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BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the matter of,	
	) Docket No. 17-BSTD-01
2019 Building Energy Efficiency Standards	

STAFF WORKSHOP ON

NONRESIDENTIAL LIGHTING MEASURES

FOR THE 2019 STANDARDS

CALIFORNIA ENERGY COMMISSION

FIRST FLOOR, IMBECHT HEARING ROOM

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

THURSDAY, JUNE 22, 2017

9:03 A.M.

Reported By:
Gigi Lastra

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P R O C E E D I N G S

JUNE 22, 2017 9:03 A.M.

MR. BOZORGCHAMI: So, once again, my name is Payam Bozorgchami. I'm the Project Manager for the 2019 Standards.

(Pause)

MR. BOZORGCHAMI: So, some housekeeping items. The restrooms, out the double doors to your right, a snack bar on the second floor. And in the case of an emergency, let's meet up at the park across, kiddy-corner from us, the Roosevelt Park, and we'll figure out what to do there.

So, the presentation today is on nonresidential lighting. And Mr. Jim Benya's going to go first, provide the indoor lighting source, indoor lighting control measures. Thao Chau is going to do the lighting alternations. And Simon is going to do the outdoor lighting measures.

These next few slides, I'm going to go through them real quick. All these presentations will be posted on our website by tomorrow. We've got a lot going on today and I just want to make sure we have enough time. It's going to get 111, 110 degrees. It's a small room, I apologize. So, I want to get you guys out as fast as you can but, at the same time we can have enough time to

take questions and comments.

After every presentation we'll pause for a Q&A session on that topic and others, and we'll move on to the next if there's nothing in the room or from the WebEx that's being televised.

We are being recorded. And when you come up to the podium, these microphones are not the best, and I apologize, so you really need to speak clearly, loudly into the mic, so it can be recorded by our court recorder.

So, Energy Commission started in 1974, founded by Jerry Bell in 1975. We were here for energy efficiency measures. We have a lot of acts and measures that we have to meet by certain periods. 2020 for energy efficiency for ZNE is what we'd call it, for residential by 2020, nonresidential by 2030. We need to look into the climate change and the whole global warming situation that's happening.

Other measures here at the Energy Commission that we need to look in and focus on, these are some of those areas that we look into. Our goals, our mandates are energy efficiency and demand response. Our primary goals here at the Energy Commission is that we look at renewable generation and the most cleanest way of doing so.

The Energy Commission staff, with the help of the utilities and the utility team, help develop the standards every three years. I'd have to give a special thanks to the utility equipment groups that have worked with us, that those would be PG&E, Southern Cal Edison, South Cal Gas, San Diego Gas & Electric, Sacramento Municipal Utility District, Los Angeles Department of Water & Power, Southern California Public Power Authority.

I'd also like to thank Kelly Cunningham and Heidi Halenstein (phonetic), who's been facilitating a lot of these communications with the Energy Commission staff and the CASE Team and the CASE Authors. Without them, we'd still be working at the beginning.

As you know, California is divided into 16 climatic zones. It's a little bit different than what you see in ASHRAE. If you're familiar with that, California's divided only into maybe two or three climate zones within the ASHRAE climatic map. The majority of California is in Climate Zone 3. For California it doesn't make sense where you have Santa Monica and Death Valley in the same climate zone.

What we do, what we present has to go through a vigorous life cost analysis based on the TDV. TDV is the value of energy for every hour of the year.

So, this is one of Mazi Shirakh's favorite graph. He's been showing that off to everybody. He's proud of it because he had a lot to do with this. The downtrend for California, it looks good and we need to keep it going.

The 2019 Standard process, right now we're in the pre-rulemaking and after these next few months we will be communicating, and we need your input. We need that today, as you hear the measures and the proposals, to come back with a final CASE Report. The final CASE Reports will be due back to the Energy Commission within the next five weeks. And from there, we're going to go into the 45-day language process. And, hopefully, we'll get the 45-day language out by the end of this year. The end of November or December era is what we're looking into and then we'll go into the 15-day language after that. It seems like a lot of time but, in reality, it's not.

So far these are the scheduled workshops that we've had here at the Energy Commission. Residential envelope, I don't think anybody in this room cares, other than me, because that's my favorite area.

Indoor air quality, mechanical systems were done earlier this week. And today being the 22nd, we've got the nonresidential lighting measures.

We're required to look at hospitals and as of -- under the 2019 Standards we will be scoping hospitals and hospital lighting, mechanical envelope measures that we're going to be incorporating into Part 6 of Title 24. That will be happening on July 13th.

July 18th is the rest of the residential mechanical systems. Then July 28th is the whole transition to solar storage with energy design rating, where Mazi's going to present. It's a full day workshop here at the Energy Commission. What the EDR is for Part 6 and what the EDR will be for Part 11. Those are the CALGreen measures that we will most likely be presenting here on August 30th. If not August 30th, it will be about September 12th. We'll send out notices on that, shortly.

All of the utilities sponsored stakeholder workshops, the CASE Reports will be presented, will be posted on the Title 20 for utility sponsored stakeholders' website.

And, yet, our building efficiency program website, which has all the historical code languages and what's happening for 2019, all the workshop notices and so forth will be posted there.

And comments to today's workshop, please submit it to the third link there. And we would like to have all comments into us by July 7th, if possible. It's

about two weeks. This gives us enough time to work with the authors and communicate back with you folks, and take care of the issues as needed.

Some contact information. You've got Mazi's, and I think everybody here knows him by now, information there, my information. Larry Froess, he's our Senior Mechanical Engineer responsible for the software development for the residential and nonresidential. He's our lead engineer on that.

Peter Strait is our Supervisor for our Building Standards Development. If you guys have issue with Simon, Thao, please contact him.

And if you have issues with Peter, or me, or Mazi, contact our Office Manager, Christopher Meyer. And Todd Ferris is our Supervisor for our Software Tool Development staff.

Any questions? All right. It's very important for your folks to really participate today because we need your comments and, I mean, just working on the three we don't have enough time for this code cycle to really procrastinate on measures, and comments. So, like I said, the 45-day language is right around the corner. It's going to be here fast.

So with that, I'm going to have Jim Benya do his presentation.

MR. BENYA: Well, good morning everyone. Welcome back to our every-three-year experience in improving our standards. I've been involved with this process for several decades, now. And I'd like to offer you an observation to build on what you said earlier, Payam, about where have we been and where are we going.

If we look back at Title 24, the very first version of the lighting standards, back in 1978, and we look how far we've come, we've gone from typical office building lighting in the 1970s that was designed at between 4 and 6 watts a square foot was considered to be normal.

I can remember getting chewed out by a client because we weren't putting in at least 4 watts a square foot worth of lighting.

In this standards that we're going to be looking at here, in a few minutes, we're now down to about one-tenth of that to be expected from the typical office/commercial building that only a very short time ago was ten times as much.

That's how far we've come. And Title 24, in my opinion, has been historically the leader, always leading the pack to make the standards more rigorous, more demanding, and industry has responded by making the products that have allowed that to occur.

This has always been a collaborative process and I want to thank everybody for being here and participating in the program. We've got a lot to cover so, with no further ado, I'm going to start talking about this.

First of all, we want to acknowledge, and I'll probably do this about three times this morning, the participation of two particular stakeholder groups in particular, the Statewide Utility Codes and Standards Team and the California Energy Alliance. These two organizations have worked very hard in the last several months to prepare CASE Reports and information leading up to some of the proposed standards you're going to see here today.

The idea of the standards, this generation, to mantras we always talk about are modernizing and simplifying. Modernizing by taking into account the impact of LEDs. LEDs change everything we think about when we write standards. I can think about standards provisions that were written in some 20 years ago, thanks to the shortcomings of compact fluorescents that we don't have to worry about anymore.

So, it's those, Smart lighting, new power systems, demand response and grid stability are all modern issues that change the way we look at the

standards.

But at the same time there's an outcry for us to make them simpler somehow, anyhow, and we're very conscious of that. My work, as a consultant to staff, is to be, oh, maybe right it a little hard and say is that as simple as we can make it. I promise you that's one of the things that I like to do.

We are going to be seeking stakeholder input on a number of things. This is sort of my list and I'm going to go through it quickly because we've got a lot to cover. But these are some of the things you will hear us talk about this morning, me and my colleagues from staff. But I want to just bring up a few things that speak to these.

First of all, the legacy lighting and socket issues. Isn't it about time to embrace all lighting as LED and not worry about it?

Unique and changing IES-recommended practices. Nancy, you wouldn't know anything about that, would you?

Extremely low lighting maintenance is a new issue. We're now looking at lighting, light bulbs you don't change. What does that do to the way we think about things?

New configurations in luminaire types and new power systems, powered over Ethernet or POE, and

distributed DC power are right over the horizon of changes we're going to be making in how we want our buildings. How are we going to accommodate that with the standards?

How to accommodate white color tuning? A very popular issue, now, amongst manufacturers and designers worldwide. How are we going to accommodate that in the standards? Every time we do something that clever, sometimes it takes all new language and I think we're going to have to do that.

Similarly with color changing, now that color changing is part of architectural lighting we have to have a way to deal with it.

Of course, this whole new light and health area, where it's like Circadian and Human Centric are coming up commonly in architectural dialogue. And we're going to have to have a way to deal with that.

And, of course, the Well Building Standard. For those of you who aren't familiar with it, take a look at it. This is probably one of the most comprehensive and, frankly, difficult lighting standards to meet and it often conflicts with the energy codes, both Title 24 and, of course, 90.1 and IECC.

In all of the above, talking about in both the context of indoor lighting and outdoor lighting. And

many of you, if not all of you, have heard by now the American Medical Association said, last year, all outdoor lighting should be 3000 K or preferably less. How are we going to address that? Or, are we going to address that in Title 24?

When I say Title 24, I'm really talking about Part 6. You know, there's a Part 11, called CALGreen, in which these things might be addressed.

How to accommodate facilities for an aging population? We are definitely getting older and especially a few of us, and it's time we started thinking about -- you know, the IES was very clear in the 2011 Handbook, it says for people over the age of 65, the recommended light levels are double what they are for the core group of 25 to 65.

Now, we have healthcare facilities coming up. We've never dealt with those before. They are complex. And it's going to be interesting to see how we integrate those into the standards.

There's also a new color system that the IES has introduced. California has led the way by embracing high color rendering LED lighting as part of the standards. And more in the residential side, but it also raises the question which should the standards be based on for the nonresidential side? We'll have a

little discussion about that, perhaps later today.

I want to cite one particular thing in the Well Building Standard. It requires a color rendering index of 90, but it also requires an R-9 of 50 minimum. These are not numbers that are necessarily easily met. Once you get to a CRI of 95, in a classical sense, then it's pretty easily met. And thank you for the research you guys did. That really helped explain a lot.

How to accommodate network lighting controls? When we talk about lighting controls indoors, which I'll be talking about in a few minutes, and replace the outdoors as well, where do network lighting controls fall into those?

Now, that the DLC has introduced a standard for network lighting controls is this something that we need to accommodate in the standards today or is this something that is a 2022 item?

I want to add that this week we're working on the 2019 standards, knowing that 2022 is being designated a major upgrade standard. Every decade or so that occurs and in the 2022, if I'm not -- I hope I'm not speaking out of turn here, Mazi or Payam, but that's the one we're looking at and saying that's where big changes are going to come.

Demand response and net stability and, of

course, the idea of big data are all hanging out there for us to be aware of.

The ready availability of very low-cost LED lamps with conventional sockets, and wattage ratings of luminaires with medium-based Edison screw sockets. And for that matter, legacy sockets of all kinds, as I mentioned earlier, are topics because Section 130.0 is how do we say how many watts a luminaire is in doing the calculations? That's a very important area.

How to accommodate no standard wattage or lumen product sizes anymore? For years I helped create tables for the standard that said if you have two F-32, T-8 layouts, it is 60 watts, or 56 watts, or whatever it became.

We don't have standards anymore. The only de- luminaire in the same product line, depending upon the color temperature can have different wattages or different lumen packages.

And, of course, the rapid changes in efficacy cause a constant change in product watts. Everything we're basing our calculations on today are our best guess at the efficacies we're going to be using in 2019, or 2020 to be exact. But that's a best guess. We've all learned from LEDs that's a moving target.

So, on any of these comments, again, I'm asking

personally, as a consultant, but also on behalf of the Commission, if you had any input on these and other items, as they come up today, please submit that information, as Payam said, by July 14th. Here is my personal e-mail. If you want to correspond with me, feel free. Otherwise, feel free to send them to staff and I guarantee you they'll be circulated.

I'm going to move beyond questions. So, we're going to start with the nonresidential indoor light sources, which really means the lighting power densities and all the other things having to do with indoor, other than controls.

Most of the proposals for this section have been submitted by the CASE Team, the Statewide Utility Codes and Standards Team. And staff has reviewed these. I've reviewed these. We have a few comments at the end, but I want to just cite the CASE Team as having done really excellent work this year.

To all of you who are here, and I see a number of you, my compliments. This is probably the best set of documents I've seen, reading these things since before there was a utility statewide group. Very, very good work.

Starting to talk about indoor lighting power densities. The single biggest thing we do every time

around is we look at the indoor power densities and say now the technology has improved, what numbers should we be using today? Remember I said earlier at the start of all of this, back when, we were putting in numbers like 3 watts a square foot, 4 watts a square foot for classrooms and office buildings. We're now talking about numbers that are in the area of 10 to 20 percent of that because of those advances.

Well, because of the LEDs, everybody in the room probably knows by now that LEDs have taken us from a high performance T-8 base down to an LED base. And that is a jump and the jump keeps getting bigger, I think, every day. That's one of the cool things about what we're doing today. It also keeps me awake at night thinking about what changed today that I didn't know about.

So, we're going to update the lighting power density values for indoor lighting. We're going to reflect the increased efficacy and increased optical control associated with LEDs and modify the allowed lighting power for all three calculation methods.

Remember, for the prescriptive method in the standard, which is the primary thing we work on here, in these hearings, there's a complete building method, the area category method and the tailored method. There are

three different calculation procedures. They're supposed to give you the same results if the input data matches. In other words, if you pick the right sample, they will give you the same results.

But they're also intended to give you different results if the input data is variable. There is bigger demands and bigger requirements than are assumed with the basic model.

They have to account for increases in LED efficacy mandated by Title 20, in 2016, and USDOE LED efficacy regulations that are being developed concurrently to the work that we're doing here.

It builds upon efforts to update the LPD requirements in ASHRAE/IES/USGBC 189.1.

There are two standards out there that we always think about as we go through this process. One of them is ASHRAE/IES Standard 90.1. Standard 90.1 is the national reference standard for energy codes. We are required by law to be equal to or more -- how shall I put it? More stringent than those standards. And we have historically not only done that, but we've tended to lead the pack by at least a couple of years.

Things have changed. IES, USGBC and ASHRAE have gotten together to create standard 189. 189, and Jon McHugh is in the room, Jon serves on the committee. I

served on the committee about 10 years ago. Standard 189 is the sustainability code. But it also introduces the notion that as part of sustainability lighting power densities can actually be a little bit lower than 90.1. And so, that is all part of the discussion that we're involved with.

But we are, first and foremost, obligated to coordinate and work with ASHRAE/IES Standard 90.1. And one of the things that does happen, and we will mention this several times today, is we're proposing a change somewhere so that 90.1 and Title 24 can be, essentially, the same. This is to the advantage of everybody in the country, every manufacturer as well as every practitioner.

The scope of the change proposal is pretty modest for indoor lighting power densities and, in fact, for this entire light source portion of the presentation.

We have two significant -- each one of these is pretty significant, but there are only two. One of them is to modify the lighting power density values and the other one is to streamline the lighting power calculations.

And what we're seeing here is modifications to the prescriptive measures of Section 140.6(c), which

will affect the compliance software. It does not affect the compliance forms.

And the proposed changes to streamlining lighting power tend to be more in other sections that relate to this. In particular, Section 130.0(c), which is how much -- again, how much power is a particular luminaire? What do we count?

I think everybody in the room probably knows we use power as a surrogate for energy. How many watts is a way energy codes are done.

I think everybody also knows that energy is kilowatt hours, not watts. But the process involves an inference that there's a baseline for standard controls, which established the operating time.

One of the big issues, as part of our standards of course, is how the controls affect the lighting power at any given time. But that will come up in the next section when we talk about indoor lighting controls.

The advantages of the proposed changes, first your electricity savings statewide will be 82.4 gigawatt hours per year. I'd say somewhere between 80 and 90 is probably a better guess. You know, to say it's 82.4375 is a little bit too accurate.

A first year peak electrical demand reduction of 12.1 megawatts. The first year water savings and first

year natural gas savings of course don't apply.

But these are the required calculations. As part of presenting a CASE Report you've got to say -- remember, this is at the core of everything we propose. Number one, it's got to save energy. Number two, it's got to be cost effective using products that are readily available from a number of manufacturers. It can't be one company and it can't be something that isn't readily available. It's got to prove itself to be cost effecting using those.

Number three, it's got to have impact statewide. That's why this calculation is done. You know, we could say for example that if we change all the nightlights in the State and require them all to be 1 watt LEDs, you could say, well, that's nice but it doesn't really have much of a statewide impact. You know, if you add them all up, it isn't much. So, that's why we go for the big fish, not the little fish, when we're fishing for improvements.

Legacy issues. Track lighting power and power limiters are legacy issues. For those of us that have been involved in the process, the idea of power limiters was introduced about 17, 18, 19 years ago as a means to accommodate the constant improvements in efficacy of track lighting equipment.

And, of course, what's happened now is we've seen LED luminaires come in, in screw-based products that can go right into those existing track luminaires.

And I don't know if any of you have messed around with any of these products, but I certainly have. And you can take a 60- to 80-watt halogen lamp down, put in a 15-watt LED and get better, or at least equal, and usually better performance. That's pretty amazing. But the great thing about it is that's an inexpensive product, now. The payback period is like a year.

So, we're at the point where many of our assumptions are no longer really -- you know, nobody's going to do anything that stupid and if they do, it's their problem. They'll pay for it in many different ways.

Similarly, requiring recessed luminaires to be rated at 50 watts. That's a legacy issue.

So, what's being proposed here in, Section 110.9, mandatory requirements, Section (c), track lighting integral current limiter, the proposed requirement is to remove the certification. This is now not really anything we need to worry about or burden inspectors with.

Track lighting supplementary, over-current protection panel. There were two primary solutions for

the track lighting power issue, as a function of the work that we did some 20 years ago. One of them was an inline device. One of them is a secondary, over-current protection panel. They're going bye-bye. This is we're now at the point where it doesn't make any sense, and it just becomes an additional piece of paper.

Lighting power densities, a summary of changes. First of all, the Section 130.0, lighting systems and equipment, and electrical power distribution systems, general. The proposed requirements will simplify the language and remove the language prohibiting LED screw-base luminaires to be classified as high efficacy light sources. It proposes new, lower watts per square foot, with or without the use of current limiters.

Peter?

MR. STRAIT: I'm going to jump in really quick. Because this is kind of a key phrase, the high efficacy sources, this is not about having them certified under JA-8. This is simply that instead of saying that if you've got a legacy socket you are assigned a luminaire rating, it allows us to look at the LED that's actually going into that socket and rate the power use base on what's actually in the socket.

MR. BENYA: Yeah, that's a great point. It's something that I've been wishing for, on behalf of

inspectors, for about a decade or so. There's an easy way to do this and there it is.

Okay, Section 140.6, prescriptive requirements for indoor lighting. 140.6-B, the proposed requirements will revise the LPD values for the complete building method. These new lower values will reduce electricity use and replace incumbent lighting sources with LED as the baseline.

Remember, everything's in reference to a baseline. And, historically, the baseline, one of the first things we do in the process is what is the baseline? It wasn't that long ago the baseline was fluorescent, whether it was T-8, T-5, high performance T-8. The baseline is now LED.

