have your safety requirements and you've referenced the UL Standard 1973. 1973 is a standard for a battery that was originally for light rails and stationary battery systems, kind of evolving into these energy storage components. But that's a battery standard.

The system standard is UL 9540 and so that's the one that will be referenced in the International Residential Code, therefore the California Residential Code. So 9540 is probably the one you're looking at and 1973, I believe, is imbedded or reference within 9540.

A lot of the other conversation that we've been having has been around the control requirements. And Francesca made some comment on that, although still of a general nature, because we don't have the consensus comments. But again, you know control requirements and controls strategies are something that we're still working on. And again, want to have a real clear language on basic control, advanced control, demand response and so on.

I will pause there, on JA11 before I move to JA12.

MR. SHIRAKH: So again, I was going to get your comments. This is Mazi. I would appreciate if you get all your comments to us in writing, so we can read it and then have a chat with you.

MR. CAIN: Yeah, definitely. Okay. Thanks, Mazi.

On JA12, I think a lot of the conversations we've been having have been around the shading verification. And we understand staff has said that a lot of this came out of the New Solar Homes Partnership. I think that the context, this is my personal opinion, I think that the context is a little different when we're talking about a code required system. And some of these requirements again, we're having these conversations and working on these. But one of the things we would be wanting to pay particular attention to is kind of the speed and the rapid deployment aspect of this.

I would expect that for production housing, as we move into more and more communities that have this as standard, that the system design of the PV system is going to be more standardized and shading measurements can only come after a building is done. So I think that we will work, again on that language and work on providing some recommendations.

I think that the remote monitoring capability, I think is becoming very, very common. So I think that that is probably where we want to hang our hat. I will make brief

mention that we have been contacted by the California -- pardon me for not remembering the exact name of the agency -- but I believe it's weights and measures, which is under the California Agriculture. But they have taken interest in the sub-metering and the measurement and they're working on preparing some future standard. So some of this proof of performance, I think is also under development.

You had mentioned HERS rating as an option. And my first reaction to that, and again this is my personal opinion, my first reaction to that is not so favorable. Because we may have a case -- again in the case of rapid deployment we have the California Solar Permitting Guidebook. We have California Legislature requiring minimum amount of inspections and speed of processing. So I'm a little concerned about things that might leave someone in the field, you know --

MR. SHIRAKH: Joe?

MR. CAIN: -- waiting for someone to show up. Go ahead.

MR. SHIRAKH: What I said was we thought about HERS verification, but we decided we were going to go with a monitoring graph and not HERS

verification. So that's not --

MR. CAIN: Okay, great.

MR. SHIRAKH: But then my follow-up point was that I just want to make sure that the points or the things that we're requiring to be monitored, we haven't gone overboard by basically having language that requires output of each module if you are using micro-inverters, or the output of each string if you are using the string inverters.

The system that I have at my house, the reports out of that, I just want to make sure that the industry agrees with that.

MR. CAIN: Yeah. I don't think that was part of the conversation we had with the other California agency and our first position is monitoring of individual panels is overboard. So yeah, we'll give that particular consideration in our comments.

MR. SHIRAKH: Okay, good. Look at that. Thanks.

MR. CAIN: Great. Thanks Mazi.

MR. PENNINGTON: So Joe, this is Bill Pennington.

MR. CAIN: Yes.

MR. PENNINGTON: Coming back to your comment about the difficult fit, maybe, of doing post installation measuring of shading obstructions. We've been thinking about that a little bit. We appreciate it as an issue. We understand that this kind of projection analysis can be done at a planning stage based on elevations from the builders and expected location of the panels, using perhaps online tools.

And I'd like to know what the industry's views are of doing something like that. Perhaps enabling just a final check kind of thing as we're talking about in this proposal that would conform with that planning stage analysis. So something like that is what we're imagining. So if you could advise on that or maybe suggest how to do something like that?

MR. CAIN: Yeah. I do think it is a valid question. And I'll work with some of our designers that have direct experience with that. One other point I forgot to mention is that another thing that did trigger some conversation on our part is the orientation restrictions. And so I don't have, again a consensus position to

speak about today, but it did cause quite a bit of conversation about the orientation restrictions.