140.6 will do the same thing for the area category method.

140.6-D will revise the values for the tailored method.

140.6-G, the proposed requirement will revise the LPD values. That's a table that is used to establish LPD values. The new, lower values will reduce electricity use, et cetera, et cetera.

The Section NA7.7.3, track lighting integral current limiter, these will be deleted. The primary data will be collected as to whether claimed wattages

are installed. So, we've moved what is the claimed wattage off to what happens in construction as opposed to what happens on the plant.

To Peter's point, this is a big deal. It's going to reduce and it's going to simplify work. It's going to be very realistic and it's going to put maybe just a little bit pressure on the inspector. But it's something the inspector can look up and see and not have to do a lot of research to figure out.

Likewise, NA8, from the joint appendices, this is luminaire power, the proposed -- or, excuse me, the nonresidential appendix, and they propose the luminaire power to account for default LED luminaire wattages.

This is going to be a little tricky because, as I said, default wattages are not necessarily something that are out there.

Okay, practical impact. What I've tried to do here is say how does this practically impact us?

The first thing is in the design phase. The new lower LPDs may result in designers having less wattage to trade off with HVAC and envelope measures. This is important because what has historically occurred, when you design buildings, is everything is a tradeoff. Particularly, once you work your way into the performance method. And, of course, the performance

method is going to be based on these methods. All right, they need to be -- they need to come out with the same results there, too.

And, historically, we've worked so that lighting, HVAC and envelope traded off, one for the other, to get a building that meets the design requirements. We've had a couple of hiccups along the way. There was a time when I know that designers of buildings, and I won't blame any category in particular, would say, well, the lighting is .1 watts per square foot for the whole building and, therefore, we can have a much less efficient envelope or HVAC.

Well, that process was eliminated with standards changes, you know, quite some time ago. But it stills to a certain extent in the performance method. And we want to make sure everybody understands as you reduce the effect of the allowed lighting power there isn't a lot of headroom left to make big changes in those areas, such as envelope and HVAC, where they would make a difference.

During the permit application phase, no changes are significantly expected, nor the construction.

But the proposed code change will result in simplified compliance and enforcement process. Things such as current limiters, which were always a little bit

of a hassle, will no longer be part of the process.

The methodology. The method, you know, this is a part of it, everybody says, well, where did you get those crazy lighting power density values, anyway? The method was co-developed by ASHRAE/IES Committee in the 1990s, within input from the CEC. I can tell you that for sure because I was the input from the CEC and helped develop that process.

This was one of the -- I sat on the 90.1 Committee, with support from the CEC, for five years. And during that period we developed the process that's still being used today. I'm very proud to see it still being used.

And what it is, it's a lumen method-based model where we try and put realistic lighting design parameters in for each of the general illumination, task illumination, decorative illumination, wall-washing, and other things, so that you have a reasonable power allowance to do a competent lighting design.

We don't use the most efficient equipment in the world and we don't use the least efficient equipment in the world. Just what is the average and how does it work? So, the process is pretty well defined and it's pretty well followed.

It's been updated to reflect trends in products

and IES recommendations. Two things here, an update with respect to products. I think everybody knows the products have changed a lot. And the products that are being used today, a little bit different than the ones we did 15, 20 years ago. Not just because they're LEDs, because of their appearance and some of the trends in design.

One of the things I've always tried to present to this process is as a member of the International Association of Lighting Designers, to reflect good lighting design practice. And we have Bernie, on the CASE Team, has been serving that, and we have all these other lighting designers in the process, as well. And the impact is to make sure that a competent lighting design, as well as an energy-efficient lighting design can be accomplished.

Again, this is the process. This has been in use now for five or six code cycles. So, this is not a new idea for us. I just wanted you to know that's how we do it.

Actually, I shouldn't say "we". I didn't do it, the CASE Team did the work and they did it very well. Illuminance targets are based on guidance from ASHRAE 90.1, ASHRAE/IES 90.1, ASHRAE/IES/USUBC 189.1, and the IES handbook, modified to align with the building and

space/are types.

Hours of operation are based upon operating schedules in the 2016 Nonresidential ACM Reference Manual. This is important when we -- remember, I said we take watts, but we make assumptions about energy based on watts. Those are taken from the 2016 ACM Reference Manual.

Useful life is based on the 15-year period of analysis. And the 2016 Standards LPDs were assumed to be met using a mix of linear and compact fluorescent, metal halide IR halogen lamps.

This is a big change. We are going from all those sources, which were part of the 2016 Standard -- remember, the 2016 Standards started getting developed in 2013, all right. And LEDs were not necessarily cost effective in 2013. They are now. And I don't think anybody would disagree with that.

Models for hospitality, museums, liturgical, some retail, dining, and some specialized office spaces include options for LEDs employing dim-to-warm and color tuning technologies.

This is important because we see these trends coming. When you use these technologies, especially white color tuning and dim-to-warm, they're not necessarily 100 percent as efficacious at one setting,

as they are at another. And so, that has been built into the models and taken into account.

Models for retail, hospitality, museums, theatrical and liturgical include options for high color rendering index, reduced efficacy, LED luminaires. This is top.

MS. BROOK: So, sorry, but what do you mean by models?

MR. BENYA: The models are the calculational models part of the ASHRAE/IES 90.1 process that I was describing earlier. It's a calculation where you put in a particular intended illuminance value and based on an agreed upon set of efficacies for particular lighting systems that include LED luminaires. So, LED luminaires are now, because we've gone from -- well, geez, I don't know why I have to get into this. We've gone from relative to absolute photometry, so I can speak in terms of a luminaire having so many lumens per watt. We couldn't do that before. So, that's been a major translation.

But there's a large spreadsheet, which if you're interested I'd be happy to show that to you or, more importantly the CASE members who worked on that will be able to show that to you. Jon's also pretty much an expert in it so --

MS. BROOK: So, is that involved in the prescriptive end of the performance?

MR. BENYA: It is used to create the allowed lighting power density for them. But remember, so it works for both prescriptive and performance. And then it gets broken down and reorganized so it can be for the whole building method, the area category method, or the tailored method. Okay.

MR. STRAIT: I'd like to remind the audience, if you want to ask any questions or make any comments, please come up to a microphone. Only because, otherwise people that are listening online aren't going to be able to hear you.

MR. BENYA: Okay, finally, HVAC interaction effects are small compared to the primary effect of saving lighting energy and cost.

So, to a certain extent HVAC impacts, again because we're now down where a typical building is under a half-a-watt a square foot, HVAC impacts are pretty minor. And the emphasis has been placed by the CASE Teams on the energy savings with minimal, but some consideration for HVAC.

And I think if there's a bigger question about that, please ask it when we get to the Q&A here, in a minute.

I've taken only samples of these. All of the values will be in the CASE Reports that are going to be uploaded to the website, as Payam indicated earlier.

One of the things I hope you all take the opportunity to do is go through all of these values and see if they make sense.

They've already made a first pass. Frankly, we made one significant observation, so far, that for the most part these numbers are pretty good. The Team did an excellent job.

We are proposing that the 2019 values would be rounded to the nearest 5/100ths of a watts-per-square foot. 1.14 would become 1.15. .6 is already there. .72 would be come .75. 1.01 would become 1.0. That sort of thing. You know, we're inferring a level of accuracy which just isn't there. So, that was one thing.

But overall, as you can see, some of the occupancies have changed really significantly and some haven't changed at all.

What impressed me about the CASE Report, upon which this is based, was the fact that probably some of the best computer modeling, and I know that the CASE Team also used AGI 32 models, did not just use the simplified lumen method developed for 90.1. They're

using much more sophisticated calculations, very thorough work, and for which I commend them.

If you look at, for example, classroom lecture or training room, the drop from 1.2 to .75 is pretty significant. That's huge. And, you know, we're going to be looking at big changes like that very carefully as we discuss from here on.

But, certainly, it's up to you, if you'd like to take advantage of the opportunity to review these numbers and comment on any of them, specifically.

For example, if we look at dining area, this one is dropping from 1 to .4. It sounds like an awful lot, it's like 60 percent. But you have to look at it in the complete context, particularly in the area category method, because there's been adjustments to the allowances for task lighting, display lighting, decorative lighting, et cetera, that may be offsetting.

I'm not going to get into all those details right now. That's for your homework. But I wanted you to know that a couple of these, we'll see. But overall, I understand the -- well, see, corridor and transition, no changes for example.

Jon McHugh. We actually do have a Q&A session here but --

MR. MCHUGH: This is Jon. Jon McHugh, McHugh

Energy. Jim, you're doing a great job presenting the proposal. I'd like to point out I think some of these are from an older version of a CASE study. The most current CASE study is posted on title24stakeholders.com, so everyone can take a look at those.

And then, we had an earlier conversation with you and the Commission staff. We have rounded everything to the closest 5/100ths, so that we're not having four decimal points or something like that. Thank you very much.

MR. BENYA: Yeah, thank you, Jon. Yeah, Jon's making a really good point. The process has been very iterative. I got the last draft CASE Report that I reviewed last night, or yesterday afternoon. It was late yesterday afternoon. And I've vetted some of that in -- it's more about controls that will show up here in a second. So, yeah, it is a -- we're in the middle of it right now. And Jon's right, this was taken from a version about three weeks ago, I think.

Okay, staff and consultant initial comments. These are my thoughts and we discussed them with staff, and members of the team that are here.

And first observations, extremely thorough and thoughtful. Still questioning individual values, but overall well done.

Will reduce cost and complexity of design, documentation, inspection and acceptance testing. We tend to agree.

Eliminates almost 40 years' of worry about cheating and abuse of incandescent lamp technology. I want to recognize Gary Flamm and all the work he's done, all the years of trying to think of all the ways that that could happen, and making sure that we found a way to minimize that. And, you know, Gary was the gatekeeper on this and did a great job for many, many years.

Okay, I'm rounding all values.

Questions for stakeholders. There may be some specific space LPDs or other allowances that haven't been addressed, yet.

Is lighting design ability protected as well as in past Standards? This is going to be something we're going to go through, probably a few more times, in the next coming months. I always worry about us creating a Standard that will only allow 2-by-4 troffers in office spaces. And 2-by-4 troffers in retail spaces. And 2-by-4 troffers in just about everything else.

There's no denying the 2-by-4 LED troffers is one heck of an efficacious lighting system. But is it appealing, attractive? Is it good lighting design? I'm

not going to necessarily go there, myself. So, we're going to be begging those questions that other alternatives, will they also be able to be designed, especially efficient versions of them?

And what about the special issues, such as seniors, warm dimming, color tuning, et cetera? These are hanging out there. We do not have a solution for these. I think we -- I'm worried about them. And I think that we're going to be talking about that more as this is the area that I think deserves a little bit of attention.

Please submit comments. You can, of course, copy me on them, but please use the process that Payam indicated earlier.

So, we have some time for questions and comments from you. Bernie?

MR. BOWER: Yeah, Jim, Bernie Bower, Integrated Lighting Concepts, working for the utilities group on this particular project.

One of the things I wanted to point out, and as you look at that CASE Report and why you sometimes see some very drastic dropped numbers, and Jim already alluded to it in some of the areas, is that we have a lot more of the use-it-and-lose-it adders.

When I had the opportunity to work on this and I

worked a little bit in 2013, and did that with retail, and now I had an opportunity to deal with other ones. I found that some, let's call them unseasoned designers, will take a number and if you give them 1.5 watts per square foot for an auditorium, they will use it and somehow they'll come up with light, and they'll use 1.5 watts.

With a monolithic, like Jim said, not everybody wants to do it by a 2-by-4 troffer system.

If, on the other hand, we look at what a base level is with a little bit of adder, which is what we've done, and then have these use-it-or-lose-it, a decorative or an ornamental lighting addition, or let's say an absent feature addition even in area method, now we can build it back up. And if somebody really wants to do that space and designs it properly, with the right equipment, they can do it.

And yet, at the same time we're just not making it real easy to throw a bunch of troffers in to get 1.5 watts or 2 watts per square foot.

So, that's the big change. As you look at that page, you'll see there's a lot more of those types of addressments in the area method.

And, of course, tailored method has had that for years. So, we've taken a little bit of that and put it

into area.

MR. BENYA: Thank you, Bernie. That's an extremely important point. Those of you, who are looking at kind of the lighting design perspective, be very careful about this. Because as I said earlier, and Bernie reiterated, some of the drops look pretty precipitous. But if you look at the use-it-or-lose-it values, you may find something else.

Can I have that question back? Let's see, how do I do that?

(Pause)

MR. BENYA: There was a question that popped up. Okay, great. So, I don't have to deal with it, you're going to deal with it. Okay.

Charles?

MR. KNUFFKE: Hey. Hello, everybody, Charles Knuffke with WattStopper.

Jim, thank you for the presentation and the explanation of what's going on.

One of the reasons I particularly appreciate these sorts of things is to try to be able to bring color, and characteristics, and background information when we do training sessions to the engineers, to let them know what the new code is.

So, in regards to current limiters, those were

installed to basically prevent lighting from being added later on. So, when you mentioned dropping current limiters from the standard, or basically dropping them is -- am I misreading? Are you now allowing light to be added later on? Or, what's being done to prevent that for a track lighting?

MR. STRAIT: I'll answer that. The main thing we're dropping is the certification requirement. So, we're saying you don't have to send a sample to the Energy Commission, have us examine it and then sign off of it before you can install a current limiter.

Also, rephrasing and restructuring some of the 133.0 language to look at what we refer to, generically, as the current lighting -- well, whatever part of the system is the maximum cap on how power can flow through it.

So, that can still be -- an integral current limiter, that can still be in a protection panel. Or, it can be, for example, if you have a driver that is really restricting how much power gets out to the lighting, it can be that, instead.

But the main thing we're dropping is the certification requirement. That was burdensome and we found that now, with these LEDs and these other systems it has less value, than it did, in really preventing

people from snapping on additional 6-year high watt incandescent bulbs.

MR. KNUFFKE: So, the certification limit goes away, but then I would imagine the wattage requirements would also go down if the intent is to have LEDs. So, what was a 2-amp current limiter might actually have to be much lower than that, now?

MR. STRAIT: If that was what we wanted to have for that system, yes.

MR. KNUFFKE: Okay, thank you very much. Sorry for the misunderstanding.

MR. STRAIT: Oh, our apologies for not being as express with that.

MR. BENYA: Thank you, Peter. Thank you, Charles.

Gary? If you have questions, please don't hesitate to stand up and get in line. And we'll get through these as quickly as possible.

Gary?

MR. FLAMM: Good morning. It's interesting to be on this side of the table.

(Laughter)

MR. FLAMM: My name's Gary Flamm, of Gary R. Flamm Consultant.

A couple things regarding current limiters'

track lighting. In Table 130.1.8, it basically requires most technologies to be dimmable. But track lighting has one step between, which seems to inadvertently favor track lighting, if you want to circumvent dimmability.

I just suggest, as you look at all the language for changing track lighting that you pull that language into your consideration and see what that means. Whether that's good or bad, I don't know. But I do believe that there's an incentive to use track lighting because of that. So, that's what I want to say about track lighting.

MR. BENYA: Thank you, Gary. Does anybody from the CASE Team want to speak up to that or just want to make a note and we'll talk about it later? They're coming up, okay.

MR. FLAMM: The second thing is on lighting power densities. One thing I wanted to say is I believe ASHRAE uses LPA, lighting power allowances, and Title 24 uses lighting power densities. Because I hear both used interchangeably, and I'm wondering if the language should be consistent between 90.1 and Title 24?

MR. STRAIT: While we're looking at these dividers for us. Lighting power density is the actual density of the power's that's being installed. Lighting power allowance is basically your allowed lighting power

density for that space.

MR. FLAMM: Right.

MR. STRAIT: So, we're currently saying is the allowance is the limit that we're prescribing. The density is whatever is actually present.

MR. FLAMM: Right.

MR. STRAIT: And I have not yet gone back to through 90.1 to see if that's fully consistent with how they use those terms. But our understanding is that we make them more consistent.

MR. FLAMM: Okay. The last thing I wanted to say is regarding evaluating the LPDs, there's a set of definitions for the functional areas for each type of functional area. What happens sometimes is there's an umbrella definition which inadvertently there's a functional area that falls under that definition for which the numbers are problematic. And the more eyes that can scrutinize are there any functional areas that need to be broken out, or does the denominator need to be raised?

So, what I'm recommending is all lighting designers scrutinize the new LPDs, not just for what's apparent, but for any sub-functional area that would fall, inadvertently fall into that. So, I'm just recommending lots of eyes look at those definitions.

MR. BENYA: Thank you, Gary. I don't think we need a response right now, but so noted.

MR. FLAMM: Okay.

MR. BENYA: Okay?

MR. FLAMM: Thank you.

MR. BENYA: Thanks. Any other questions? Greg?

MR. ANDER: Thanks, Jim. Greg Ander, I'm an architect here, in California.

I want to give you some context here. I notice in your acknowledgement slide you acknowledge the CASE Team and the California Efficiency Alliance.

The Efficiency Alliance is a group of pretty broad-based industry folks, design professionals, academia, NGOs, national labs, literally several dozen organizations that have gotten together to work on issues of importance, on energy issues in the State of California as we drive towards zero net energy and, ultimately a clean energy economy.

So, it's drawing from this expertise of, you know, practitioners in industry that we submitted a couple of CASE studies. You've been in a couple of meetings, and some staff as well, we appreciate it. We briefed Martha and Commissioner McAllister, a couple of weeks ago, on some of the projects.

But the organization is now assembled and

working on initiatives with the Energy Commission, the CPUC, the Cal-ISO, ARB, you know, when it's appropriate to help inform the process and use the expertise in terms of engineering analysis, cost effectiveness, market issues that we're seeing, things like that.

There's a number of control organizations affiliated with this group, interested in advancing some of these advanced automation opportunities going forward. We recognize that the '19 Standards pretty quick, happening fast, so we're looking at tweaks here.

As we go on, I understanding there will be forthcoming venues to talk about these.

But a lot of interest in advanced automation for grid stability, working with the Cal-ISO, Dr. McAllister, and Commissioner Weisenmiller about this, too.

But to the extent we can start to leverage these and the development process to integrate these, as we see much more renewables into the system, and using them for balancing and so forth. New energy imbalance markets are coming up, as well as price signals and evaluation.

Want to work with you on this. Understanding that's forthcoming, but wanted to plant the seed, now. Okay?

MR. BENYA: Thank you.

MR. ANDER: Thanks.

MR. BENYA: Mazi?

MR. SHIRAKH: I think what Greg just said is very important in our long-term mission for organizations who are pursing those and I think we need to.

MR. BENYA: Yeah, and from my own point of view, I thank Greg. He's been a participant in this program for as long as I can remember. And the issues we face in the State are very dynamic, they're changing very quickly. And as a result, yeah, unfortunately this process is one that has years in which we fix, and improve, and tweak, and then there's years when we do overhauls. And the 2022 is the overhaul year.

So, it's going to give us a little bit of additional time. But remember, the work done in 2022 starts in 2019. So, once this is done, the work just starts all over again.

One of the things, I want to react, though, to your recognizing the fact that what the CEA has done is it's reintroduced the collaborative process that, for so many years was how the standards were developed. Before the Utility Consortium was created, and provided so much of the heavy lifting, a lot of this work was done ad hoc

by a number of different, disparate groups getting together.

What I'm thrilled to see is the CEA bringing in a reasonably well-organized and well-funded group that can represent a quite a few that includes, possibly, some different points of view than are being presented by the CASE Teams.

The CASE Teams are doing an excellent job. CEA's been doing an excellent job, although they're very young. So, it's great to have both points of view being represented. I'm not sure I'm seeing a lot of difference between the two of you.

But I am seeing a little difference in the experience and background being brought to the two. So, this is good, this is really good. Thank you, all.

Nancy?

MR. BOZORGCHAMI: Oh, can I interject here, real quick, before Nancy. This is Payam, again. One correction to what Jim said, work for 2022 is going to be starting shortly. So, it won't be until 2019. We'll probably end it and we'll start end of 2017, early 2018 and we'll start brainstorming and moving forward to get going on 2022.

2022 is going to be a big move. One of the areas that the Energy Commission is committed is to

separating multi-family, separately from both residential and nonresidential.

And what Mazi said, with great harmonization and what Mr. Ander said, it's very important that we start that work sooner, than later.

MR. BENYA: Thanks, Payam, I stand corrected.

INAUDIBLE SPEAKER: Just to follow up, we haven't scheduled it, yet, but just keep your eyes out for some time in the fourth quarter of 2017, we're going to look at doing some sort of scoping workshop, yeah, very high level for 2022, so that we can start putting on the table the things that we're looking at. But also, really, we want to get an idea of what people, outside stakeholders, what they would like us to start looking at, so we have plenty of time to do that before the standards start.

MR. STRAIT: Also, there's one other point of logistics. We are going to be having separate presentations that are on, specifically, lighting controls, so there's going to be some presentations looking at those topics.

Also, we have a later workshop that is examining demand response as a channel throughout regulations. So, there is another upcoming workshop that will get into more detail on demand response, specifically.

MR. SHIRAKH: So, for Jim and we know 2022 is going to be a bit year for nonresidential. How does the lighting play into that? I mean, are you envisioning big changes to lighting for 2022 or --

MR. BENYA: Gee, Nancy, you want to take that one. Well, let me take it, first.

What I see is the continuing evolution of solid state lighting driving down lighting power densities. But at the same time I see a big growth in white light color tuning, circadian lighting. One of the things I'm going to flag about so-called circadian lighting, or human-centric lighting, whatever you want to call it, is that one of the things we all need to realize is that most indoor lighting levels we work at, we're in the zone of what's called biological darkness. In other words, there's not enough light to inspire your circadian system.

The light levels that have been found to be necessary to do that, and vertically measured at the eye, seem to be in excess of a thousand bucks. Now, we don't light indoor spaces to a thousand bucks. And I don't think we, as an entire industry, starting with the CIE, and the IES, and everybody on the way down have yet got their arms around what does this mean in terms of how we design buildings, how we design lighting systems

and, for that matter, daylighting?

So, all of these are topics that are going to evolve over the next several years. So, I think it has probably less to do with major changes in lighting technology, but the major changes are going to come in design practice, with that one as sort of the tip of the iceberg of changes in how we understand light and human wellness. That's going to be a very interesting area and see what we find out.

Nancy, do you --

MS. CLANTON: I couldn't agree more with Jim. It's going to be the influence of daylighting and, you know, instead of putting lipstick on a pig --

MR. BOZORGCHAMI: Nancy, can you state your name?

MS. CLANTON: Oh, I'm sorry, Nancy Clanton, Clanton & Associates. We're also the CASE authors for outdoor lighting.

So, my question for you, Jim, and you don't have to answer it here, but you did mention light tuning as something for -- you know, for the next code cycle. But for us, right now, trying to figure out what the wattage is, is that with a control system and adjusting the white tuning or is it -- I mean, this may be a question for Alex, from NEMA. Where are you? Yeah, there you

are.

MR. BENYA: Yeah, let's --

MS. CLANTON: In other words, every time we talk to manufacturers, there's huge confusion over this topic.

MR. BOZORGCHAMI: Could you get to the mic so people on the phone can hear you?

MS. CLANTON: Yeah, huge question for this.

MR. BENYA: Nancy --

MS. CLANTON: So, anyway, I just wanted to bring that up.

MR. BENYA: Yeah, thank you. You k now, we're going to tap into this a little bit in the next segment. But very quickly, that's why when I did my opening presentation it said "input requested from stakeholders." Give us something. We're all stakeholders here, okay, give us your thoughts. I have my own thoughts. But as part of the team I'm working with, here at the Commission, we've opened the topic.

But industry and industry standards are going to drive this. If I can chide industry a little bit, industry has not been standardizing things enough to make them able to be codified. Okay? So, industry, Tanya, I'm looking at industry here, and all of you, you know, some standards that you all agree on pretty darn

quickly, I might add, are going to be necessary for us to be able to use for the language in the standards that are going to be developed.

Tanya?

MS. HERNANDEZ: Hi, good morning. I'm Tanya Hernandez from Acuity Brands. Thank you so much, Jim, for the presentation. And, actually, I was sitting there saying do I really have a question?

But I guess the first thing is during your presentation on the general issue, that you just mentioned you had a laundry list of things that you're looking for stakeholder input. And I looked at those, and I think you guys have asked a lot of questions about those topics before.

But as of right now, we don't have like a draft CASE Report that we can reference to see what exactly, what kind of information you really need. I mean, there's all kinds of information on color change. What, specifically, you're looking for as far as code language, or basically could help your models, we're unable to really provide that information without having, you know, something to work from.

So, I just wanted to make sure that -- maybe I'm missing it, but we were looking on the website and we haven't find the light sources CASE Report, as of this

morning.

And then I also wanted to confirm that, you know, we really support the LED baseline for indoor lighting, so it's actually good to see that being put forward.

One of the things that you mentioned was that it was being affected by the requirements for Title 20, in the DOE requirements. And I'm assuming that's for lamps. I mean, we're talking pretty much lamps, the JA-8 piece. Well, not JA-8, excuse me. The actual --

MR. BENYA: 887, yeah.

MS. HERNANDEZ: Yes. And so, when I looked at that I was little confused because this is a nonresidential lighting piece and those products are really for, you know, retrofit lamps. At least that's my understanding.

And so, I was trying to see where you're going in terms of nonresidential lighting and if there are standards that you're referencing for that, not just a retrofit standard.

MR. BENYA: Peter?

MR. STRAIT: Sure. First of all, on the topic of the CASE Reports I know they're currently available at the title24stakeholders website, is where these are. If that one's not present, let me know and we can figure

out a way to -- we can try to post it on our website, as well as a link over there.

In terms of what we're doing with the State and Federal Standards, the State and Federal Standards are lamp standards, but they are not specific to either residential or nonresidential. They basically regulate all products that are entered in the stream of commerce, so, we have to make sure that our regulations comport with those.

For example, JA-8 was drafted before Title 20, before Title 20 Compliance folks had put in, you know, their lamp standards. And, obviously, that wasn't exposed to a public process at all. So, polished that in with ours. So, we're trying to bring ours into alignment with that so that we are not asking people to meet very slightly different standards, when they really ask you to do the same thing, and make the same demonstrations.

And to the extent we can then base additional standards on those to where there's consistency between lamp products are going to be State or Federal regulated as an appliance, and the products that fall outside of that, we're trying to hold them to at least -- at least an even playing field, so they're not terribly different.

So, it's those kinds of concerns we're primarily looking at.

MS. HERNANDEZ: And then my last question was the comment due date. I think you mentioned an earlier date and then --

MR. BOZORGCHAMI: It's July 7th.

MS. HERNANDEZ: It is the 7th.

MR. BOZORGCHAMI: It is the 7th.

MS. HERNANDEZ: So, your date --

MR. BENYA: So, my dates are wrong.

MR. STRAIT: Okay, so one second.

(Pause)

MR. STRAIT: July 14th. Yeah, he's right. Because of the holiday week we set it forward one week. Apologize.

MS. HERNANDEZ: Okay, great. Thank you. Thank you for at least thinking of us on the 4th of July.

MR. BENYA: The 14th. The 14th for comments, yeah.

MR. STRAIT: So, just as a general rule, we tend to give two weeks after the workshop for folks to submit written public comments on that workshop. We're not adverse to taking comments later, but that's kind of we want that because tomorrow our staff are going to be working on these topics, diligently. And the sooner we

get those comments, the more they can add the momentum we've already got going in-house.

In this case, because of the July 4th holiday we're giving an extra week. So, it's three weeks to get those comments in.

MS. HERNANDEZ: Okay. So, we look forward to having those documents posted so we can get working on it. Thank you.

MR. BENYA: Thanks, Tanya.

Come on up, Kelly.

MS. CUNNINGHAM: Hello. Kelly Cunningham, Pacific Gas & Electric. Regarding the Indoor Light Sources Report, it is currently on title24stakeholders.com. You have to navigate to the indoor light sources page. If you scroll down, briefly, there's a measure description. The next section says, "Codes and Standards Enhancement CASE Report," and there's a draft CASE Report download link.

So, a few days ago, the 2019 CASE Reports had their own section, but this was confusing because then we had a lot of topic descriptions, and then a separate list. So, they've gone back to where they should be, which is under each category.

so, when you look at the second paragraph, or second section, that's where you can find them and it's

there, now.

And please don't wait until July 14th to submit your comments. And the CASE Team also invites direct connection with the CASE Authors, when appropriate. We will also be monitoring the comments and hope that we can reach out to you for future discussions.

If you post things early, our discussion will be more productive. Thank you.

MR. BENYA: Thank you, Kelly. Any other comments?

MR. URAINE: This is Christopher. I just wanted to sort of thank you for that comment because it's something we encourage. It's like we reach out to staff with, you know, basic questions to help focus your comments that's very helpful. So that instead of having a very complex public comment, if you can address comments, you know, or address questions to staff, we'll help you with that so that you can actually focus your comments on things that are more complex.

MR. BENYA: John Martin?

MR. MARTIN: I'm John Martin. I am here partly in my capacity as Public Policy Consultant to the International Association of Lighting Designers, and partly as Co-Chair of the California Energy Alliance.

So, the first question I'll raise with respect

to the complexity issue, the IALD, the International Association of Lighting Designers, has some concerns about the modeling methodologies used to calculate LPDs, both in Title 24, and more recently in ASHRAE/IES 90.1. And when we know more and have more to say, we will send a complex comment.

In my capacity as Co-Chair of the CEA, I just want to follow up on some of the comments that Greg Ander made, and speak a little bit off topic to 2022. Mazi raised the question of, well, what would lighting look like in 2022?

Part of the scoping exercise the CEA intends to go through is to say, well, what should it look like? What would really, instead of being an incremental change to what we've done for the past 40 years, what would a whole new direction look like?

We have whole new technologies. We have whole new ways of measuring energy. What would make the most sense to allow lighting to really both serve needs of human comfort and productivity and, at the same time help do even more than the 90 percent that lighting has already done to achieve a zero net energy future?

So, we look forward to participating in that, as well. Thank you.

MR. BENYA: Thank you. And just as a comment

from me, personally, I see you picked up on a few things that I also picked up on. Things that are going to have to change. And I'm glad to see Professional Lighting Design, as well as the entire Association participating in that process. It's going to be really, really a big deal.

So, not seeing anybody else lining up, RJ, do we have anything online?

MR. WICHERT: Nothing online.

MR. BENYA: Okay. So, not seeing anybody else lining up, we're nine minutes ahead of schedule.

Cheryl, you want to say something?

MS. ENGLISH: Good morning, Cheryl English, Acuity Brands.

Just a quick question. So, I appreciate the extra time on the response because that will be very important. When are the models going to be available? Because it does take quite a bit of time to go through the models to evaluate them. I did not see the models. I see CASE Reports that were apparently just posted early this morning, or last night, but I haven't seen any of the data regarding the models.

MR. BENYA: Jon McHugh, he'd probably be as knowledgeable about that, as anybody.

MR. MCHUGH: Hi, Jon McHugh, McHugh Energy. You

need to talk with CASE Authors and we'd be happy to share the details of the method models. Would that be of interest?

MS. ENGLISH: The ones in the CASE Report?

MR. MCHUGH: Yeah, absolute. Now, the report -- myself and Bernie.

MR. BOZORGCHAMI: Jon, use the mics.

MR. STRAIT: You can walk around the other side of the podium, if you need to.

MR. MCHUGH: Yeah. So, contact us, we'd be happy to share the documentation. The CASE Report, itself, has very extensive appendices. So, after you've read the appendices, you may find that you have all the information you need. But if you want to go down to, you know, the actual equations, we can provide that as well. Thanks.

MR. BENYA: Thank you, Jon.

Anybody else? So, we're finishing about 7 or 8 minutes early. Let's then take a 7 or 8 minute break. We'll start again at the bottom of the hour.

(Off the record at 10:22 a.m.)

(On the record at 10:31 a.m.)

MR. BENYA: Please take your seats.

MR. STRAIT: Hello folks, I know there are many useful and productive conversations going on, but we

need to stick to our agenda. So, if people could please take their seats?

MR. BENYA: Okay, gang. Now, one of the reasons why I wanted to get started on time is this one's probably going to push us to the limit. It's not going to give us another break before lunch, so let's get busy.

This is about lighting controls. The primary work here is, again, done by the CASE Team in the lighting controls area.

The scope of the changes that are being proposed affect primarily these areas; automatic daylighting dimming plus OFF, mandatory occupancy sensing full OFF controls in restrooms, manual ON commissioning for automatic time-switch controls, and nonresidential indoor lighting code language cleanup and alignment with 90.1.

This is a table of the proposed changes. Again, there's actually five areas in which changes are proposed. The first one, daylight dimming plus OFF, daylight dimming plus OFF controls in secondary zones, occupancy sensing controls in restrooms, manual ON time-switch controls, and residential indoor lighting code language cleanup.

One of the first things the CASE Team is

proposing is specific 90.1 2016 disagreements. Lighting power wattage exception recommends leaving the Title 24, Part 6 lighting power exemption in place as opposed to harmonizing with 90.1. I think this is a pretty good idea.

The cost of energy is more expensive in California and Title 24, Part 6 uses a lower discount rate than ASHRAE/IES 90.1, which allows for a lighting power wattage to be cost effective.

There's a total glazing area exception that recommends leaving the Title 24, Part 6 glazing exemption in place, as opposed to harmonizing with 90.1.

So, I think those of you who want to take a crack at this, this is an interesting area. I haven't tried to reconcile the two, myself.

One of the big changes is to make occupancy sensing with full OFF controls in nonresidential restrooms. This is already required in 90.1 and it's recommended now, for Title 24.

It recommends that Chapter 5 in the 2019 Nonresidential Compliance Manual include guidance on the appropriate occupancy sensor technology based on the size and configuration of the nonresidential restroom.

Larger, multi-stall restrooms should consider zoning and install more than one dual-technology

occupancy sensor to avoid false OFFS. Occupancy sensing technology and the layout of the space should be discussed in the compliance manual. Pretty self-evident.

Manual ON commissioning for automatic time-switch controls. This is a change. Automatic time-switch controls to comply with Section 130.1(c) should be commissioned as manual ON. this proposal would exempt the automatic time-switch controls used in a number of applications, industrial, et cetera.

It will reduce the amount of time the no nonresidential indoor lighting is turned ON when there are no occupants present in the space.

It does not prevent automatic time switches from being reprogrammed to use automatic ON setting after acceptance testing and commissioning are completed.

You know, I think this is -- one of the things I like about the CASE Team's work here is that they're thinking about the ramifications of doing some of the things that are being proposed, and I think they're doing a good job of that.

Nonresidential indoor lighting code language cleanup and alignment. Increase minimum dimming level in classrooms. Consolidate automatic daylight dimming controls to Section 130.1

This is appreciated because we all know that the standards have grown over the years. They've changed number systems, a lot of things have happened, and some things have gotten out of place. And one of the things I love about our process is we think about this as we work on the standards. Everybody's thinking about how can this be made more easily understood, appreciated, implemented and inspected? And so, these are, I think, very good ideas.

There are some changes here to Section 130.1(b), multi-level controls. This gets a little complicated so I'm going to show you the bullet points. I'm going to show you what the new language looks like.

One of the things is a cleanup. Replace enclosed area, which is not a defined term, with enclosed space, which is, in Section 100.1.

One of the things that is part of the process, hidden behind the scenes a little bit, is making sure that Section 100.1 definitions, and every phrase or definable term used throughout the standards are consistent. And every now and then we find one like this and yeah, we know we've got to go back and fix it.

Delete the Exception Number 1. Classroom lighting is proposed to no longer be exempted to the higher 0.7 watt per square foot. The simple multi-level

controls.

I was the CASE Author for the controllable lighting change for the 2013 Standard. The reason why classrooms were exempted at that point was because based on the CASE Report classrooms didn't have enough burn hours to warrant controls.

I can tell you, just from my own personal and professional experience, that not only has the lighting power density in classrooms gone down, but the cost of controls capable of making these changes had come down, too. That's one of the most surprising things about lighting these days is things that seemed extremely expensive in 2011 and 2012, when we worked with Doug Avery, and when he was with Edison, to create the controllable lighting standard. Things were so expensive relative to today. You know, occupancy, vacancy sensing, you know, controllable light. Every driver is dimmable pretty much. It wasn't that way back them. So, that's why these things make sense.

Exception 2, as applications comply with Section 130.1(c)7 and (c)8, for the exception for continuous dimming controls, and the current exception only includes applications complying with 130.1(c)6.

That's all pretty techy language, so let's see what it really looks like. It would change multi=-level

lighting controls to say the general light of any enclosed space, 100 square feet and larger, where the connected lighting wattage exceeds half-a-watt per square foot shall provide multi-level lighting control that meets the following requirements.

And these are pretty much the existing language that we have today.

I would like to challenge the CASE Team and everybody else, to look at that 0.5 watt a square foot exemption. Maybe that number can be lower now, for the reasons I just pointed out.

This is how the exceptions change. The exceptions would change classrooms with a connected lighting of 0.7 watts per square foot or less and public restrooms shall have at least one control step between 30 -- well, this is the proposed language. I think we've got a problem here. Jon?

MR. MCHUGH: Jon McHugh, McHugh Energy. I believe the proposal is to strike the entire exception. That exception is no longer needed anymore.

MR. BENYA: Yeah, I kind of pasted these up like last night.

MR. MCHUGH: Okay. Yeah, not a problem.

MR. BENYA: And when I got to copying it, I'm afraid I blew that one. My apologies.

So, what it does is get rid of that entire Exception 1.

The next one, Exception 2 it used to be, is now 1. So, 1 goes away. 2, an area enclosed by ceiling height partitions. 3 becomes 2, and 3 is added as restrooms. So, this is the way it will change. Section 1 completely goes away, my apologies.

Okay. These are lighting controls, 130.1(c)1C Separate Shut-off Controls. Clarify the intent of the square footage limits per control. The direct intent of this section is that separate controls are required for each space enclosed by ceiling height partitions no greater than 5,000 square feet, and lighting is controlled by each control. Consider changing the criterion from square foot to wattage. Interesting.

Clarify the exception. Malls, auditoriums, single tenant retail, industrial, convention centers and arenas, with separate controls for each space and no greater than 20,000 square feet of lighting is controlled by each control. Also convert the maximum controlled area from 20,000 square feet to 15,000 watts of controlled power.

You can see this change a lot, from square footage to power. The CASE Authors, where did -- is this a 90.1 reconciliation? Anybody? Okay, it's just a

suggestion, okay. It's now in the discussion.

So, this is the way the language will look and --

MR. STRAIT: This is Peter Strait. So, I think the underlying and strike through was not carried over to the (inaudible) -- because I'm looking where it says 5,000 square feet, 3,000 watts. And I think one of those is supposed to be struck and the other is supposed to be underlined.

MR. BENYA: Okay, thank you, Peter.

MR. STRAIT: So, apologize for the technical difficulty there. The language is also shown in the CASE Reports, so you can also get those online.

MR. BENYA: Yeah, I would recommend that because we were receiving these kind of late, and I was in the middle of work a little late, and may have missed a couple of things. My apologies, again. The CASE Report will have all this accurately.

So, make your comments not on the presentation, but on the CASE Report.