MR. SHIRAKH: So what we have here is -- again as part of our grid harmonization strategies, we're trying to encourage PVs that are oriented in a way that helps the grid in late afternoon. So that means installation between 150 to 270 degrees from true north. And that also happens to be the range that gives you the maximum TDV value.

If you are outside of that, you're not going to get the TDV value and also you are actually aggravating the grid conditions by having too much generation at times that it's not needed, so that's why we have -- and we really don't have a restriction here. Basically we say in the current language that if you are between 150 and 270, you have to have a production of, I think it's 1,450 kilowatt hours per nominal Kw, which is not that hard. If you're outside of that range, between 110 and 150, it's 1,600. That's a 10 percent increase just basically to make up for the lost TDV value, if you oriented it in the wrong direction.

And again, it's our way of saying orient it correctly and try to get as close as possible to southwest as possible, because that's the time when the grid needs the output the most.

MR. CAIN: Yeah, understood. One of the things that I start to wonder about, and this is perhaps a sidebar, is whether performance of buildings and systems will one day drive the street and lot layout of developments from the beginning, at the civil engineering state. Because that's something that historically has not yet happened.

So okay. Thank you, Mazi.

MR. SHIRAKH: My pleasure.

MS. WAHL: Hey, this is Francesca Wahl of Tesla. As Joe mentioned, we're all sort of still discussing and reviewing JA11, JA12 and I would just reiterate whatever Joe has just mentioned. There are a couple of areas in particular, for the battery side that we're still reviewing, which is definitely the control requirements as well as the minimum performance requirements. So we will be submitting written comments on both of those areas.

And then on the solar assessment tool, Bill, that you just mentioned having an online

version of this or some sort of online design tool, while we haven't kind of come to an internal conclusion on that, I think that would be the preferred route.

And then what has come up several times, as a question is sort of the need to have a sort of onsite display as well as if you're able to access it on your phone or on an online tool via your computer why do you need to have both, is one of the things that's come up as well. So, I just wanted to comment on that.

MR. SHIRAKH: Thank you, Francesca.

MR. NESBITT: George Nesbitt, HERS Rater. You mentioned adding another joint appendices for the smart meter. Since --

MR. SHIRAKH: Mark, you know the meters, smart meters.

MR. NESBITT: Smart inverter. Sorry, too many words.

MR. SHIRAKH: It's (indiscernible) 14, but we have --

MR. NESBITT: Sure not 13? I believe that the smart inverters are now currently required to be installed. So I'm wondering what the purpose of having another appendices on that

and it's a -- you know, regulations change and those are regulations that are well beyond your control. And whether it really serves any purpose to put language in and to try to replicate what those requirements are.

MR. PENNINGTON: So the Energy Commission has been leading the charge on smart inverter working group work. Staff in our Energy Assessments Division are actively involved in leading that work, so we will be drawing from their expertise. We also would be intending to rely on where the PUC will be at by the time our proceeding is done. And there's work going on right there.

Our intent is to have the smartest inverter that's reasonable to be required, because potentially that can make these systems much more valuable to the utility grid and be of value to all of us. So we're not trying to, by any means this staff create something new. We're just trying to make sure we advance this as far as we can, this cycle.

MR. NESBITT: Yeah. I mean, unless you're going to require something that isn't already required there, it just -- I'm not sure

if it's necessary.

Than on the sort of verification. As HERS raters we do find systems that are not working, not working properly whether they were wired wrong or what. And that's part of the value of having the HERS Rater and also in the NSHP having the expected output and taking actual measurements of the installed system.

MR. SHIRAKH: Well, this reported system that we're requiring would actually pinpoint all those problems.

MR. NESBITT: Maybe, maybe not. And maybe not for a long time. Some of that also depends on how you set up. So I mean certainly a micro inverter system monitors panel by panel. And there are certain things that definitely the system will tell you are wrong. But some of them are also dependent on how you set up the -- when you create the system online. Whether you put in an expected output and whether you put it in right and whether or not it will send a warning if it's not producing enough energy.