Section 130.1(c), Mandatory Lighting Controls. Add a mandatory requirement for occupancy sensing full OFF controls in nonresidential restrooms to capture energy savings when restrooms are unoccupied.

A little bit of history of this, from my

perspective, one of the reasons why we were reticent to have full OFF lighting controls in restrooms, other than worrying a little bit about somebody getting trapped in there and not being able to get out, should they fall asleep or whatever, the real issue was cycling of lamps. You know, until we had solid state lighting, you didn't want to be turning fluorescents on and off, and on and off, and on and off. It would just eat light bulbs and it wouldn't pass a cost effectiveness test based on the maintenance cost.

It changed. All the world changes with solid state lighting. You don't worry about those things anymore. And that's one of the reasons why this is a good idea.

Add an exception to 5A and 5B in areas not required by 130.1(b) to have multi-level lighting controls, lighting is permitted to be controlled by an occupancy sensor that automatically turns the light ON, all lighting when the room is occupied.

And automatic time-switches shall be commissioned as manual ON, with the exception of several function spaces that are open to the general public.

I think I mentioned these earlier, but you can see it in the specific language.

This is 130.1(c)3, Manual ON Time Switch.

Change time switch control, and delete "other than an occupant sensing control". It causes confusion.

Clarify that the area control in each room is capable of manually turning lights OFF. Clarify the timed override of the time clock control by the area control. And a new requirement in which time-switch controls are manual ON for most occupancies.

Again, excellent work by the CASE Team here. I don't think I've seen quite so many small changes in the controls area in a while. And I think this was pretty excellent, so good job.

Mandatory indoor lighting controls, automatic daylighting controls. Add mandatory requirement for Skylit Daylit Zone and Primary Sidelit Daylit Zone including OFF step in automatic daylighting controls with an exemption for classrooms and Primary and Secondary Sidelit retail spaces. Also applies to Secondary Sidelit Daylit Zone for projects using a prescriptive approach.

It requires lights being turned off when daylight illuminance exceeds 150 percent of design illuminance.

Did everybody get those? You can see what those are about, okay.

We're going to come back to some questions that

have been raised about those a little bit later, so just hang on. The step OFF is giving a few people some concern and I have that later in the presentation.

Indoor lighting controls, Section 130.1(c)4. Renumber Section 130.1(c)3D as it is another requirement of time-switch controls. Renumber the remainder of 130.1 as needed.

Correct references made to Section 130.1 from Section 141.0(b)2I, J, and K, lighting and wiring alterations.

So, there's definitely some cleanup work. I think, as we have looked at fairly briefing in meeting with staff, we see this again is some pretty thorough work. There's some tweaks that are going to be needed, I think, but overall I don't see any reason not to be discussing these parts.

Section 130.1(c)5, the areas where occupant sensing controls are required to shut OFF all lighting. Require restrooms to do it.

Remove the term "room," since a defined term for a room is an "enclosed space" or "space."

Clarify that area controls shall be capable to turn OFF lights even when occupancy is detected. Move this feature from the bottom of the requirements to earlier in this section.

Simplify the area control requirements by including an exception for controls that are exempted from Section 130.1(b).

Added the term "manual ON" to better reflect the terms used by industry practitioners. Redefine the term "vacancy sensor" to permit field adjustable occupancy/vacancy. Also affects Title 20.

Now, that's an interesting twist. I didn't see that one coming, but it's an interesting question.

The CASE Team also recommends 130.1(c) areas where full or partial OFF occupancy sensing controls are required.

Remove the exceptions to Section 130.1(c)6A for controls that reduce power by 40 percent if they are less than 80 percent of area category LPD or if they are HID lighting.

I hope everybody agrees with me that HID lighting is as dead as a door nail. Okay. If you don't, let us know.

In Items A through D, add clarifying language to the phrase "reduce lighting power of each luminaire."

This is an interesting one because what it's really saying is that even illumination control now, instead of spotty light level controls. This is a change in philosophy made capable by LEDs.

In Items C and D, add language to allow reducing lighting power when the space is vacant but other portions of the path of egress are occupied. Item D to call out stairwells, controls retrofit when altering luminaires, as separate from corridors where controls are not required to be retrofitted when altering luminaire.

Section 130.1(c)7, areas where partial OFF occupancy sensing controls are required.

Lighting in common area corridors that provide access to guestrooms. Require all corridors to have, at a minimum, partial OFF controls that require that power is reduced by at least 50 percent when no activity is detected in a corridor for longer than 20 minutes.

Include the phrase "reduce lighting power of each luminaire".

Add language to provide the flexibility to reduce lighting power when a space is vacant but other portions of the path of egress are occupied." Controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space shall be automatically activated when entered from all designated paths of egress."

There is a problem there, I'll bring it up a little bit later.

Separate stairwells from corridors so stairwell controls can be called out as a part of lighting retrofits. Corridors are more difficult to retrofit motion controls due to hard ceilings, small wattage luminaires and aesthetic considerations.

Change requirements for parking garages, parking areas, and loading and unloading areas to match Section 130.1(c)6

Add the clarifying language to the phrase "reduce lighting power of each luminaire."

It will be interesting to see if you all agree with that.

Section 130.1(d)1A, skylit daylit zone definition.

Remove the introductory language, which was only intended for a list of items but there is only one item.

Add a definition of daylit zone for atria. There is actually an improved definition of atria and how that is handled, that we've seen. It's in the CASE Report. Strongly recommend you look at it.

Exempting areas under skylights that are shaded at least half the time, 1,500 hours a year during the timeframe of 8 a.m. to 4 p.m. That is kind of a really good idea, isn't it? You're not going to get a lot of daylight through something that's shaded.

Section 130.1(d)1B, primary sidelit daylit zone. Clarify that the term "glazing" is only located in an exterior wall and does not define sidelit zones near interior windows. Thank you for somebody figuring that out.

Replace the term "window" with "vertical fenestration" which includes glass doors.

Add the term "vertical" to clarify that this zone does not include areas that are obstructed by vertical obstructions. This includes that horizontal obstructions, like light shelves, do not reduce the areas of the sidelit zone.

Any area of skylit daylit zone should be subtracted from the primary sidelit daylit zone to avoid double counting of areas and to provide clarity on how lights are grouped together for separate control of lighting by daylighting controls.

Given the skill of some of the experts working on these proposals, I'm pretty sure these are spot on. But I ask everybody to check and make sure you think you agree with them.

Section 130.1(d)1C, secondary sidelit daylit zone definition.

One of the proposals is to change the secondary sidelit zones definition to be similar to the primary

sidelit zone. This includes clarifying the terms vertical fenestration and vertical obstructions.

And lights in the skylit zone or primary sidelit zone are subtracted from the secondary sidelit daylit zone to avoid double counting of areas and to provide clarity on how lights are grouped together for separate control of lighting by daylighting controls. The proposed definition eliminates any overlapping skylit and primary sidelit zones.

Again, good logic. Thank you, CASE Team.

Exception to Section 130.1(d)1B & C.

Provide an exception for areas near windows from being considered as primary or secondary sidelit zone when the horizontal projection of overhand distance is equal to the window head height. Energy savings are reduced by around 50 percent when the ratio of the overhang projection to the window head height is 1.0 or greater.

This is important new work. I don't think we ever thought about this well before. Thank you.

The exception does not apply if there is a glazing above the overhang, such as a clerestory window, typically used in light shelves and similar projections.

130.1(d)2 daylighting controls. There's a lot of detail in here. Move the prescriptive daylighting

controls from Section 140.6(d) to Section 130.1(d)2.

Remove Section 130.1(d)2C. The proposed definition ensures there are no longer any overlapping areas.

Remove Section 130.1(d)2D and renumbering the following item. I'll just let you catch up on that.

Change 130.1(d)2Ciii to refer to "daylit zone" rather than "space."

2Civ, where lights are dimmed to 35 percent of rated power to 125 percent of design illuminance. Require lights to be turned OFF when daylight illuminance exceeds 150 percent of daylight illuminance.

Change 130.1(d)2Cv to add "plus-OFF" portion of the daylight controls and allows a gap of 25 percent.

Change exception 2 to 130.1(d)2 to clarify that no daylight controls are required in the secondary sidelit zone and better define when controls are exempted in the secondary sidelit zone.

A lot of detail here, very thoroughly recommend it.

Strike the following sentence, "Lighting shall be reduced in a manner consistent with the uniform level of illumination requirements in Table 130.1-A." This requirement can be advantageous in applications, such as ornamental display, or displays in retail and

restaurants. However, the language "uniform manner" over-specifies how projects choose to reduce their lighting power.

Thank you very much. This is a lighting designer thing and I'm glad to see it.

New lighting controls. No controls shall override any of the required lighting controls in Section 130.1 that results in an increase in the energy consumption.

Additional controls can be included that reduce energy consumption.

Exception 1, override the 2 hour sweep in certain circumstances indefinitely, such as if there's a captive key switch.

Exception 2, permit certain time-switch controls that can turn lights ON in "industrial, single tenant retail," et cetera.

Exception 3, an occupancy sensor can only override the manual switch after "the space has been vacated and re-occupied regardless of prior operation of area controls".

Start thinking about what that might mean in some public spaces. This one, I'm not sure about it, yet.

MS. BROOK: I have a question.

MR. BENYA: Yeah. Hi, Martha.

MS. BROOK: Martha Brook, Energy Commission. Can you go back a slide?

MR. BENYA: Sure.

MS. BROOK: So, how would you check that the results do not increase the energy consumption? Is there like a test procedure that would verify that you haven't increased the energy consumption? It seems like a vague requirement.

MR. STRAIT: So, one thing I have to point out, and this is Peter Strait from the California Energy Commission. What Jim's going through right now is the contents in the CASE Team's proposal to us.

We generally agree with a lot of the concepts that are in there, they seem to be well-justified and well-founded. The specific language and specific embodiment of it, we're going to be looking at how that might be integrated and we may or may not use the exact language or the terms that they're using.

Also, that's where we want feedback from the public. If there's anything in here that is of concern, either in the specific language they've proposed or in the general concept of, for example, having a rule that says you can't have your controls cause more energy to be used, let us know. Please provide that feedback to

us.

Right now, we're just like looking at a lot of these proposals, they look pretty good. They look like they're going to accomplish the Energy Commission's goals of saving energy, while providing benefits in terms of the people that own buildings.

If there's something we're not seeing, though, let us know and give us that feedback.

MR. BENYA: Thank you, Peter and Martha.

Section 140.6(d), Table 140.6-A, lighting power adjustment factors. We're proposing they be revised. Revise the power adjustment factors for daylighting plus OFF control only to the applicable areas that are proposed to be exempt in Sect1on 130.1(d)2C.

Daylighting dimming plus Off end-user questions/concerns. I received these last night. I loaded them in here because the CASE Team is already aware of some end-user concerns. So, these technically are getting into part of the discussion.

If occupants report a problem when the lights are off, but functioning as intended, building operators might disable the daylighting controls to avoid future complaints, even though there's a simple adjustment or education that might accommodate the complaint.

I think this is really common sense. It's good

thinking and the CASE Team is being very proactive in saying, well, what will some of the complaints be? Without waiting for the complaints or issues to be raised.

Daylight dimming plus OFF may be an issue in spaces with "fine task" work or personally owned -- I don't want to say owned, but personally managed spaces. In other words individuals may have a problem.

Acceptance requirements must be simplified. One of the more difficult parts, I think in acceptance testing, is setting the daylighting controls up correctly because you have to go back and retest them day and night. And this may expand upon some of those requirements.

So, make sure there are no additional requirements added in the forms, and provide an explanation on how to do the testing when there are multiple daylight zones, such as primary and secondary in the same space.

These comments also said the length of time to test for all daylight conditions, which may require multiple site visits to test during the daytime and nighttime when the conditions provide the 60 to 95 percent daylight. Systems with auto-calibration can make the task more manageable.

This is obviously getting pretty technical. I see several people out in the audience who are very knowledgeable and may want to comment on this further, when we get to the Q&A here, in a second.

Some of our thoughts. One of the things I want to bring up is the State Fire Marshall has overruled Title 24, Part 6 of the Energy Code. Lighting control requirements when they conflict with Title 24, Part 2, Section 1006, egress lighting and emergency egress lighting, specifically partial OFF. We could also include any OFF control. Partial OFF does not mean Section 1006.1 unless the lower light level meets egress requirements whenever the building occupied.

The Fire Marshall has been very aggressive and has come out a couple times. This is recent code interpretation. The Fire Marshall's made it very clear if there's one person in the building, the entire path of egress must be illuminated. We cannot have partial OFF, if the partial OFF takes us below the egress level requirements. Okay?

So to everybody, for example, when you design lighting for a parking garage, we typically design parking garage lighting levels for minimums of about one-foot candle. Under normal conditions, typical averages are around 5.

Now, we could debate whether it's 3.7 or 4.2, but these are just some rough numbers.

The egress lighting level requirements under Section 1006.1 is 1-foot candle minimum on the path of egress. The Fire Marshall sees the path of egress as being most of the garage. Not all of it, but most of it.

So, for us to have a partial OFF it would drop the minimum light level in the garage, on the path of egress below 1-foot candle is no-no.

So, this is a suggestion to the CASE Teams to revisit this and see if they want to come back with an updated proposal.

One of the things I would also put on your plate, if you're willing to undertake it, we've already had discussions with the team about is there a middle ground? Is there a way of working with the Fire Marshall to come up with a proper way of doing this?

The Fire Marshall's come right out and said, though, there is no procedure in the code for establishing a way of saying the building is or isn't occupied. If there's one person in the building, it's occupied. And there is no way of saying if you go from one area of egress to another area of egress there can be an automatic response. That's not in the Building

Code. So, we've got a little homework to do there, folks, and I just wanted to make sure everybody's aware we've got to fix it this time.

MR. STRAIT: And one of the things I'll point out, too, is where there's a condition like this where the Fire Marshall, in this case, is saying that that control cannot provide its benefit in certain circumstances, that reduces the benefit we're able to weight against the cost of installing that control.

So, a requirement like that can actually make the control that is cost effective when it's providing as much benefit over as many as hours as we would anticipate, towards no longer cost effective, because some of that isn't arriving. So, this can strike directly at whether or not we can even have a requirement to have a partial OFF in this circumstance, even if there's a case where, well, some of the time it might work or if the light bulbs are in a certain state they might work.

All of it has to be in -- it has to ultimately feed into that cost benefit analysis.

MR. BENYA: Okay, coordination of lighting controls, Section 130.1(f) deserves considerable thought and may need to be expanded.

As you can see, the work by the CASE Team is

being very thorough, very detailed and they've considered a lot of things. One of the thoughts I've had, and this is more or less my comment, is we need to go back through this with a fine-toothed comb. Every year since controls really became as prominent in the standards as they are today, we've historically gone through this very careful process of making sure everything makes common sense and everything works. And so, I think it needs a little bit more.

I'm asking the question, network lighting controls? I mentioned this earlier, but I wanted to put this on everybody's plate. Network lighting controls have the ability to do several things. One of them is to detect whether there is anybody in the building.

The second thing is to measure how much energy is being used.

So, are these opportunities that should be explored in 2017 for the 2019 Standards? Are these opportunities that we maybe need to wait a couple of years and start looking at for 2022?

Given the representation of the industry that's here, I want to put this on everybody's plate. I see this as a giant opportunity for lighting controls to step forward and make a contribution to some of these challenges we face, otherwise, that they're already

capable of doing. The question is how do we build that into the standards and when?

Impact on acceptance testing is noted in the report. Could acceptance testing be simplified and how?

A giant question for all of us because we all know that acceptance testing, which was introduced a couple of standards ago, is probably one of the most important ways we know that the lighting controls are doing the job that all of our standards are based on them doing. And if they're disabled, they're not working, they're not properly connected or calibrated, we lose those promised savings.

Daylight switch to OFF. This one has given me a little bit of heartburn, too. One of the reasons is that most drivers dim to a range of about 10 percent to 100 percent of the designed light level. Okay? A switch to OFF from 10 percent will be a very noticeable step.

And the drivers that are offering one percent minimum light level, or even 0.1 percent minimum level are more expensive and not necessarily universal.

So, my challenge to the CASE Team that proposed this, and all of us, is to think in terms of the differences among the drivers and their bottom line performance, and how they might affect your response or

your thoughts on this.

Finally, we're ready for questions.

Nancy?

MS. CLANTON: Nancy Clanton, Clanton & Associates, lighting designer.

Jim, you mentioned, I want to go back over that point of switching to OFF. And also, when you go at 150 percent of the light level to turn the controls off, I know there's research out there that daylighting and balancing of light, electric light does with indirect lighting or wall grazing, when you just turn things off at 150 percent, it's going to feel very differently.

And I know there's some daylighting experts in here. You know, Neall Digert and Greg Ander. It's different. I mean, where did that 150 percent come up with? And is it horizontal illuminous, vertical illuminous, ceiling illuminous? These are my questions that I would, you know, as a lighting designer that I would really question.

MR. BENYA: Thank you, Nancy. Anybody from the CASE Team want to offer a thought or two, or do we just want to collect questions right now?

Go ahead, Jon. Thank you.

MR. MCHUGH: Thanks, Nancy. The 150 percent is something that's actually currently already in the

standards --

(Microphone comments)

MR. MCHUGH: So, the 150 percent is the current requirements that are in the standards and I --

MR. BOZORGCHAMI: Jon, you need to --

MR. STRAIT: Well, I think there might be a problem with that microphone. Can you turn it off and turn it back on?

(Cross-talk about microphones)

MR. MCHUGH: It's good to get up every now and then, too, right?

So, the 150 percent, what that does is in the preexisting standards there is a requirement that the lights be dimmed, currently to be dimmed to a minimum at 150 percent of the design illuminance.

And the reason for that is so that we're not just saying, oh, you've got to have your lights at minimum, you know, with no opportunity for air, right? These controls aren't perfect and so you're allowing a certain amount of -- what's the word I'm looking for? Adjustment, or a certain amount of offset from the -- you're not necessarily setting your daylighting system to the very perfect number of the design illuminance. So, that makes for the acceptance testing a lot easier than if you had to say, oh, the lights are at minimum at

exactly 100 percent of the design illuminance of the space.

So, that was preexisting. And the history of this measure, in terms of the plus OFF, is we're replicating what's in the ASHRAE 90.1, and that's a mandatory requirement for most spaces.

And the idea is that you dim -- the change now is that you dim to your minimum level, to 125 percent of OFF. And that by 150 percent you're at full OFF, you turn the lights off. That extra 25 percent does two things. One is that it provides a dead band between your minimum -- you know, you don't want to be, oh; at 126 percent I'm turning the lights off, right? So, you don't want to have a situation. So, it actually got quite a bit of dead band between my minimum dimming and my turning my lights off.

Also at that point the discussion is that people don't even -- you know, the lights are already down at 10 percent and they're only providing 10 percent out of 150 percent of the design illuminance. So, you've got about a 6 percent change when you switch the lights off. So, you have a dead band so there's lots of time between the lights turn on and off. And you have this relatively small amount of light, which is the 5 percent of the remaining light that's available.

Is that answering your question?

MS. CLANTON: Good answer. This is Nancy Clanton, again. Good answer, except what you're equating is lighting level is perception. And by dimming down, the perception is the lights are still on or the luminous, the brightness balance is still there.

When you go to off, it's a whole different perception. It's not illuminous. It's going to be a luminous balance. And that's what I'm wondering if the CASE Team thought of?

MR. MCHUGH: Right. So, the issue you bring up is at this point your electric lighting is at 10 percent or so, you've got a lot of reflective light in the space. Yes, if you're looking -- if you have a direct fixture, you can see it, right? But if you have an indirect fixture, there's not much to see there.

And, specifically, there are certain areas that are exempt. And so, I don't know if Jim's really highlighted the exemptions. But, basically, this is exempting classrooms, your office spaces, places where you have a fixed task.

Imagine you're in the airport and the light goes from 5 percent to off, is this something -- you know, these are spaces -- in general, the spaces that are not exempted are spaces that don't have a personal ownership

of the space. So, that's the issue.

MR. BENYA: Neall?

MR. DIGERT: Neall Digert for Solatube International.

Nancy, you raise an excellent question. And I think that the art -- well, I think the art of daylighting has evolved. We're no longer worried about task illuminance. So, when we talk about quality daylighting design, hopefully designers are thinking about grazing of walls with daylight.

So, I'm less concerned with this current change because I'm hoping that daylighting design has progressed to a point where we don't need the electric lights to balance the space anymore, that we are getting grazing of light on walls. We're getting light on the ceilings. And we're thinking about volumetric lighting with daylight, beyond just task light illuminance. I'm hoping.

But that is a great question and it would be nice to have the CASE Team look at that.

MR. BENYA: Thank you, Neall.

Charles?

MR. KNUFFKE: I'm going to have to wear my glasses to make sure I hit these. First off, thank you, everybody. Quite honestly, the fact that there's only

30 minutes for questions, I'd like 30 minutes to go for almost every one of these slides because there is so much meat and feedback opportunities on that.

So, I've got a couple of different comments. One is that there was originally an item in the code where occupancy sensors were recognized as meeting the area control device requirement.

So, when we talk about occupancy sensors in bathrooms, one of the issues that's come up repeatedly by designers is why am I then putting a switch in the space?

Similarly, with hallways, where there's always a question. I truly wonder why the occupancy sensor cannot be considered to be an area control device since it does exactly what an area control device would normally require.

And these are sometimes area where you wouldn't normally want to turn the power or light off. So, I just would ask that that be a consideration.

Jim, I absolutely agree with your comment in regards to the multi-level dimming requirement, that the 0.5 watt exemption really seems like that is now setting a bar that would be easily met. And yet, the fact is the dimming ballast, the LED fixtures have that automatically. So, that question about the 0.5 watts, I

really kind of wonder why that wouldn't be looked at by the CASE Team.

With Nancy's comment, you might think that I'm going to say that, no, you should always go off on photo cells. And yet, I would actually say that's not the case. First off, there's nothing that prevents anybody with an automatic system from setting up so that photo cells do turn the lights off.

The question is whether or not it should be a code requirement.

And similarly, my experience has been very much what Nancy has mentioned, which is that when you have a photo cell that turns a light off and somebody goes into that space, A, they don't know that a photo cell is doing it, so they may think that the lighting control is actually not working.

One of the questions that's come up repeatedly by designers is, well, can I override a daylighting control system? My belief is that the area control device requirement allows you to be able to do that. But I know that the CEC has sometimes indicated otherwise.

So, if going to full off is a requirement, then I would definitely make sure that lights could be overridden on because that would at least be able to

prove to the occupant of the space that the lights are actually working and controlled. And my personal preference is that I don't think making it as a mandatory to OFF as a requirement. I think that good design would dictate that for the spaces that Jon was talking about.

So, the designer is always in the purview to allow that to happen when they want. I just don't believe that that should be a mandate.

Vacancy sensor versus manual ON. I appreciate the idea of making sure that we use the term manual ON in the commercial world. Vacancy sensor carries characteristics because it is defined by Title 20, and that there cannot be a way of being able, or a dip switch to be able to make it from manual ON to automatic ON.

In the commercial world we also sell, as manufacturers, products that are used in different spaces. So, calling it a manual ON device means that it is set up as manual ON. It is tested to verify that it is manual ON by a CLCAPP. And I think that that is absolutely the right thing is to try to keep that difference between manual ON and vacancy sensor as it pertains to commercial versus residential applications.

Lastly, to put on my CEA hat for a moment, some

of the comments that were made about corridors and stairwells, I do believe that as part of one of the alteration proposals some language changes have already been made. And so, I just would warn that I think there's some harmonization that needs to be required between what just got presented and what is also being presented, probably, in the alternation section.

So, I look forward to seeing that and making further comments. So, thank you very much.

MR. BENYA: Thank you, Charles.

MR. SHIRAKH: Charles, I had a question. You know, you said using occupant sensors in some places and not have manual ON --

MR. KNUFFKE: Correct. And so the code, up until 2008, said that you needed to have a manual control device or an occupancy sensor. I think it was the 2008 Code that actually took out the option of occupancy sensors. So, up until then a designer could put an occupancy sensor in, or could put a switch in, or could put both.

But that really seemed like that eliminated the problem of a phone call, today, from a designer who is just saying why am I putting a dimmer in a hallway, if I've already got occupancy sensors to do the control that is being required.

MR. SHIRAKH: Then for the switch, if you have a space with an occupant sensor, but not a manual shutoff, and you want to do some maintenance on some of these lights, then what do you have to do? Turn the power off and --

MR. KNUFFKE: And for sure that's what we'd be thinking would be the desired effect.

So, if you're saying that switches are being installed as disconnect devices then that's a whole different rationale than what I've heard before. But it seemed like the code language before was very popular with the designers because it gave them the ability to make the choices that they wanted to in the space.

So, thank you very much.

MR. BENYA: Thank you, Charles.

MR. STRAIT: Also, the one thing to the 0.5 watts requirement or threshold for dimming or for multiple controls, conceptually we agree that that is becoming easier to reach with LEDs, and that wasn't the intent of having that threshold in there.

However, part of the reason that threshold is there and is the level that it's at is because lighting below that level, you simply are not saving enough energy by reducing it by some fraction to pay for the control. That is that cost benefit.

When the original analysis was performed, that was where the balance point was found to be. That above that amount there's enough energy being saved that it pays for the control. Below that amount there's just not enough energy being saved to pay for having solved that control.

What we need in order to reexamine that threshold would be a cost analysis showing that the current cost of those controls are low enough that even if we're going from like something that's at 0.3 watts, down to 0.2 watts, that energy saving is still enough to provide a positive cost benefit ratio with that lower threshold.

MR. BENYA: Peter, if I could just add something, too? Historically, we've not only been concerned about turning lights on and off very quickly, the power curves where most loads flattened out. So, you were still using a heck of a lot more watts than 10 percent of the wattage, when you were at 10 percent of the energy.

With LEDs, we have a chance for that to be different. So, that's something to keep in mind.

The next question is by Peter.

MR. SCHWARTZ: Yeah, Peter Schwartz, a Principal Investigator at Lawrence Berkeley National Lab, heading

up the Lighting Control Team.

I want to echo Jim's thought with regard to network controls. We're rapidly reaching a point where the market forces are outpacing code cycles. In particular, we're doing a lot of work relative to demand response and commercial lighting as the main distributed energy resource providing that.

But even beyond that, with our grid modernization work is using lighting to provide grid services, as mentioned earlier, to help deal with the excess solar capacity at midday. Which, as we're finding with the more circadian research coming out that we may want an increase in light levels at midday to help, as Jim said, stimulate people's circadian cycles. And oh, by the way, it matches neatly with the excess solar.

So, when we think about our watts per square foot, you know, moving in the future are we looking at the right performance metrics given the greater functionality that these new lighting systems can provide?

Another aspect is we're funding, as one of our EPIC Projects, to come up with a new lighting performance metric to promote outcome-based codes. So, as rather up front how many watts per square foot are

you doing, it's more how many kilowatt hours per square foot, per year, and when are you using it? To match the municipalities who are doing benchmarking. So, kind of move in that direction.

And we would encourage the CASE folks, and others, where it's 2019 or the next cycle is we need to look at lighting as beyond just lighting for humans, but lighting as a distributed energy resource and what does that mean relative to code?

The value proposition changes because we're not buying it based on energy efficiency. We might be getting a lot of revenue, which enables us to put in more and more controls.

MR. BENYA: Thank you, Peter. Yeah, we've had discussions about this.

Nancy, does this sound familiar to something you and I talked about 10 years ago or so?

MR. SHIRAKH: Yeah, Jim, I want to make some comments on what Peter said. And I totally agree. We've learned a lot about our experience with ZNE in residential buildings, and part of it is when you add photo voltaics and renewables you bring the maximum benefit to the building, to the homeowner, and the environment of the grid, is when you grid harmonize. And that is to use their projection from the PV system,

the kilowatt hours generated as self-utilizing. Use them as much as you can on this side and minimize the amount of kilowatt hours you're sending back to the grid.

You know, you get into NIM, the compensation rules and all of that, but setting that all aside is that, you know, when we move forward as part of 2019 and 2022, it is all very important to think about controls that will remain with us to achieve this great harmonization. So, I agree with some of the comments that's made today and I think that is something to really pursue.

MR. BENYA: And I just want to thank LBNL for all the important contributions over the history of Title 24, and continuing to bring them forward. Peter, thank you.

Go ahead.

MR. SCALZO: Hello. Michael Scalzo, I'm with the National Lighting Contractors Association of America. We're an ATT certified provider.

I'm just going to make some quick comments. I'm going to definitely review these codes. We went through these slides pretty quick.

But in reference to shading, you've referred to the skylit zone. Was there other considerations for

daylight zones, like all other daylight zones, like garages and buildings?

We have situations, like in San Francisco, where buildings are stacked up, where they have glazing, and so that might be a consideration.

You referred to overhangs for daylit zones. That would probably add in a requirement for acceptance testers, for verification processes to see if it's required or not required during our testing processes. So, that might be a consideration of how that's going to be accomplished.

Speaking to dimming plus OFF, which is the hot topic, I know personally, having been on over 250 plus projects throughout California testing, dimming plus OFF in the retail sales environment is really horrible. No business wants their lights going off in a sales environment. Plenty of times, as I'm getting into my car, they're rewiring the controls.

So, you might look at that as another exception for that.

And that's it, thank you very much.

MR. BENYA: Yeah, I believe that is one of the exempt spaces, so you're in agreement. Thank goodness.

MR. GIOVANNI: Michael Giovanni, Lutron Electronics, and also a member of the CEA.

Good stuff, Jim. Most of it doesn't give me heartburn and so far we support it. But I do want time to digest it and I will provide written comments.

One thing that does give me heartburn is the part they presented that said, "No controls shall override any of the required lighting controls that results in an increase in energy consumption."

So right now, our standard today allows for partial automatic ON, and automatic ON, automatic OFF, say in the restrooms. So, the issue is, if the last person in one of those spaces has turned the lights off, okay, and then when the space becomes reoccupied, when the lights come partially on, or fully on, such as in a restroom, that does not comply with this language that was proposed. So, we just need to fix that.

I'm a little bit disappointed that there's not any changes to the demand responsive lighting, or very little changes there. I think we can do a much better job there and actually provide true demand responsive lighting where something happens with the lighting when you get a demand response signal. Okay? Right now, if the lights are already below 85 percent, nothing happens, based on the current language.

MR. BENYA: Yeah, if it's below half-a-watt a square foot.

MR. GIOVANNI: Say that, again?

MR. BENYA: And if it's below a half-a-watt a square foot.

MR. GIOVANNI: Right, right. So there's some opportunities there that I think we should --

MR. BENYA: There is some work there and you'll see it when you review the CASE Reports.

MR. GIOVANNI: Okay. And I also just want to ask if there's something that wasn't changed, can we still provide comments on language that should be changed?

MR. STRAIT: In this pre-rulemaking phase, yes. We will accept comments on any of the language we've got. Not that in terms of making substantive changes, we are kind of being somewhat bound by what we have analysis that supports.

For example, we had a proposal where we were -- a similar proposal for demand response controls to change to the 0.5 watts exemption there, or that threshold there, but didn't have analysis to show, that would let us do that.

Because as to your point, 0.5 watts was actually baked into the analysis to perform the original CASE Report on which we adopted it.

So, absolutely, please provide comments on

anything in the code and we'll provide feedback on that. And I can also echo that staff shares your concern with relation to automatic ON. We don't feel like Title 24 should be in a position of restricting where someone can elect to have an automatic ON behavior. So, we are looking closely at some of that language to make sure we don't preclude folks that want automatic ON behavior, from being able to put that in place.

It also goes to like questions, though, if there's a manual -- should we also say that that control needs to be capable of providing manual behavior, as well, so somebody's able to choose what they want? But there's a lot of questions like that we've got to sort through. But yes, we're sensitive to that as well.

MR. GIOVANNI: All right, thank you.

MR. BENYA: One more comment and then we're going to have to cut it and move on to the next segment.

MR. STRAIT: I'm sorry, Jim, I think we want to make sure we listen to everyone that has a comment on this.

MR. BENYA: Okay, a new rule by Peter. Let's go.

MR. HARING: Hi, Rick Haring, I'll try and be quick.

I just wondering if you could clarify a couple

of things? Looking through the slides this morning, I noticed that there was a reduction in the controlled space from 15,000 square foot to -- or, from 20,000 square foot to 15,000. I wonder if you can clarify the rationale for that.

MR. BENYA: CASE Author, 20,000 square feet to 15,000? It's actually 20,000 square feet to 15,000 watts.

MR. HARING: Ah, I'm sorry. Okay.

MR. BENYA: So, it's changing from a square footage-based metric to a wattage-based metric.

MR. HARING: Oh, okay. Any particular rationale for that?

MR. BENYA: CASE Author?

MS. LINNEY: Okay, I might call -- Jon McHugh also has some information on that.

MR. BOZORGCHAMI: She can't hear you.

(Microphone comments)

MS. LINNEY: Okay. So, just to point out there is -- we do have the Section 6, or 7 of the CASE Report has the standards language and cross-out, and then it's highlighted.

And then, Section 2 actually has a detailed explanation for all of the different things we're proposing in the general cleanup language. So, it's

going to be a little more detail of why exactly we're going to this wattage-based, wattage from the square feet.

So, I think it's on page 8. And, basically, it's trying to simplify the code is our main goal. Yeah, we have a full, it's like two pages. So, if you have any other questions, you can reach out to us.

MR. BENYA: Thank you, Erin.

MR. HARING: The second question is the rationale for manual On, for time clock switch?

MR. BENYA: Case Author? Erin, is that you again?

MS. LINNEY: The rationale for it. So, we got feedback from several stakeholders that this would save energy. And it's really only a certain amount of time that we're looking at this manual ON. So, we've seen from stakeholders that -- I'll just use an example of an office building, where the building control system's going to turn the lights on at 6:00 a.m., or something. We have the actual hours in the report. But then, people don't show up until maybe 7:00. So, we're saying there's that hour of time where the building's going to turn the lights on when people aren't there.

So, we want to -- for just certain spaces that we're recommending, where there isn't people who come

and they can turn on the lights. Of course, this wouldn't apply in areas in the general public, lobbies, and things like that. That if you're in an area and you can just flip that light on when you're actually there, that can save some energy.

MR. HARING: Okay, thanks.

MR. BENYA: Mr. Flamm?

MR. FLAMM: Gary Flamm. So, Jim, you had a discussion in Section 130.1(b). You suggested the exception for 0.5 watts per square foot that you've revisited. And then, Jon said something about the language was different.

Help me understand, what is that exception now? Is the exception going to go away or has it been modified?

MR. BENYA: Jon?

MR. MCHUGH: Hi, this is Jon McHugh. I'll just remind everyone again that all these CASE Reports are posted at title24stakeholders.com, so everyone has access to the reports.

As you see, Gary, here for this section, Exception 1 would be completely stricken. And that's because, as Jim rightly noted, the cost of dimming driver versus the incremental cost of a dimming ballast.

Back in the old days there was a greater

increment of cost to go to dimming. So, that's why this exception is no longer needed. So, that's it.

MR. FLAMM: I was going to suggest that that exemption go away because the baseline technology is dimmable. And so, there's no cost to that. Okay, thanks for the clarification.

MR. BENYA: Thank you. Any other questions; comments? Michael McGaraghan?

MR. MCGARAGHAN: Mike McGaraghan with Energy Solutions, for the California Utility Team. And I just wanted to follow up on Michael Giovanni's comment about demand response.

So, there are some aspects related to demand response that were considered and discussed in the CASE Report, so please check that out and we'd love to talk to you about that more.

But I also wanted to highlight that there is a separate demand response-related workshop that's addressing demand response, demand response throughout the code. I think it's July 13th.

MR. BENYA: Yes.

MR. MCGARAGHAN: And there are a couple of things that might overlap and we can talk to you about that offline. But one of the things is we're considering whether lighting controls that are required

to be demand responsive, whether they should have an open ADR-certified virtual end load. So, and there may be a couple of other things, but let's keep that conversation going. So, thanks, Michael.

One other comment. I don't have the list in front of me but there was a lot of question about which base types were exempted from the daylight dimming plus OFF. If that would be helpful for people, Jasmin's probably on the line. And Jasmin, could you just read through the exempted spaces so that everybody in the room here is clear?

MS. LINNEY: I can actually do.

MR. MCGARAGHAN: Oh, okay, we've got it right here. Thank you, Erin.

MS. LINNEY: Oh, Jasmine, I can do it. That's fine.

Okay, so if you see on page 64 of the CASE Report we have the actual code language. So, we have Exemption 1 is sidelit daylit zones in retail merchandise sales and whole sales showroom areas.

And then, Exemption 2 is classroom, lecture, training and vocational areas.

And what is actually proposed is keep -- those are exempt from this daylight dimming plus OFF, but you can still get a power adjustment factor if you do

install daylight dimming plus OFF. Which before, the plus OFF was a power adjustment for any space. But now those are, we've taken those exemptions and put them in the power adjustment factor, if you choose to do that.

MR. BENYA: Thank you, Erin.

Jon?

MR. MCHUGH: Hi, this is Jon McHugh. I just wanted to respond to Michael Giovanni's comments about the controls coordination.

You know, Jim's done a great job condensing down a lot of information. These are, you know, huge reports. Again, at title24stakeholders.com you can download the reports.

When you look at the proposal for controls coordination there's three exemptions. Basically, what this proposal does is it makes explicit where are those areas. You know, saying in general you can't have a control that overrides another control and increases the energy consumption. But there are three specific cases where they are specifically called out because they're defined earlier. And those exemptions are related to the timed override control, a time switch that can -- if you have a time switch, you can use area control and turn it on. And then, finally, occupancy sensors, you know, whether they're partial ON or full ON, those

occupancy sensors override the other controls. So, those are those places.

And so, if you take a look at those exceptions and you have any additional comments, we'll be very interested. Thank you.

MR. BENYA: Any other final comments?

MR. WICHERT: We do have a comment on line, which I'll get to now. This is from Eric Page, of Eric Page & Associates.

MR. BENYA: Hi, Eric.

MR. WICHERT: "Did you say that the photo sensor locations restrictions in 130.1(d)2D will be eliminated? Or, is this restriction retained somewhere else? Personally, I feel that in the real world area of things, where sensors are wireless and potentially useful data can come from anywhere, we shouldn't eliminate sensor locations that are potentially useful."

MR. BENYA: Good comment. Noted.

MR. STRAIT: This is Peter Strait. I don't believe it's in the Utility CASE Reports, but staff, in doing "cleanup review" did look at that, and we're looking at changing that requirement that all the sensors be located in a specific place. Say that one of these sensors should be located where it's specified.

And that's partly because we're seeing a lot of

devices where the senor -- where there are sensors built directly into luminaires for troffers. And that requirement that all of the sensors have to be located in a specific place would have the effect of banning devices that happened to have just an integrated sensor in them, even if that sensor wasn't being used to actually control lighting.

And also, we're broadly aware that we need to revisit that language and revise it. So, yes, that is on the radar. I don't know that we're going to completely remove that because we probably still want one sensor, at a minimum, at a place where it's going to provide the most useful lighting data for that space. But we certainly don't want to make it so that all of the sensors have to follow suit.

MR. BENYA: Peter?

MR. SCHWARTZ: Yeah, this is Peter Schwartz with LBNL. To elaborate a little bit, what Eric is referring to is research from one of our Epic projects around ambient lighting control and, specifically, having the sensor mounted on a task light or even a computer monitor where you're getting a much better view of the task area. Want to make sure that any new code language doesn't eliminate the possibility of that type of sensor location.