MR. SHIRAKH: But my understanding is that a HERS Rater cannot go up on the roof. If you can't go up on the roof, then what do you

actually verify?

MR. NESBITT: Why can't a HERS Rater go up on the roof? I've been on -- I can't tell you how many roofs I've been on to do PV verification.

MR. SHIRAKH: Well, yeah you may go, but we cannot require HERS raters to go on the roof. And if they can't go on the roof?

MR. BOZORGCHAMI: There is fall protection requirements, so the --

MR. SHIRAKH: Especially when there's all kinds of liabilities and risks, so we cannot require. And especially when you have a steep slope two-story home we cannot require people to go up there. The installers go there because they have to install and they're equipped for it. They're insured for it, but we cannot require HERS raters to do that.

MR. NESBITT: And you can verify a lot of that stuff without going on the roof.

MR. MILLER: The wiring?

MR. NESBITT: And the outputs. I mean we're trained to do that, too. I mean so, but anyway I guess the question is really, is a post -- or well what is the post shading analysis

good for? I mean, unless you're actually then kind of creating the baseline for what the system should do. I don't think that's really unreasonable to do. It is difficult, I think especially on a new home, to do ahead of the time.

There is certainly online software, Aurora, and there are some others that do satellite images and can do shading analysis, based on existing conditions. But if you don't have a house there, trees and they haven't grown yet, you don't have it. But kind of making sure a system is working and working properly is important.

MR. BOZORGCHAMI: So I'm going to stop this section of this discussion on these two or three topics and move on. And if I could ask everyone to submit their comments in writing, we're just running out of time. Right now we've got one more section still we need to go through, and that is the reference appendices. And I apologize for this, but we're just running out of time right now.

MR. MILLER: I'm Jeff Miller here to present Residential Appendices. These are the

Residential Appendices.

MR. STRAIT: That's it. Everyone can go home now. (Laughter.)

MR. MILLER: So we have additional protocols that are being added and they need to be updated in the table in the beginning of RA2. There are some that are not there yet, whole house fan, central fan ventilation, cooling systems, heat pump capacity, kitchen range hood are also needed. They have to be added to the table.

MR. STONE: (Indiscernible.)

MR. MILLER: I'm sorry, I can't hear you.

MR. STONE: Can you go back to the slide (indiscernible)?

MR. MILLER: There's a Table 2-1, a summary of the measures. It's grown quite a lot over --

MR. BOZORGCHAMI: If you look at it, it's on page RA2-3. I know you've got it on your computer, Nehemiah.

MR. MILLER: In RA2, there's a section on the Third Party Quality Control Program that has required some updating. So we've mainly are adding clarifying language, but also trying to

emphasize that Third Party Quality Control Program should accomplish more than a HERS Rater would accomplish. So that would involve strong oversight by the Third Party Quality Control Program entity, so that corrections can be made in the field before the installer leaves. And there's some additional language -- there's an expectation that there could be some electronic location verification done automatically if it's available. And also since we'll be modifying some data transfer language in JA7, we think that impacts the third party quality control programs and we've mentioned that also.

There's a new protocol for verification of central fan ventilation cooling systems. This is essentially the same verification that's done for central fans for newly constructed buildings. The thing that's different is that the same airflow rate and fan efficacy verification is required to be done at the ventilation fan cooling speed. So there'll be a change made to the compliance document and so that's the additional protocol.

We've added a protocol for verifying the

heat pump capacity. When heat pumps are specified for the performance compliance approach, it matters what the capacity is at the lower temperatures. And the compliance software models that capacity. So a HERS verification of the installed model and using the AHRI database, confirming the capacity is equal to what was modeled. It's very similar to the EER verification and the SEER verification that's already there. It's just confirming the AHRI specifications.

Oh, this is a QII. I'm just going to read this stuff. So there were changes made to the definitions: Modified the definition for compression, it clarified language and reduce the allowable compression to 30 percent, modified the definition for delaminated, clarified the intent to present voids or compression of the insulation, modified the definition for the inset stapling, clarified the intent to prevent voids between the insulation and the air barrier, inserted new definition for non-standard framing. So in 3.5.4, loose fill insulation, there's clarified language, reorganized some content, separated out gable ends from kneewalls and

skylight shafts, removed duplicate language, clarified window and door header insulation requirements for single-member headers that are the same width as the wall, added new section to address below deck insulation.