MR. STRAIT: Yeah, we agree with that.

MR. BENYA: Thank you. Further comments?

Seeing none, I'm going to introduce staff, a member of the Building Standards Office, Efficiency Division, Thao Chau, our new member of the team. And Thao is going to take on Nonresidential Lighting Alterations. Thao.

MR. CHAU: Thank you, Jim. Okay, so this is the 2019 Residential Lighting Alterations Measures.

So, I would like to take this opportunity to thank the two stakeholders that took part in this round, for this measure. And the first is the Statewide Utility Codes and Standards Team, which is also known as the CASE Team. We've mentioned them a few times this morning, already.

And the other team is the California Energy Alliance, or CEA.

So, currently, under 2016 Code there are two sections that apply to lighting alterations projects. So, 140.0(B)2I is the entire luminaire alteration. And the 141.0(b)(2J is about the luminaire modification of component modification.

So, under code any lighting alterations projects has three compliance pathways. Option 1 applies when you have LPD which is greater than 85 percent of the

lighting power allowance. In this section, full controls are required, the same as a newly constructed building.

Option 2 applies when the lighting power density is up to 85 percent of the lighting power allowance. Area and shutoff controls are required. No demand response, no daylighting, with limited multi-level, which is the bi-level control in this case.

Option 3 is the existing lighting power reduced by either 35 or 50 percent, depending on occupancy type. And area and shutoff controls are required. No demand response required, no daylighting, no multi-level.

The CEA proposal, submitted to us, is regarding those two sections that I just mentioned. They proposed that we merge the two sections together. So, instead of having entire luminaire alteration and a separate luminaire component, they want it to be a new altered lighting system.

So, what that means is the current 10 percent exemption will be applied to both, instead of just Section 141.0(b)2I, only.

They also propose new updates to the exceptions to the lighting alteration requirements. They limit Exception 2 to apply to spaces with one luminaire, instead of 2 or fewer, as it currently is in a whole

space.

Reduce the annual allowance for luminaire changes from 70 per floor to 50 per year, and move this allowance into a new exception.

And also move the language regarding lamp and ballast change outs into another exception.

Continuing on with the proposal, they also propose the reduction for the LPD limit for Option 2 from 85 to 80 percent of the allowance.

The proposal narrows the scope for Option 3 by adding a size limit of up to 5,000 square feet for a project and also adding the "one-for-one" language that prevents adding, subtracting, or relocating any luminaires.

And the proposal also sets a uniform lighting power reduction of 40 percent to all occupancy types for Option 3.

So, here is an example of their proposal language. So here is when we see the altered lighting system is replacing the entire luminaire alteration. And the similar language is proposed for the luminaire component, as well.

So, this is also where we see the 10 percent being applied for both -- the 10 percent exemptions being applied to both sections because they have merged,

where it currently stands.

So, this is where we see the one-for-one language being introduced, being used in the 40 percent lighting reduction uniformly applied. And the 5,000 square foot limit is also in here.

So, again, I'm just going through the highlights of the proposals. I'm not discussing all of the details. All of the details will be in the reports, itself, and I will talk about where we can find the reports at the very end. I just want to take the opportunity to present both proposals at the high level, not in the details.

So, in terms of the CASE proposals, they are proposing changes to three sections, 141.0(b)2I, J and K. The proposals shrink Sections 141.0(b)2I and J by having both refer to shared tables where they lay out information side by side.

It also shrinks the Section 141.0(b)2K by referring to separate, similar tables.

And it reduces existing "two or fewer luminaires" Exceptions to one luminaire, as well as incorporates directly this language into proposed new tables.

The proposals also specifies, for the CASE Team that is, it specifies Option 3 to include every single

luminaire in the space at the project that's being done. So all, every single luminaire will be counted.

Also requires partial OFF occupancy sensor controls for stairwells and sets a uniform lighting power reduction of 50 percent for all building types for Option 3.

So, here is an example of the shared tables. So, on the left side we see the entire luminaire alteration portion and then we see the luminaire component modification section. They lay side by side in this table, in an attempt to clearly show people which option applies and under which scenario.

And in comparing the two proposals, I just want to point out some main similarities here. So, both seek to clarify and streamline the lighting alterations sections, in the hope that the sections will be clearer and easier to follow.

Both propose to reduce the two luminaire exceptions into one luminaire.

And they both address the ongoing concern of the industry about the partial retrofits, under Option 3, although they have different approaches about that.

And they both propose clear, new update tables for ease of usage.

In terms of the differences, again I'm just

putting up some of the main differences. There are many others. You guys need to -- they're all in the reports.

So, the CAA proposed a 10 percent luminaire threshold apply to all projects, and also reduced the luminaire for a year to 50. So, that's 20 less than it currently stands.

The CASE Team proposed no changes in this matter.

And the lighting, existing power reduction is being -- I'm sorry, lighting power density limit for Option 2 is being proposed 5 percent lower, to 80 percent, than it currently stands.

And the CASE Team proposes no changes to this.

And they both try an attempt at solutions to partial retrofit issues. So, Option 3, for CAA, applies to the one-for-one alterations only, while the CASE Team's proposed that we sum all of the power of all of the luminaires in altered space.

I have a typo here. It should say, "Existing power reduction." I will change that later.

For the CAA, is uniformly proposed 40 percent and 50 percent for the CASE Team.

The CAA also proposes a project limit size up to 5,000 square feet, while the CASE Team had no changes proposals.

Additional control is also required from the CASE Team, of partial OFF occupant sensing in stairwells. And the CAA proposed no control addition.

We welcome and really invite you, and everyone to come on each and every item on both proposals, but we want to focus attention on these four questions for the stakeholders.

Should we use the CEC "one-for-one" language or the CASE "all lighting in altered spaces" language?

Should we propose a 5,000 square feet size limit on Option 3?

Should we lower the lighting power density threshold for Option 2 from 85 to 80 percent>?

Should we also look at the lighting wiring alteration, which is Section 141.0(b)2K?

So, in terms of the information, please submit your comments by July 14, close of business day, by two methods. You could either E-file, using that address. Please note that you need to submit it under Docket No. 17-BSTD-01.

Or, you can e-mail it to the docket team, but please also include the docket number in your subject line so it goes to the right place.

Both proposals are actually being developed using a spreadsheet-based analysis alteration tool. And

this is a really great tool. We make the tool and both proposals available on that link. Please, when you look at the proposal, also look at the tool and see how these ideas are being developed.

And if you have any questions on how to submit your proposal, or any comments on anything, that's my e-mail as well, Thao Chau.

And with that, any comments or questions? Cori, please.

MS. JACKSON: Hi, thank you. Cori Jackson from the California Lighting Technology Center. I was the lead author on the CEA's proposal. We're a member of CEA, which is the California Energy Alliance.

And I just want to give a little overview of what our proposal really aimed to achieve. I know that specific details have been picked out for discussion for this meeting, and it's a little bit taken out of context.

So, I want to just give some context so that the stakeholders can really understand where our Alliance was coming from.

So, the overarching goal for us was simplification. So, we looked at the lighting alterations standards that had grown from something like a few lines of text, 10 years ago, to more than two

pages of requirements. And we thought, from a practical perspective this was getting potentially too complex, or more complex than it needed to be. And we wanted to sit down, as a group of industry stakeholders and figure out a way to simplify that language.

So, you'll see specific changes that we're recommending, but that overarching goal of simplicity and energy savings is what really drove this proposal from the beginning.

So, we cut about 47 percent, 50 percent of the language. So, if you actually look at the clean versions of the requirements, by combining different sections, providing one universal set of exemptions, providing one universal threshold we really feel that we're simplifying things for the end-user, which will increase compliance, increase comprehension and, hopefully, an increased number of retrofits in the State. So that was number one.

Number two was energy savings. We want to make sure that the great work that was being done under the 2013 Code and the 2016 Code with respect to alterations. We want to make sure that whatever our Alliance proposed it didn't decrease energy savings with respect to those existing standards.

So, we relied on, as Thao said, an excellent

tool that was prepared by the Utility Codes and Standards Teams to quantify the baseline. And, really, without that tool it would have been much more difficult for me to author this report. So I thank them very much that they shared that tool with us in advance.

But we wanted to make sure that we had energy savings. So, our proposal is putting forth about 11 gigawatt hours, annually, of additional savings beyond 2016, what we would get for a retrofit under the current standard. And an additional, about 2 megawatts of peak demand reduction.

So, not only do we have 50 percent less standards, we have more energy savings.

So, I just want to keep that in mind as we're going through these specific details, that overarching simplicity and energy savings was what we really strived to achieve. So, thank you.

MR. SHIRAKH: So, before you go, this is Mazi Shirakh. I spent a lot of time this last summer coming up with -- on this existing language for lighting alterations. And one of the reasons we came up with this 35/50 percent was to basically make sure that Option 3 would be at least as efficient as the 2016 Standards.

Now, with the reduction in the LPDs that are

proposed for 2018 Standards, we need to look at that. I'm a little bit surprised that, you know, you're recommending a 40 percent uniform reduction and you find that to be more efficient. You know, my experience is that it's not going to be anywhere close to be, given the new 2019 --

MS. JACKSON: Right. So, we had access to the estimated lighting power densities for 2019, and we used those in our analysis. Yeah, so they are based on what we think those LPDs will be in the future.

This is where the 5,000 square foot limitation that we're applying comes into play. So we, as a stakeholder group, recognize that small buildings and tenant spaces needed an option where they didn't necessarily need to comply with the full suite of lighting power density and controls requirements.

That 5,000 square foot limit affects about 50 percent of buildings. So, we're leaving 50 percent of the buildings on the table in California to be able to follow Option 3.

But it moves the other 50 percent to what the traditional compliance approach is, which are based on allowed LPD and controls. So, the savings by doing that far outweigh the small loss of savings that you'll leave in Option 3 by going from -- you're referring to the 50

percent processes, for example, down to a 40. By moving that building stock towards modernization, towards more sources and controls it's far exceeding the little bit of savings that you will lose by making a uniform level at 40 percent.

And just to say, those 50 percent of buildings are still exempt, they can use Option 3. We've left all the compliance options there. But the 50 percent that does move towards those traditional methods, under our approach, represents about 90 percent of the building stock.

So, in number of buildings we're leaving a lot on the table for small business owners and tenants, but we're moving the majority -- we really want to move the majority of the building stock towards modernization. And that was the goal of our proposal.

MR. SHIRAKH: Thank you. I'll look at that separately.

MS. JACKSON: Thank you.

MR. STRAIT: Yeah, I think really the explanation there, the tool was used, and because we didn't -- specifically, both of the proposals used the tool to demonstrate the changes, brought in at the same baseline, of it being at last as good as the 2016 requirements, with the assumption of the 2019 proposed

lighting power density levels.

The CEA proposal gets there by making a number of small changes that, again, shifts the balance of who chooses which option, and puts some other limitations in play.

The CASE Team proposal makes one big change of pushing everything to 50 percent and then is able to make fewer of those changes that are kind of accessory to our surrounding that choice of option.

But that's part of why we have these -- if we can go back one slide, actually? Actually, back one more.

Part of why we have these questions is because they were some of the key distinctions between the two proposals and we'd like to hear from stakeholders which way they would refer us to go with these two options.

We see value and merit in both of them. They're both amenable to what we would like to do and, therefore, we want this to be a stakeholder-driven process as to some of these decisions.

MR. SHIRAKH: So, number two would limit Option 3 to sizes below 5,000.

MR. STRAIT: Below and equal to, yes.

MR. SHIRAKH: So, the other ones would have to be either 1 or 2?

MR. STRAIT: Would have to go Option 1 or Option 2, yes.

MS. CUNNINGHAM: Kelly Cunningham, PG&E. I just wanted to thank CEA for their collaboration on preparing both these proposals that were intended to complement each other in some ways, and represent independent thinking in other ways.

For example, there were conscious decisions to invest the time and resources that we had in sections that did not duplicate each other's efforts.

So, we hope that the stakeholders will take the time to read both. And if one idea emerges as a good direction from one, another from another, they are not an all or nothing on either side proposal. And that they are meant to both represent thinking of which we can assemble, hopefully, a final proposal that in an ideal world is in alignment.

So, that's a reminder to not take these as an A or B scenario and to ask questions of both parties. And we will share, as appropriate, if we find out from stakeholders' direction that will inform and benefit both proposals. Thanks.

MR. STRAIT: Thank you. And, actually, I'll go ahead and echo that. Just to give a little bit of background on these four questions we're -- as she had

mentioned, we're not looking at an either accept one proposal entirely, ignore the other, or vice-versa. A hybrid approach, where we're taking good ideas from both of them is certainly something we're interested in.

Question one, for use of the "one-for-one" language, this is a bit of history. An early 2016 proposal to clarify some existing 2013 language, I could have -- the original phrase said a "like-kind" replacement. And that became a "one-for-one" replacement. And unfortunately, because there was difficulty defining what that term should mean, that term ended up getting dropped out of the 2016 language when it went through adoption. But that's some of the history there that there might be a still way to incorporate that concept, that idea.

And that's not necessarily exclusive to this idea that if we're having an option that's counting lighting power, that we require to look at all of the lights that are in that space.

Option 2, should the proposal be to look at 5,000 square foot size? It isn't just a binary yes, we should or no, we shouldn't. But also, is that the appropriate size limit for these kinds of buildings?

We already have some size limits in different areas of the code. Sometimes it's 5,000, sometimes at

20,000 -- I'm sorry, sometimes at 10,000. And I think there's one even that's not in our code, but elsewhere in the building code, it's like at some much higher value than that.

But just so that we can have some consensus on both whether there should be a limit, but also what that limit should be.

For number three, lowering the LPD threshold. The original 85 percent was established by actually figuring that a 15 percent savings was equivalent to what would be expected from implementing daylighting and demand response. So, there was originally that direct link between the two.

Lowering to 80 percent, this is done in the same context of lighting power allowances going down. So, coming in at four-fifths of a lower lighting power, now, this makes it even more challenging.

Now, the CEA report does show that this is achievable by off-the-shelf products that can be bought and installed today, so that seems to be fully appropriate.

But we want that feedback from stakeholders to say is that -- is that achievable or does that put some unintended roadblocks in the way of lighting design?

And then item four is, you know, really there

are three sections that relate to lighting alterations because there were distinct requirements for the wiring alterations from those things that touch the actual light-producing elements.

If we're considering merging two of them or considering aligning two of them, should we wrap all three of these back together? So, there seems to be strong opportunities for additional code, streamlined code simplifications to actually put these all three as saying when you have a lighting system and it's being altered, here's what happens.

So, that's kind of the context here and definitely we're interested in feedback on both proposals, and how to integrate both of them, and which ideas.

MR. KNUFFKE: Hi, Charles Knuffke, WattStopper and a supporter of the CEA. So, I just wanted to call out specifically that I do believe there is extreme value in the CEA's proposal, particularly the use of the phrase "one-for-one".

The reason for that is that if you take a look on the current nonresidential compliance manual, page 5-83, there is a table that was put together to kind of take what the current language is, in the 2016 Code, and make it into a simple table.

I have seen this passed around by multiple people and this table is an example of why we want to make sure that "one-for-one" language in there. In that there is no differentiation between the three categories of either following the lighting power allowance or going with the reduced 35/50 power reduction.

And the fact is the language in the code makes it pretty clear that there is one path that is always required whenever you're moving walls. And the other path really is only for when you're doing some sort of a simple, one-for-one retrofit. But the word "one-for-one" wasn't there.

So, if you just took at this table, it looks like there are very equal compliance paths that there is no separation between those. That anybody can choose any one of those, based on it.

And so, I just do believe that the CEA's proposal is making absolutely clear that there is an opportunity for doing retrofits, as long as it's one-for-one and you're not changing the lighting in a room. If you're truly making a KEI (phonetic), you're going in there, you really should then be following what is the area category method. And somebody really should probably be taking a look at that lighting design, a professional person, as opposed to somebody who's just

been changing lights.

So, I do think that the approach that the CEA takes is really to be commended in the way that it makes sure it's very clear there are tenant improvements in spaces and there are lighting retrofits in spaces, and never the twain should meet. So, thanks.

MR. WICHERT: Actually, I'd like to interject a quick clarification from online.

"Does the 5,000 square foot limit apply to the altered space that the altered lighting serves or the entire building floor area?"

MR. STRAIT: So, we're looking at which of those -- that's another good question as to how that should be phrased. Right now, the way that the code is structured, we go back to the example of your common strip mall. That you might have a great amount of square footage, but any individual tenant space in there is going to be fairly small. And are those small spaces that they should have access to Option 3, or should we say because the building overall is very large that they no longer have access to that option?

Right now we are looking at that being a requirement for the space, or for the tenant area as being more appropriate. We do know that tenant area, as a concept, like to say the tenant space can't be more

than 5,000 square feet is problematic because a building inspector doesn't necessarily have a way of knowing or verifying where one tenant space ends and the next one begins. Especially in a strip mall area, where some of the walls can be taken down and moved.

So, that is something of an open question. It would be a lot more difficult for us to say that it's based on the whole building, because then there's a lot of small projects, and small business that take advantage of those small projects that would be impacted by that. So, there's other code requirement we have to be aware of, we also have to consider the effect on small business.

But we know that that is kind of an open question because we know some people would prefer that this be more restrictive and say the building at all is in excess of 5,000 square feet, then none of the spaces in that building can make use of Option 3.

MS. JACKSON: And I can add, from CEA's perspective, we wrote it to imply that the 5,000 square foot limitation applied to the tenant space or to the whole building, if it were a single tenant or building owner. So, whole building or tenant space is the way it was intended.

But I just wanted to point out one other thing

on the one-for-one, to follow up with Charles. The one-for-one also came about to align with ASHRAE 90.1 2016. So, there's been a lot of effort, from all of the teams working on code change proposals, to try to get an alignment on certain areas with ASHRAE. And that one-for-one term is included in ASHRAE 90.1 2016, although they don't provide a definition of what that means. And that seems to have always been the sticking point.

So, we've put forth, CEA's put forth a definition for one-for-one, under Section 100.1 for the code. And we would welcome help on navigating, and creating, and crafting that definition. So, we have a first draft out there of what that one-for-one means, but we definitely need a little work on that.

MR. SHIRAKH: So, that would be helpful. Because one-for-one was in 2013 Standards and we took that out because of those difficulties.

MS. JACKSON: Right, and we recognize that. And I think that's one of the areas we could definitely use some more feedback on, for that definition.

MS. BECKING: Stefaniya Becking, Energy Solutions. I'm a lead CASE Author for this topic, alteration. And I'd like to thank California Energy Commission and the Board, in particular, for putting together a proposal on this topic.

Just a couple of comments. One is in the CASE Team proposal they also have a one-for-one term introduced in the proposed code language, based on the feedback we were getting from the stakeholders.

And another comment that's -- it's not really, you know, the first question should we use the one-for-one or the CASE whole lighting altered spaces, which might be misleading. It's really not, you know. For instance, the whole lighting it's really the wattage in the altered spaces. The total wattage is what is being proposed to be evaluated, you know, before versus after.

So, in fact, one of the key proposals in the CASE Team report is to look at the total project. So, not go space by space reduced by 50 percent at this stage but, rather, look at the total project. And the total project needs to cut the wattage by 50 percent.

So, it might be that corridors might be reduced by less, while some other space area that's in the project, you know, by more. So, that is another flexibility that's being proposed for consideration. Thank you.

MR. MARTIN: I'm still John Martin. I'm still Co-Chair of the CEA. And I want to speak in particular to the 5,000 square foot limitation.

There's a larger context here that we would urge

everyone to think about. The marginal gain available from imposing these kinds of constraints on spaces less than 5,000 square feet is simply not worth the diminished public acceptance of Title 24, and similar codes, when they are applied to these small marginal areas. This is what creates public resentment, lack of implementation, and actual -- the language may look good and the theoretical savings may be great, but the actual implementation three, four, five years down the road finds that people widely ignore restrictions of this type.

So, one of the reasons that we, in the CEA, went for this type of limitation was in the spirit of trying to get effective and completely implemented energy savings in place. You have to write the code, then you have to train people to implement it, then you have to actually implement it. And the chances of doing that and doing it in a way that achieves widespread public and user acceptance is increased if you don't worry about these small marginal gains, but instead focus on where genuine savings are able to be gained.

So, I would think that the -- we believe that the 5,000 square foot limit makes good practical sense. Thank you.

MR. CHAU: Thank you. Any other comments?

MS. ENGLISH: Hi, I'm Cheryl English with Acuity Brands. I think that the -- and I'm also a supporter of the CEA. I think that the proposals both add some simplicity and deliver incremental energy savings, so I applaud both teams.

I do support the CEA approach to this. I think that both proposals leave a lot of energy savings on the table. This has been a very challenging process as we've implemented existing building requirements, so this is a good step forward.

I would suggest that in 2022 is an opportunity to really become aggressive about existing buildings because there's a tremendous energy savings there. Wireless control capabilities are available today. They'll certainly be more robust in 2022. And the LED technologies continue to progress.

So, I think the thresholds here are very reasonable. They're a low-hanging fruit and it's a good approach.

I will reiterate one of the comments that I had with the 2016 requirements regarding the LPD option, regarding the enforcement. And I don't believe there is, today, a pre-alteration inspection. I think this leaves an option open for gaming. To validate the compliance. And so, while that's not in the code

language, I would ask the Commission to very carefully look at the enforcement of that LPD option to make sure that the actual claimed LPDs were achieved.

MR. SHIRAKH: Thank you, Cheryl.

MR. AVERY: Doug Avery, Co-Chair of Cal CEA, and also Co-Chair of Cal CTP, the training program.

I just want to basically say, first, we're very excited to see a -- to be able to collaborate not only with the Commission staff, but with industry and with the utilities. We're looking to make the code workable. We're looking to make this simple. We're looking to have something that is actually going to produce energy savings for our State.

We have some pretty lofty goals. And as of right now, we're not really on track to meet all of those goals. The technology's here, the ability is here, we're just not doing it.

So, I think that if we all start working together, if we start paying attention to simplifying language, making it easier for compliance, making it easier for energy savings to be implemented that we're going to move this forward.

So, we look forward, as an Alliance, to working with not only the Commission, but anyone in this room that wants to step up and add a voice to moving

California Energy's future forward.

So, thank you. We really appreciate the ability to work with the Commission. It's nice to have collaboration, rather than confrontation. So, thank you.

MR. CHAU: Thank you.

MR. BENYA: And, Doug, this is Jim Benya.

MR. AVERY: Who?

(Laughter)

MR. BENYA: You've never seen me before. Yeah, the one thought I'd like to reiterate, I made this point earlier, one of the things I would call upon industry to do is establish enough standards. Right now, every company seems to be going in their own, independent direction. We have the internet of things being talked about, the different protocols, the different systems, the lack of interoperability, lack of interconnectivity.

Industry, if you want these things to be part of the standards, which they deserve to be based on what Doug's just said, and I agree, we've got to have some belief that the people of California aren't buying products that they might be stuck with something, and we can't fix it and can't replace it.

Because one of the things that comes with the growth of the lighting controls industry, as I've seen

it, is a lot of people are nervous about what they're acquiring. I'm glad to see big companies stepping in and producing products, but there are an awful lot of smaller companies that are very exciting with what they're offering. Likewise, we also know of several that have failed and have left the customer, you know, holding the bag. We can't have that, particularly in the standards, I don't think.

MR. AVERY: No, I don't.

MR. BENYA: So, work on that. Get everything to a common enough level that there's enough interchangeability and interoperability that it can easily be part of the standard without us worrying about the difference between brand A, brand C, and brand D doing the job.

MR. AVERY: We certainly would be happy to undertake that mission. Thank you.

MR. BOZORGCHAMI: So, if there's no more comments, how about lunch?

MR. STRAIT: Well, quick, are there any comments on the line? No, okay. Then, I second the motion.

MR. BENYA: There's still one more comment.

MR. OCHOA: I was daydreaming, yes. Hi, my name's Craig Ochoa. I'm with Morrow-Meadows Corporation. We're electrical contractors and

engineers. We do a lot of design build work. I'm also a member of the CEA and I'm very proud of the work that Cori and others have done in such a short time, to get something together.

So, what I'd like to do, because I know I'm between everybody and lunch, is just to speak broadly about this stuff. Okay, I'm not going to pick on any particular point. But I do want to echo John Martin's point about simplicity.

What we find, because we implement the code. We not only implement it on the engineering side and the design side, we implement it on the acceptance testing side and actually building things.

So, what we've seen, unfortunately, is a race to the bottom with value engineering and other approaches that tend to incentivize people to find ways around saving energy, at the end of the day.

And when we get to the alterations marketplace, in particular, that pressure's huge. So, the easier that we can make this, the clearer we can make it, if we can remove layers of darkness from the window that we're trying to look through, the better off we'll all be and it's going to be much more accepted on the users' end.

So, again, thank you to everybody for their hard work. And to Jim's point, to the manufacturers, I work

with you all, I love you all, but yes, take what he said to heart. Thank you.

MR. BOZORGCHAMI: So, a quick lunch. We'll be back here about 1:30. Thank you.

(Off the record at 12:22 p.m.)

(On the record at 1:36 p.m.)

MR. BOZORGCHAMI: All right, good afternoon. This is Payam. We're going to start the second session or the afternoon session of today's workshop and we'll be hearing from Simon Lee for the rest of the afternoon.

MR. LEE: Welcome back, everyone to this staff workshop. And we'll continue on nonresidential lighting.

My name is Simon Lee. I'm one of the advising staff of the Building Standards Office. I will go over three presentations this afternoon. First, I'll go over the Outdoor Lighting Source proposal, then the Outdoor Lighting Controls, and then the last one, the Advanced Daylighting Controls.

First, we would like to acknowledge the CASE Team's efforts, their time and all the energy that they put into it. And also, appreciate the work of the CASE Authors.

All installed outdoor light fixtures are covered by Title 24, Part 6. That includes wall-mounted

fixtures, pole-mounted fixtures, canopy-mounted fixtures. These are all covered by Title 24.

Title 24 provides two types of lighting power allowance. One is general hardscape lighting allowance, the other is specific application lighting allowance.

Allowance is to be used, but not to exceed. Also, specific application lighting allowance is for dedicated specific use and cannot be used on other lighting applications.

And here's a table, provide 3,000 from above general hardscape lighting, specific application lighting. And also, there are some outdoor lighting applications not covered by Title 24, and they're listed in Section 140.7.

And there are no proposed changes to the allowance method in this cycle.

LED light source has been around for quite some time, more than 10 years. And Department of Energy has reported, in 2016, that Led outdoor area lights have demonstrated ability to provide suitable illuminance levels using significantly lower level of light output than the conventional lighting products, such as CFL and fluorescent fixtures.

And there are several findings from the CASE Team, as reported in this CASE Report. The efficacies

of outdoor LED luminaires have increased in the past three years, and the cost of it has dropped significantly.

And, finally, there is a DOE forecast that LEDs for outdoor lighting represent 75 percent of the sales by year 2020.

And with that, the CASE Team proposed to use LED Luminaires in lieu of the legacy light source as a baseline for both general hardscape lighting power allowance and specific application lighting power allowance.

And in this CASE study analysis, 3000K luminaires are used and they are all shown to be cost effective and able to meet the lighting power allowance.

So, there is a new set of outdoor lighting power allowance densities proposed and these values are for Table 140.7-A and Table 140.7-B. A is for general hardscape and B is for specific application.

There is a slight format change to 140.7-A, some new columns are added. One is for asphalt surface parking lots and the other is for concrete surface parking lots.

But the number of lighting zones are the same, from LZ0 through LZ4. And there are no proposed changes to the lighting zones in Table 10-114-A.

And this is the existing table or here we call it the old table.

And the next slide, we show the new table. As you can see, there are information added to the table showing asphalt and concrete. And also, new columns added under lighting zone 2 and lighting zone 3, one for asphalt, one for concrete.

And this is the table for specific application, 140.7-B. And the next few slides will show the rest of the table. I'll just go for it.

As part of the effort to update the baseline using LED as the light source, we also update the -- or, the CASE Team proposed to update on the outdoor luminaire distribution cutoff requirements. It was 150 watts and we're proposing to change to greater than 30 watts.

And this is related to Table 130.2-A and 130.2-B. The industry called out the IES ratings. And the picture to the right shows what is considered to be up light, forward light, and back light. So, all the outdoor luminaires must not exceed the values on these two tables.

As far as the BUG rating, or the numbers on these two tables, there are no proposed changes in 2019.

While we are working on Title 24, the IES

Committee -- yeah, the IES Committee has been going on some revision work on RP-20. So, there might be possible revisions to RP-20, depending on the research. And the research is performed by Virginia Tech and funded by California Utilities and IES.

So, in the final CASE Report there may be proposed modified values in Table 140.7-A.

As Jim mentioned this morning, there are some emerging lighting technologies, such as color changing fixtures for both indoor and outdoor applications. And here at the Commission, we pay attention to the developments. And in the future code cycle we will examine the technologies over the future time.

And with that, we look forward to your comments. As mentioned earlier by my colleagues and by Jim, you can submit written comments by either E-filing or submit for e-mail. And I can also be contacted. My e-mail address and phone number is on the screen.

So, that's all I have and with that, I'm opening up for questions.

MR. BOZORGCHAMI: Questions?

MR. BENYA: Hey, Simon, this is Jim Benya. I'd just like to add that one of the things you presented and got a little bit of reconciling to do, Title 24, Part 6, when it comes to outdoor lighting, limits the

amount of energy to be used by outdoor lighting. But also both in controls, which we'll hear about next, as well as the power density. Part 6's primary job, though, in effect is to limit the number of lumens into the environment, as well, which is one of the basic concepts of controlling light pollution.

On the flip side of this is in Title 24, Part 11, CALGreen. The BUG system's already required for nonresidential properties. And so, I think we may be redundant if we have BUG in both Part 6 and Part 11.

So, it's something we'll take under advisement as we work together and come to meetings. We just wanted to get out to everybody, be fully conscious that, you know, Part 11 in CALGreen has gone a long way to addressing wasted light that is caused by the light sources, and everything else using the BUG system. And it is required. So, we don't really want to have things appearing in two codes at the same time. There's always the threat they'll be different, which is not good.

MR. LEE: Okay, thank you for the inputs, Jim. We will talk about it after the workshop.

MR. STRAIT: Simon, this is Peter. Can we go back to the slides that show the example, the table with the different light values? Yeah, can we go back to the first one? There we go.

Just want to point out that that percent reduction that you're seeing in these numbers is fairly consistent across a lot of these guys. So, some of them are falling by kind of close to two-thirds. Others are falling from one-third to one-half.

Can you go to the next slide? So, here we've got a 20/25 going to 11, and 26 going to 19. We've also got a 0.5 to a 0.2, a 0.75 to a 0.28. So, these are pretty sizeable drops, but they are easily achievable for LEDs.

Go to the next slide? And just so the folks are given the chance to see all these. Thank you, Simon.

MR. LEE: Yeah, all the detailed information, including the methodologies, the calculations are in the CASE Report. And if you're interested, we encourage you to look at that, yeah. It has all the information that you will be able to find.

MR. KNUFFKE: Charles Knuffke, WattStopper. Would you go back a couple slides? There was one thing where you talk about reduction from 150 watts to 30 watts. Keep going, it was early on.

Because that is the exclusion for, was it the controls for outdoor lighting, or what section was that in?

MR. SHIRAKH: No, it's for BUG.

MR. KNUFFKE: For BUG, okay.

MR. SHIRAKH: It started out in 2005 as being 175 watts. It was based on (inaudible) --

MR. KNUFFKE: Okay.

MR. SHIRAKH: And now we're going down to, what is it, like 35.

MR. KNUFFKE: Okay, gotcha. Okay, thanks.

MR. SHIRAKH: Now, it's sort of migrated.

MR. KNUFFKE: Thank you.

MR. STRAIT: And that really is just a response to LEDs, because a lot of luminaires now at full load at 150 watts. We don't want that to cause an increase in light pollution or an increase in problems associated with it. So, for consistency with IES and the CALGreen requirements, we're just lowering that threshold.

MR. LEE: Yeah, and just one piece of information. On all the other means being exempt and being in this CASE studies, they're all found to be able to be retained and operating.

MR. FLAMM: Gary Flamm. Earlier, in one of your earlier slides you talked about accommodating 3000K lamps. There have been a number of people that have wondered what that means? Was that a lower efficacy that was used in the models? Exactly what was done to accommodate 3000K lamps?

MR. LEE: I'd like the CASE authors to answer.

MS. KUCZKOWSKI: I'll take that one. So, Annie Kuczkowski. I'm Annie Kuczkowski with Clanton & Associates.

So, all of the luminaires studied for both the general hardscape and the special applications were only 3000K luminaires. Any luminaire that was 4000K, we didn't consider it and we chose the warmer color temperature option.

MR. FLAMM: So, I'm still not clear what that means. Was the 3000 -- where are the 3000K --

MR. STRAIT: I'm sorry, you're going to have to get closer to the mic.

MR. FLAMM: Were the 3000K luminaires less efficacious than let's say 5000K? What does that mean that you looked at 3000K luminaires? I'm still not clear on that.

MS. KUCZKOWSKI: So, the 3000K luminaires are less efficacious than a 5000K or they're most comparable to a 4000K at this point. So, we wanted to make sure that each of these standards could be met with less efficacious luminaires.

MR. STRAIT: Yeah, this is Peter Strait from the California Energy Commission. This was something that actually involved out of the conversations we had with

the CASE Team. That we wanted to make sure whatever lighting LPDs we established, that we weren't removing or restricting the ability for landscape planners to put in lighting that suited their needs. And especially when we were finding out about high power temperature being more disruptive to wildlife. So, we wanted to make sure that outdoor lighting was able to install warmer lighting, and still meet whatever update we had to this lighting power balance values.

MR. LEE: Oh, indeed. They mentioned for the same model of luminaires, the lower the temperature, like 3000K, would consume more power compared to the cooler temperature model.

And with that I will go on to the next topic, which is Outdoor Lighting Controls.

I want to acknowledge the CASE Authors for their efforts in the outdoor lighting controls proposal.

As Jim and others points out this morning, lighting controls go hand-in-hand with light fixtures. Lighting controls allows the light source to come on and off at the designated time, and also to address the light source in some other ways.

And for some highlights on the existing requirements of our outdoor lighting controls. When daylight is available, turn off the outdoor lights. For

a portion of a light, turn off the outdoor lights. When there is no activity in the area, dim down the light, such as those luminaires mounted at 24 feet or less above the ground.

Given the development of the proposal, the CASE Team has received feedback information that many new parking lot lighting systems are left on throughout the night, well after normal business hours.

And in response to CASE Team proposed changes to the outdoor controls requirement, which I will try to sum it up in the next few slides.

First is to define occupied and unoccupied hours. During unoccupied hours dim down the outdoor lights. And the owner and the operator can define the normally unoccupied schedule. If the space is occupied all night long, then that means there is no unoccupied hours.

If the schedule is not known, then occupied hours is from 6:00 a.m. to midnight. And after that is unoccupied hours, from midnight to 6:00 a.m., in the morning.

Also, one of the proposals is to set a maximum of 400 watt of lighting power to be controlled together for all time. That means occupied hours and unoccupied hours.

And continuing. For motion sensors, the proposal is to suggest to add the following to the definition, reduce lighting power after an area is vacated.

And then, number two, automatically increase lighting output when an area is occupied.

Another proposed change about the motion sensor requirement is to align with ASHRAE 90.1 on the maximum vacancy period requirement of 15 minutes for exterior lighting motion controls.

There is another alignment with 90.1. The alignment is about lighting wattage reduction to 50 percent.

Right now, the Title 24 requirement is reduction to 40 percent. That's because in the past cycle legacy lighting technologies, such as HIDs, can only be dimmed down to 40 percent. So, with the LED technologies, used as a baseline, they can be dimmed to much lower level. So, therefore, the suggestion of reduction to 50 percent.

And then there is also to revise the exceptions. Previously, it was 75 watt for pole-mounted fixtures and 30 watt for non-pole mounted fixtures. In this proposal, it is luminaires rated at 30 watts or less.

And with that, the staff is considering some

proposed changes, which are different from the CASE proposal.

First is about revising the definitions on outdoor lighting control. There are terms that have redundant meanings. One of them is automatic scheduling control and automatic time-switch control. They have the same meaning. And so, the staff is proposing to delete automatic time-switch control and using automatic scheduling control throughout the text.

And there are also other revisions to the outdoor lighting control definitions. This is to ensure that they are consistent with one another. And the list is on the screen.

And this is the proposed definitions, the full text. And you can see that automatic time-switch control is proposed to be deleted.

For the control requirements, in the existing standards there are different sets of requirements for luminaires at 24 feet or less. And also, slightly different requirements for building façade, ornamental lighting, outdoor dining lighting, and outdoor sales lighting.

And here we are proposing to have similar control requirements for both of them. Except for luminaires at 24 feet or less above the ground, we still

want to keep the motion sensor requirement with it. But we are proposing to reduce from 1500 watts to 800 watts.

And this table summarizes the proposal.

MR. SHIRAKH: Simon, just to be clear, can you go back to the previous? So, are you requiring any controls for luminaires that are taller than 24 feet?

MR. LEE: Yes, for luminaires taller than 24 feet, they still will have to meet the automatic scheduling control requirements, and also to be -- that means it has to be turned off during nighttime -- during daytime.

MR. SHIRAKH: But no motion sensor requirements?

MR. STRAIT: Correct. And just to let folks know on that one, we're aware of some technologies that are developing that are able to function as a sensor on poles that are larger than -- or taller, I should say, than 24 feet. We're just not seeing where those are necessarily where they would be fully appropriate for us to mandate within the standards.

So right now the controls aren't required when the poles are -- when the lighting is not 24 feet in less in height, mainly for that reason.

As Simon said, what we're mainly doing here is saying that we want a motion sensor for each grouping of 800. Which is lower than what's on the books right now,

at 1600, but not as low as the 400 be proposed by the CASE Team.

MR. LEE: Okay, moving on. So, this is about proposing the same requirements for luminaires at 24 feet or less, and also building façade, those lighting.

So, when there is no activity during normal business hours, the proposal is to dim down the light. But after hours there are three options allowed, or three settings. Number one, they can dim down the light. Or, number two, they can turn off the light. And then option three or setting three, for half of the light they can either dim it down or turn it off. And then, for the rest of the lights, they can put it on motion sensors.

And this is the proposed language. So, try to recap, all installed outdoor lighting has to be controlled by automatic scheduling control and plus one of the following, further control called part-light outdoor lighting control or other controls.

And then this is for luminaires mounted at 24 feet or less above ground. So, it has to be controlled by automatic scheduling control and motion sensor.

And then the capital, that A, it spells out the requirement for normally scheduled hours -- normally occupied hours the light has to be dimmed down.

So, this is a repeat of the table. During business hours, dim down the light.

And then the next one is -- this is after business hours. So, there are three options to choose from. They can either do one of the three. Either dim down the light, or turn off the light, or the last one is to have at least half of the light to be dimmed down or off, and then the rest of the light to be on motion sensors.

And then the table, again. Okay, and this is for luminaires at 24 feet or less. No more than 800 watts of lighting power has to be controlled by motion sensors.