Section 3.5.8. Insulated concrete forms. We clarified the language, reorganized some content, separated out gable ends from kneewalls and skylight shafts, removed duplicate language.

RA3.6 field verification of water heating systems. Section 3.6.5, HERS verified compact hot water distribution system expanded credit. This section is updated to reflect changes to the HERS verified requirement.

And Section 3.6.9 for drain water heating recovery systems, it's a new section that describes the requirements for drain water heat recovery system verification.

RA3.7 for a mechanical ventilation systems. There's a new verification for kitchen range hoods. And it involves going to the field, discovering the manufacturer name and model number that was installed, comparing that model number to the listing in the HVI directory to see that the installed model meets the requirements

for air flow rate and sums at 0.1 inches water column.

RA3.8, field verification and diagnostic testing of building air leakage. This is just an update to reference the new RESNET Standard. And currently, that's all we're doing. We've deleted what was already there and deleted it completely and, well, mostly that's what's done and are referencing the new standard. It's I'm uncertain whether we will attempt to get permission from RESNET to put the actual language of the protocol into that section or not. If we can do that, I think it would be desirable for the HERS raters to be able to read the procedure directly out of our appendix. I'm unsure if we'll accomplish that yet.

Additionally, in the current standards we reference -- I think there's at least three different ways to accomplish the verification of the envelope leakage. And what we're proposing to do is to limit it to the one point, a single point test.

The whole house fan verification, RA3.9. This is a new protocol. And the purpose is to provide a performance compliance verification

that whole house fans actually provide the air flow that has been modeled, that are expected to provide. Additionally, to measure the fan watt draw.

The air flow rate can be measured according to what we're proposing, using three different methods. A pressure matching methodology that uses a blower door, an airflow rate measurement using powered flow capture hood, and also a method using a traditional flow capture hood.

Water heating measures, pipe insulation credit. This section was deleted due to mandatory pipe insulation requirement in California Plumbing Code.

RA4.4.6, compact hot water distribution system. It's a new section that describes the requirements for the basic credit of compact hot water distribution systems. RA4.4.116 HERS verified compact hot water distribution system expanded credit, the section updated to reflect changes to the HERS verified requirements.

RA4.4, water heating measures.

4.4.20, solar water heating systems. Added the IAPMO listing as a listing agency.

RA4.4.21 the drain water heat recovery systems. It's a new section. It describes the requirements for a drain water heat recovery systems.

And I think that's it. Questions?

MR. MCHUGH: I just have a really quick question. You were going to get rid of the pipe insulation verification, but I thought earlier today or yesterday I can't remember, that's still a method for what is it, electric water heater. I can't remember which water heater it is, but one of the water heaters you can use the pipe verification?

MR. TAM: There’s two credits, one doesn't require HERS verification. That's the one that's being deleted. The HERS verified one is still there.

MR. MCHUGH: Okay. Yeah, thanks.

MR. STONE: Three things, and I'm not going to take them in order here. Nehemiah Stone, Stone Energy.

In RA3.8.1, as you're changing the reference to RESNET, it brings up an issue for me. That at the bottom of that section it says, "For purposes of this procedure conditioned space

boundary is defined as building envelope." So what that says to me is that this does not apply to multifamily, because that's not the boundary for multifamily.

MR. MILLER: That's not the intention. This protocol is going to be required to be used for the multifamily dwelling unit verification. We don't have any kind of an energy credit for multifamily whole building envelope leakage. But we are going to use this protocol for the dwelling units in multifamily dwelling units to determine compliance with the 0.3 CFM 50 per square foot of enclosure for those dwellings.

MR. STONE: So I shouldn't be troubled by the language here that says that the boundary is building envelope?

MR. MILLER: I can't hear you.

MR. STONE: Sorry, so I should not be troubled by the language here that says the boundary is the building envelope?

MR. MILLER: That doesn't sound correct to me, yeah.

MR. STONE: The whole house fan verification procedures, they're extensive. It starts off though saying, "When required for a

compliance." And I looked all through 150.0, 150.1, 150.2 and there's nothing in the standards that says it's required.

Now, you can put it in the table in the appendix, but based on something you said just a few moments again, Payam, and if it's in the appendices and it's not in the standard -- no, you were talking about the manual. Right, so if it's in the appendices this is --

MR. BOZORGCHAMI: This is a credit, though. This is a credit verification. It's not a prescriptive requirement. You could put a whole house fan in, no problem. But if you want to take an extra credit you have to go through the verification and you could get a percentage credit for it.

MR. MILLER: So it'd be specified in the ACM.

MR. STONE: In the ACM.

MR. MILLER: That would be specified in the ACM.

MR. STONE: All right, now I'm confused slightly differently, I guess. So can you show me where it would be -- can you point to where it says it would be required for some reason?

MR. SHIRAKH: This is not required again. The whole house fan is in the prescriptive baseline. It's in I think 151.00; I don't know.

MR. STONE: Yeah, it’s required in certain climate zones for both.

MR. SHIRAKH: No, it's prescriptive, right?

MR. STONE: Prescriptively required in certain climate zones.

MR. SHIRAKH: Prescriptively required, now you can put in a whole house fan just like you do now. And you'll comply, you can walk away, nothing additional is required. But if the builder wants to get an extra credit then they can do a verification using one of the procedures that he just outlined. And you get like a point or two on the EDR scale by doing that verification.

MR. STONE: Now, the language around this is really confusing then. I don't consider a particularly stupid person, but when I read this --

MR. SHIRAKH: I understand and we need to read the language and make it more.

MR. STONE: Okay. And there's a typo on

the label of that anyway, by the way.

MR. SHIRAKH: That's Payam's fault.

MR. BOZORGCHAMI: Blame it on Danny.

MR. STONE: Then the other thing -- it's going to take me a moment to find it. If anybody else has a comment I'll be back.

MR. SHIRAKH: I'll be back, yeah. All right.

MR. NESBITT: George Nesbitt, HERS Rater. Yeah, so kind of following up on Nehemiah in Section 150.1(c)12. In the prescriptive requirements for the whole house cooling fan, it originally --

MR. SHIRAKH: That's too close.

MR. BOZORGCHAMI: Most people are too far away.

MR. STRAIT: Don’t make our court reporter come up and slug you. We will put an end to comments that are too loud.

MR. NESBITT: So originally the language was for that this would be HERS verified, but it was eliminated there. So thank you for -- I had noticed while you're putting in all these verification procedures, but it wasn't required. But if it's going to be a ACM credit that's fine.

I guess my only real comment on the residential appendices is essentially what I said yesterday, is that really these are all HERS. This is the HERS appendices and some of those HERS tests have always applied or long applied to nonres, duct testing and some refrigerant charge. And now additionally, we're adding the ASHRAE 62.2.

So in the nonres appendices, there is a large amount of duplicate language talking about the HERS system and third-party control and all that. And so back to the idea of simplification. If we're eliminating all the duplicate redundant definitions in JA1 why are we duplicating large sections of the HERS appendices in the nonres appendices? And perhaps what you need to do is just consolidate the HERS sections, the acceptance testing as well as the commissioning into one joint appendices. Because they do all -- I mean, although commissioning and acceptance testing are only nonres the HERS goes both ways, but at least not duplicating the language. Because it just is room for error.

MR. MILLER: It's true, previously there was just the duct leakage testing. Now there's more and my view is failing to be very clear about what

the scope is for the protocol, in other words to reference a residential protocol for a nonresidential requirement, this is confusing. And so even though this is redundancy, it is I think very clear what the requirements are. We could discuss having a joint HERS appendices. That's what you're proposing, yes?

MR. NESBITT: Just call it HERS appendices. It's no longer a residential appendices.

MR. MILLER: Not all of them would be applicable to nonresidential.

MR. NESBITT: Right. But I mean, like a lot of places in codes it'll say well, you have to do this according to that section of case. So you have to go to that section of code. We don't just duplicate those section of codes everywhere it's referenced, so it's just --

MR. MILLER: Thank you.

MR. STONE: Nehemiah Stone, I apologize. I'm not going to be able to cite the sections. I was looking and I can't find them, but in one section of 150 -- and I'm not sure where it is -- it says that insulation, piping insulation is required on piping that is between three-quarters

and one inch, and then all piping to the kitchen etcetera.

MR. STRAIT: Yes.

MR. STONE: You know, the "to one inch" was added recently, so I mean that was a conscious thing on your part, obviously. And but it raises the question, what about piping over one inch? And are you saying the changes in the Plumbing Code now make that language irrelevant?

MR. STRAIT: What we did in that section was to align that language with the Plumbing Code by saying follow the Plumbing Code requirement with the following modifications. Because the Plumbing Code says that your minimum insulation is based on pipe thickness. And there were a few areas where pipe thickness was still required to be at one inch even though the pipe itself was at three-quarters inch or less under our code. So for those handful of circumstances, we put in that specification as the minimum. Not the exact amount, but the minimum level of insulation for those pipes is one inch around those.

MR. STONE: You were talking about different things, Peter.

MR. STRAIT: Oh, I'm sorry.

MR. STONE: I'm not talking about the thickness of the insulation. I'm talking about the diameter of the pipe.

MR. STRAIT: Oh, I'm sorry.

MR. STONE: You added language that says that -- sorry, thank you -- so it says, "All hot water piping with a nominal diameter between three-quarter inch and one inch," that's what has to be insulated.

MR. STRAIT: Right.

MR. STONE: So over one inch you don't have to insulate it.

MR. STRAIT: So, hot water piping of one inch or greater is required to be insulated under the Plumbing Code.

MR. SHIRAKH: I think he has a point (indiscernible).

MR. STONE: So why did you add this? I mean, any piping over three-quarter inch has to be insulated. I mean, that's the way it was said before.

MR. SHIRAKH: That makes sense, what he said.

MR. STRAIT: I think that makes sense. I'm just explaining that my understanding is it's

required in the Plumbing Code. If that language isn't accurate we can bring it in alignment.

MR. MILLER: Any other questions?

MR. WICHERT: I'm going to go to a question online. Andy, I'm going to unmute you now.

MR. LLORA: Can you hear me?

MR. WICHERT: Yes.

MR. LLORA: I'm sorry if my language sounds strange. I just got out of a root canal and half my face is number.

I did miss the section on 150.1(c) (phonetic) regarding HERS verification, so I'm trying to make a partial comment. Now, is there any language pertaining to CFI systems, which currently have no pre-certification method? Because whole house fans are pre-certified with HVI right now. And there's currently nothing stopping a Title 24 consultant from modeling a CFI system with basically unattainable field values for CFM and water. They could put .3 watts per CFM and 10,000 CFM on a five-time carrier unit, which is mathematically impossible, and get an insane amount of compliance. The only thing preventing that would be having a HERS

verification for the CFI systems. I don't see any language planned, so I was wondering if I missed that?

MR. MILLER: When you say CFI system are you talking about a central fan ventilation and cooling system or a central fan indoor air quality system type?

MR. LLORA: I'm talking about the CFI system that is used for Title 24 Part 6 compliance under cooling ventilation credit, in the same area where whole house fans are used. Those two measures are the two items for nighttime cooling ventilation credit. And currently, you know you have whole house fans that are pre-certified with HVI and you have CFI systems that have no precertification can be applied and installed with multiple HVAC systems. And there is no precertification or HERS verification. Do you plan on installing language for HERS verification for CFI systems?

MR. MILLER: So those central fan ventilation cooling systems are purely performance compliance credit opportunities. So the verification that -- let's see, where is it? I don't know why I'm not seeing it. I better stop looking for it.

Central fan ventilation cooling system protocol has been added and the reason it's been added is because of the problem that you just described. The opportunity to get a credit for ventilation cooling using the central system was introduced, I think in 2013. But the protocol for the verification had not been developed and this is catching up with that oversight.

Also, those systems are not required to be certified through HVI, because these are central fan systems. And it includes the performance of the central fan plus the quality of the design of the duct system. So there would be no reason to go to HVI to certify them. That's not the case with whole house fans.

MR. LLORA: No, I'm not recommending HVI certification for an HVAC system. I'm saying that there currently already exists a HERS test for fan, water and airflow. HVAC systems can be tested in fresh air mode for how much CFM and the watt draw that is occurring during that mode of fresh air operation. Because currently, Title 24 software, you can put numbers that are lower than 0.58 watts per CFM and if that system doesn't actually deliver said CFM, and at the modeled

watts per CFM ratio, they're getting fake compliance that is not realistic.

MR. MILLER: Yes, this HERS --

MR. LLORA: That would be the equivalent of me basically making up a fan CFM in wattage and not HVI rating it.

MR. MILLER: This HERS verification then tends to close that loophole.

MR. LLORA: Okay. So you will have a HERS verification for CFI systems?

MR. MILLER: Yes, for central fan ventilation cooling systems.

MR. SHIRAKH: And again, it will be just a compliance credit similar to the procedure for whole house fans, correct?

MR. MILLER: No, it's entirely different, and in terms of the protocol that's used for central fan ventilation cooling systems.

MR. LLORA: I think you're talking about something different, because in the Title 24 modeling software under cooling ventilation credit, you can pick a CFI or you can pick a whole house fan. Both of those products have two values that are input at a CFM that they're able to cool with that amount of volume and the

wattage.

And the ratio for the whole house fans are pre=certified with HVI, but the CFI systems are based on a three-time system that's 1050 CFM and 0.58 watts per CFM. They can choose to model 800 CFM for the CFI at 0.58 watts per CFM, but can also choose to model -- basically the software will allow you to put in 10,000 CFM at .1 watts per CFM, which is mathematically impossible with a three-time carrier system that can only deliver 1050 CFM. So the software currently is flawed and the only thing that would catch anybody doing that for extra compliance would be a HERS verification.

MR. MILLER: Yes, I think we're agreeing very forcefully on this.

MR. LLORA: Oh, okay.

MR. MILLER: The purpose of the verification is to close that loophole and the protocol involves measuring the fan watts and the airflow. And ensuring that it meets the 0.58 watt per CFM criterion at ventilation cooling speed.

MR. LLORA: Okay. And the second question I had was more of a clarification. The

HERS verification for a whole house family, that's proposed for 2019, is that for ADR points and additional compliance bonuses, and not going to be a mandatory measure?

MR. BOZORGCHAMI: Yes, that's what that is.

MR. LLORA: Like when whole house fans are modeled on a performance model, does a HERS test automatically get triggered?

MR. SHIRAKH: No.

MR. BOZORGCHAMI: So, what happens is when you model a regular whole house fan prescriptively, you're okay. But if you want to take the extra credit you can get a couple of EDR scores points if you go and do the verification.

MR. SHIRAKH: We don't know if it's going to be a couple of EDR points, but --

MR. BOZORGCHAMI: Yeah.

MR. SHIRAKH: -- it will be some credit, yeah it's going to be above and beyond. And it's not a mandatory or prescriptive requirement. It is at the builder's option.

MR. LLORA: Oh, okay. So the HERS verification will be optional for compliance credit. Okay. And the last question I had was regarding the

HERS verification, it looks like you have three proposed measures for the HERS verification procedures. Keep in mind that more and more often we are seeing builders exceeding 2 CFM per square foot. So the systems need to be capable of testing well in excess of 10,000 CFM of whole house fan power. A 5,000 square foot household easily will have 10,000 CFM installed when a whole house fan is performance modeled.

So we would put in 26.5 model fans, that's resulting in about 11,000 CFM. We've seen as high as 15,000 CFM and we've even seen custom homes that have 17,000 square feet or 7,000 square feet. And they're putting in 14,000 worth of CFMs of whole house fans. They're putting one 2.5 fan in every bedroom. We've seen installations like that where you have well in excess of 25 or 30,000 CFM of whole house fans. We will need some language there as to whether or not the fans will be tested individually or is it some whole. And as to what equipment or system you're going to use to test static pressure of that magnitude, if you were to put in three, four, five blower doors into the structure to create static pressure equivalent of what 20,000

CFM is evacuating into the attic from the home that amount of static pressure will open every single damper including kitchen range hoods, bathroom dampers, dryer vents. All of those dampers would get pushed open resulting in a margin of error that could cause the fan watts to be reporting a false failure, because we're creating so much static.

So these things should be considered, that the prescriptive amount of 1.5 CFM per square foot is rarely using the applications that we've seen. Ninety to ninety-five percent of the applications we've seen are still putting in 2 CFM per square foot or greater.

MR. MILLER: Okay.

MR. SHIRAKH: So I think the point of the test is not to just test the maximum CFM that the system can deliver. It is to make sure that you are providing whatever the prescriptive requirement is, so if it's 1.5 in a 3,000 square foot home you should be able to deliver at least 4,500 CFM. So if you put a fan that's bigger than that, it's fine. But we're interested that you are getting 4,500 CFM and it should be at the fan watt draw that's required prescriptively.

So you can have more fan than that, but we're not going to be testing all of it. It's just --

MR. MILLER: So performance though you may not (indiscernible).

MR. LLORA: Wait, does that -- but if they actually model more than 1.5 CFM using the performance method, wouldn't the HERS verification encompass and require that a 2,000 square foot home, let's say they put 3 CFM per square foot and that's 6,000 CFM, wouldn't the HERS test verification on both the 2R and the 3R require that they meet that modeled amount of 6,000 CFM?

MR. SHIRAKH: If you take credit for it, I think it would yes.

MR. MILLER: Yes

MR. LLORA: Okay. That would make a lot of logical sense.

MR. SHIRAKH: I guess I was describing a situation where you don't do that and you only specify the minimum required. And then you end up with 4,500 CFM, but somebody installs a 6,000 CFM fan. In that case --

MR. LLORA: That's perfect

MR. SHIRAKH: -- then you're not claiming

the credit for that extra and so we won't be testing it. But if they did model it with 6,000 to get an extra credit then you're correct, and it will be the entire CFM.

MR. LLORA: Okay. We'd like to offer our services into helping you devise the best systems for all three of those procedures for HERS testing. So anything that QC Manufacturing can do to assist, just let us know. Our R&D staff is at your disposal.

MR. MILLER: Well, excellent. Thank you very much.

MR. SHIRAKH: Thank you, Andy.

MR. LLORA: Okay. Thank you very much.

MR. MILLER: If you would like to submit suggested changes to the draft protocol that could be helpful.

MR. STRAIT: This definitely sounds like a good conversation to continue offline.

MR. LLORA: Okay. Thank you very much, and I'm sorry I missed it earlier. I just came in right at the comments section, so I will go through the videos and go through the language that you put on the slides.

MR. STRAIT: Excellent.

MR. MILLER: Thank you.

MR. LLORA: Thank you

MR. BOZORGCHAMI: Any more comments? Anyone from there? Good, I ran out of ink. Thank you every one for participating today and please submit your comments. The sooner the better, but by October 20th it would be great.

MR. SHIRAKH: Man, you said 4:00 o'clock and we're right on the money.

MR. BOZORGCHAMI: We've got four minutes, anybody want to talk? Anything? Thank you so much.

MR. STONE: Before anybody leaves the Tax Credit --

MR. STRAIT: You realize we weren't being serious, right?

MR. STONE: -- the Tax Credit Allocation Committee has their draft regulations for next year for sustainable building measures, which includes a lot of energy stuff. And relates back to the standards out for review and the review ends at the end of this month. There's hearings on it next week. If you all think you might have something to say on that, and I think you might, I'd urge you to take a look at the draft

standards and comment.

MR. STRAIT: Just for simplicity's sake if you've got a link you could email to us that would be great.

MR. STONE: I will do that. Thank you.

(The workshop adjourned at 3:59 p.m.)

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.

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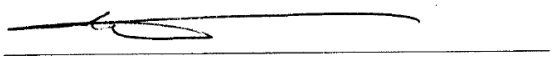

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I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

MARTHA L. NELSON, CERT**367

November 20, 2017