And then subsection 3, this is for façade lighting, ornamental lighting, outdoor dining, outdoor sales. And the capital letter A and B, the same requirements for luminaires mounted at 24 feet or less above ground.

And one of the questions or inputs that we would like to get, we see from the stakeholders and consultants is that do you have concerns about the proposed motion sensor control requirements of no more than 800 watt of lighting load?

Does that cause any problem to design or limit design flexibility?

And with that, that's all my presentation on outdoor lighting controls.

MR. BENYA: So, I'll start off some of the discussion, if you don't mind. Jim Benya. Number one, something that I thought of this morning also applies to outdoor and that has to do with egress lighting, and the necessity of us preserving that exception.

Egress lighting for outdoor lighting is something that is, I hate to say it, I've never been all that crazy about the way the code is interpreted and used, and written, but it is what it is.

And many AHJs say from the front door of the building or from every egress of the building or in the building to a public right of way is still a path of egress.

So, we're going to have to make sure that we build into this section an exception that that lighting also has to have one foot cable, minimum, on the path of egress. So, it's a non-trivial thing in outdoor lighting if you have to have an egress better lighting than the rest of the parking lot very easy. But that's what it's written and we have to observe that until such time as other things can be done to make that code a little better.

So, that's issue number one. Issue number two

that I'd like to put on the table and I know, Simon, I'm sorry you and I haven't had a chance to talk about this stuff. We need to put it on our agenda, is the right-around-the-corner evolution of wireless lighting controls as a system to be used in parking lots and other outdoor lighting situations.

Now, that we have the IMA 710 Standard for cells on individual luminaires that would illuminate lighting controls that are not integral to the luminaire and make them for credible indoor or outdoor and a lot of other things.

So, I think we can modernize the standards a little bit more by embracing that idea and, you know, giving that option.

And by the way, I can even see that option being used as a possible thing to address the 24-foot high limit. And once you can have a number of sensors networked and talking to each other, the sensors don't necessarily need to be mounted at the same height as the luminaires. And maybe the answers our out there that are really good. Because I've already sort of worked on a parking lot like this, and it really provides you with a dimension you never thought about before.

And with the costs coming down and the ready availability of this technology, I think we have to

embrace it in this section. So, things to do and for us to think about.

MR. BOZORGCHAMI: Any other comments?

MR. MUTMANSKY: Michael Mutmansky, TRC Energy Services. Jim just mentioned the 24-foot limitation on controls. And when that was originally put in, there were a couple of reasons that the limitation was set there. One was the detection distance of traditional motion sensors that were able to be employed outside, at that time.

As you go higher, they just don't sort of see as far, so they just weren't viable.

Jim mentioned that there's new technologies that are coming on and, in particular, video chip detection technology will actually make it basically irrelevant what the mounting height is of the sensors. And with adjustable lighting locations, et cetera, you can set up a grid and have a couple of sensors on corners of the lot and assign, you know, zones of coverage that are assigned to luminaires. And suddenly, you can have an entire parking lot covered by just a couple of sensors very effectively until it gets foggy, or something like that.

However, the other problem with 24 feet is as you go up in mounting height your area of coverage of

the luminaire increases. And the issue with -- Jim's nodding his head, so he knows where I'm going with this. The issue is that there comes a point at which we shouldn't be controlling all of the watts on a high-mast pole, for example, universally. And that was the reason that that original 1500 watt limit was put into the code a couple of cycles back. Which has been dropped, which is being proposed to be dropped to 800 and 400, it looks like, in the CASE Team proposal.

And I support actually aggressively reducing the number. And I think it probably ought to be -- I have not run the numbers, so I leave it to the CASE Team for that. But I believe that it makes a lot of sense to be going more aggressive on that, rather than less aggressive.

In particular because with the ability to do address of a lighting, we can actually identify zones of coverage and turn on lights individually to cover a certain zone. Even if you have a four-head parking lot pole, in a grocery store parking lot, if you have the ability to actually identify that, you know, one of the fixtures is in a covered zone that somebody just walked into, you could turn on only one of the fixtures on that pole. You don't have to turn on all four.

So, limiting the wattage to 400, to me makes a

lot more sense philosophically, if we're going to actually go there with the controls.

The other thing that I wanted to comment on is the three options for compliance during the non-normally occupied period. It appears that one of the options effectively is the same as running the lights during the normally occupied period. Is that correct? Yes, dim down.

So, why is there a distinction being made, if you're not actually requiring the system to be turned off after the normally unoccupied hours set point? I think there needs to be some clarity on what the reason is that we're actually designating a normally occupied versus a non-normally occupied, and either treat them different or actually don't make a distinction. There isn't a reason to do that.

And the second thing is, is that implicit in that, in this approach is that if you're running an occupancy or a motion sensor system, fundamentally what we're really talking about is the lighting that's happening when nobody's actually around to see it. It's that tree in the forest problem.

Because when it's normally occupied, the sensors are going to turn the lights on because it's occupied. When it's not normally occupied, we leave the lights on

during the normally occupied period, the presumption being there's a higher activity level and there's, you know, obviously, maybe a chance that people get missed along the way with the sensors, until they get picked up by the sensor.

But it's also an indication that the facility is open and is ready for business, or whatever, however you want to go with that.

So, I guess what I'm getting at is I don't see setting one in the normally unoccupied being a logical allowable thing, if you're going to essentially distinguish that as a normally unoccupied hour.

So, I would consider eliminating that in favor of two, and I'm not sure about three. That's new. So, I'd have to think about what the implications of that are.

MR. MCGARAGHAN: So, is this mic working? How about this one? Mike McGaraghan, with Energy Solutions. So, thank you, Simon, for running through the presentation, and Mike Mutmansky for your comments.

So, I just wanted to elaborate a little bit on this and the goals of the proposal here. Right now, you're forced to either turn your off, essentially for the whole night, or to use this dimming approach. And when you dim, you can't lower your lights any lower than

90 percent dimmed.

And we've heard a bunch of comments saying you should be allowed to turn your lights all the way off in response to vacancy.

So, the proposal here is to allow that flexibility, is to add a design option for people who want it. If you have a portion of your night where you expect occupants to occasionally be in the space, you can keep what's already there, which is the 50 to 90 percent dimming.

But if you have this other big portion of the night where you don't expect any occupants and you want to choose to turn your lights all the way off, you now have that capability.

So, it's really just supposed to add design choices.

One other point I'll make, just on the 800 versus 400, so the CASE proposal suggested that we drop the 1500 watt threshold down to 400. And that was essentially just based on improvements in technology. The 1500 number was an antiquated number based on HID and the 400 was our calculation of an equivalent amount of light load based on current product trends. So, just a little background of where that came from.

MR. LEE: Yeah, the staff, I mean, did a

different set of calculations. It was based on, like being conservative, seeing that the LED light source efficacy -- I mean, by using it is like a 50 percent improvement from the legacy technologies. So, a quick calculation, from 1500 watts you drop about half of it, 750, and I ran it up to 800. So, therefore, the proposal of 800 watts. So, this is a conservative that's being proposed.

And we'd love to hear inputs from stakeholders, from consultants about what is appropriate.

MS. CLANTON: Yeah, Nancy Clanton, Clanton & Associates. I want to clarify a little bit about that 1500 watts. That had nothing to do with technology, it had to do with maximum loading of a circuit. So, you could easily put a relay on it, okay, so it was -- I mean, we didn't have addressable controls at that time, or anything. It was loading a circuit and that's how you could control it, versus running more circuits out there.

So, I just want to clarify that, that that's where the 1500 watts came from. One relay per circuit. Okay, does that make sense?

MR. LEE: Yeah. One thought I guess about -- if that is about the capability of relays, then that means that number will stay at 1500. So, yeah, we'd like to

hear from the stakeholders.

MR. MUTMANSKY: Michael Mutmansky, TRC again. So, Nancy's correct, that 1500 was based in part on what was essentially circuit loading.

But the other reason that it was done was because when these controls, these motion sensor controls were introduced into the code, the concern -- one of the concerns was that a single sensor would be put in and the coverage would -- the luminaires that were being controlled by it would exceed the coverage of the sensor, or the sensors.

And, you know, sort of the cheap solution to putting a control system in is putting a single one in that does the entire parking lot, and then as soon as the building's been accepted, you just go in and override the controls. And then, you've got a static system that defeats the purpose.

And by essentially putting a limit on the wattage of each control zone, you're making it difficult for somebody to essentially game the system and comply for initial compliance and then, you know, defeat the system later on.

So, I mean there's a practical reason for 1500 that's tied to the circuiting. But ultimately it had to do with the lighting within that control zone

essentially reaching beyond the control sensor and essentially having whole zones, whole areas of the parking lot that are not under sensor coverage, that are waiting for the sensor to actually turn on before they come on.

So again, there is a valid, strong reason to be going lower with the number. And I think that approaching that 400 watt number makes a lot more sense considering the addressable lighting that we have sort of starting to take over in outdoor lighting controls.

MR. MCHUGH: This is Jon McHugh, with McHugh Energy. And this kind of reminds me of, you know, the three blind people feeling the elephant and they --

MR. STRAIT: Can you speak into the microphone?

MR. MCHUGH: Yeah, sure. Three blind people feeling the elephant. And so, Nancy, myself, and Mike probably all have different recollections. And, of course, you know, maybe I'm just getting old, too.

But anyway, what I remember is that this also related to the area that this would control. And back when this was done was before we had -- we'd come up with a wattage. Before we had adopted, I think it was the 2008 standards, the area wattage allowance. And back then it was 0.09 watts per square foot. And now, we're going down to 0.025, if you look at lighting zone

three.

And if you think about -- if you calculate this out, the 800 watts is 32,000 square feet. And so, what is 32,000 square feet? And I think one way of thinking about it is a football field is 160 feet wide by 300 feet long. You know, it's a hundred yards to make your touchdown.

And so, if you think about the width of a football field, the 32,000 square feet is 200 feet long by 160 feet wide. So, it's two-thirds of the size of a football field is what 800 watts is.

And so, 400 watts is 160 by 160, so it's about, you know, a little under half the length of the football field and its full width. So, that's really the idea. And the smaller the zone, the more savings you have. Because the larger the zone, you have more opportunity for people to come into that zone from different sides.

And so, this is an energy -- the size of the zone you pick actually has an energy impact and we don't need to have this large a zone for cost effectiveness. We've actually shown that the zone can actually be quite small.

So, that's just sort of the background.

MR. SHIRAKH: Basically you're saying that indoor lighting, where motion sensors make more sense in

small offices rather than large, open areas.

MR. MCHUGH: Yeah, and you can also think about this. If you look right now, there's actually a fairly significant power adjustment factor in open plan offices. And that power adjustment factor increases the smaller you make that detection zone.

And, you know, there was some work done back in 2013 that looked at, okay, if I make that zone smaller, I actually save a larger fraction per sensor.

So, thank you.

MR. BENYA: This is Jim Benya. I just want to observe that another way to look at this is --

(Microphone conversation)

MR. BENYA: Another way to look at this is that today a standard parking lot lighting design, in lighting zone three, let's say, which is a large percentage of the State of California's populated areas, you're going to be looking at lighting poles that are probably going to be 2 and type 3 luminaires that, depending upon how they feel about Title 24, either about 22 feet or 25 feet. Okay.

And so, you know, each one of these luminaires today is probably going to be under a hundred watts. More like in, you know, this 85, 90 watt category. Maybe a little bit more, depending upon your

requirements.

So, start thinking about each pole is about 200 watts. That is with poles on every bumper line and about, give or take, a hundred feet apart or so along the bumper line. That's going to be the area of a parking lot they cover.

So, start thinking about if you have a parking lot that is a typically double-loaded parking, 90 degree parking, and so you've got poles on every bumper line, where the cars' noses come together. About every hundred feet along that is going to be another pole, or pair of poles, as it were.

Start thinking about what that constitutes in the way of a zone. If you have 800 watts, you're likely going to be covering four poles as a zone. All right. That helps understand how relevant these numbers might be. 400 watts would be only two poles and it may not cover a large enough area for some needs, and maybe plenty for others. But 800 is a good-feeling number to me. Because a four-pole zone, from a controls point of view, makes a lot of sense. Okay?

And controls, the future of controls, as I see it, will do the proper overlapping and the inter-coordination of the zones and it will work really, really nicely.

There's also, by the way, a lot of parking lots that are just one lane. The worst one to design is when you've got one lane, with parking on either side and one side backs up to the street. Or, particularly to the street or a sidewalk in the street. There you have to deal with Part 11, CALGreen's backlight off-site trespass, as well as everything else.

But again, start thinking about four poles and the zone it creates. And I think the 800 watt number makes an awful lot of sense now.

MR. GIOVANNI: Michael Giovanni, Lutron Electronics and member of CEA. I'm trying to understand this. And Jim, you helped me out a lot with your explanation there, but I'm still not clear on -- it's clear on indoor lighting what the area is because there's walls in a room, and you know when a room is occupied or not.

But for outdoor lighting, we're trying to define an area based on the total amount of wattage that can be controlled. So, when would that area become occupied or how would you know when an area is -- when there's activity detected? Do you understand my question? How are we defining the area?

MR. BENYA: So, now we've got a controls expert asking us that question? I expect you to give me the

answer, Mike.

MR. GIOVANNI: Because I'm going to -- you probably have to explain it and I'm going to get the question.

Okay, so there's a total wattage that has to be controlled together, so at what point in an outdoor, big, large parking lot do we know if somebody's in the area? I might have to write up my question to be more clear. But I'm still not clear exactly how we're defining the area that needs to be controlled together.

And then, the second question is, are there requirements for lighting that's higher than 24 feet, or I wasn't clear on that, either.

MR. LEE: Well, on the existing code, right now -- okay, so there is a requirement on this automatic scheduling control for all outdoor luminaires.

And then, also, turn lights off when it's daytime. So, that's the requirement for all outdoor applications.

And then there's C-3, that's the requirements for luminaires at 24 feet or less. And that C-4 and 5 are for some other specific lighting application.

So, I'm guessing, going back to your questions, are there requirements for luminaires above 24 feet? It's just the bare requirements.

MR. GIOVANNI: Okay.

MR. LEE: Turning off during daytime and also turning on automatic scheduling control.

MR. GIOVANNI: Okay.

MR. BENYA: This is Jim Benya. Michael, to your point though, it's a really good one. But remember this is restricting the number of watts and it's not indicating a zone, the way I see it.

MR. STRAIT: I think that to a small extent the intent of having a limit at all for wattage in this is so that we don't have the entire parking lot for a, you know, mega mall complex fall on one circuit, to where if there's anyone leaving all of that lighting is on.

At the same time we don't want to prescribe exactly where somebody might divide things up into zones or how they might want to arrange that. Because we don't know what that building, or that plot of land's going to look like, or where the paths of egress are going to be. So, we're just saying any time you've got an amount of wattage over this amount, you've got to break it up and give it some separate control.

And we leave it to the designer to figure out what the appropriate way to carve that out in practice is based on, you know, where the paths of egress are, how the parking is arranged, what have you.

We are looking at dropping that wattage because of LEDs. So, that wattage was originally assuming that we had a large enough area that you have a significant number of poles with traditional coordinates on it before you had to jump to having a second, or third, or fourth sensor in play.

Now, with LEDs, we're saying do we draw that down? Maybe we don't. I mean, if the comment -- it really is just about making sure we have a bunch of lighting coming on that's not necessary just because there's one person at one corner of the property. Then if the feedback is it's not worth trying to lower this amount or come up with a better balance for it, then so be it.

But the original intent was really to say at some point we don't want all lighting coming on. What's a reasonable way of saying you have to chunk this lighting up in some way so that you don't have 5000 watts of lighting coming on when one person walks to their car.

MR. GIOVANNI: Okay, thank you.

MR. MCGARAGHAN: So, this Mike McGaraghan. And, Michael, I just wanted to follow up further. My impression of your question is that you're asking about the -- not about the 400, or 800, or 1500 limit that can

be controlled together, because that's pretty clear cut the wattage is what can be controlled.

I think you're asking how do you define the area.

MR. GIOVANNI: Right.

MR. MCGARAGHAN: So, the language right now says when no activity has been detected in the area illuminated by the controlled luminaires. And are you -- does that answer your question or are you looking for more specificity than that?

MR. GIOVANNI: So, that provides some clarity. So, it's basically --

(Microphone conversation)

MR. GIOVANNI: So, that's basically you look at the luminaires and where they can illuminate the area, and that's how you know. Okay, I didn't know it was worded that way, so that does answer my question.

MR. MCGARAGHAN: Okay.

MR. LEE: And I just want to add one more note. Existing Title 24 requirements for motion sensors is mandatory for luminaires mounted at 24 feet or less. That's mandatory.

For all other outdoor lighting applications it's optional. So, motion sensors is optional for all others.

MR. MCHUGH: I'm actually just looking for input from, I think, the other members of the audience. When I read your Item 3, which talks about building facades -- would you go to that slide? Yeah, sure, I think it's your Item 3.

MR. LEE: That one?

MR. MCHUGH: Let's see, it's the one that's got lots of little print on the slide.

(Comments on slides)

MR. MCHUGH: It's the one that has the list of spaces. Keep going. There we go, yeah.

So, when I look at this, it appears to be saying that you have to use a motion control. Is that right? I mean, I look at Item A and then you can do B. And Item A you have to do, and then you have the choice of three things for Item B for the unoccupied periods.

It looks like Item A is saying you have to use a motion control.

MR. LEE: Yeah, that's correct. So, it's about like if there's no activity without the light. Therefore, actually, it's a motion sensor requirement.

MR. MCHUGH: Right. And in the current standard these areas are covered by something that allows you to do a motion sensor, or something that's a scheduling control. And I look at this list, and I think it would

be useful to hear from the stakeholders, but my perception is that this list -- these are a lot of spaces where you probably wouldn't want to force people to use a motion control. You don't necessarily want the façade lighting to come up and down depending on whether people are walking in front of the wall.

And for the sales frontage, the similar kind of thing. You know, the sales frontage is acting like a big advertising sign.

So, I think, anyway, it would be useful for folks in the audience to describe if this is what their thoughts are. Thank you.

MR. BENYA: Jim Benya here. Jon, that's a great point. In fact, yeah, many times the purpose of façade lighting is a way finding tool, such as for hotels, and as an ornamental thing just to show off as part of the skyline.

I think we need to rethink how that fits into this a little bit.

MS. ENGLISH: Hi, Cheryl English, Acuity Brands. Thank you, Jon, for asking that question because that's what I thought I read, but it went by pretty quickly. So, I agree with the comments that Jim made that, you know, façade lighting serves more than just the purpose on the site. It's hard to determine, you know, when

there's no occupancy when its purpose extends beyond the site. Ornamental lighting, landscape lighting, typically the sensors are usually associated with the -- installed with the fixture. And these may be up under a bush. It's going to be very difficult, in many cases, without adding a separate self-control, self-contained sensor to detect the occupancy, which is going to be more complex. So, we will definitely have comments on that. I think it's appropriate to keep the scope as it was in 2016, relative to the occupancy sensor control activities.

MR. LEE: Appreciate the inputs here.

MR. BENYA: I'm just add one more point, too. Start thinking about the hospitality industry, multi-family industry, security lighting and a lot of other things. I think we need to do a little bit deeper dive on this section.

But, yeah, I thank Cheryl for those points and we'll get this headed in the right direction.

MR. LEE: Yeah, thank you for the inputs. Just want to point out that the intent here is to have the same set of control requirements for both 2 and 3. But I do see the point that they are specification that maybe they should stay on.

MR. STRAIT: Do we know if there was exception

language that we just didn't copy into the slide, that might have been proposed?

MR. KNUFFKE: Actually, I'm questioning, so this didn't -- sorry, this is Charles Knuffke with WattStopper. This is the CEC recommendation language, because this is not the language that's in the CASE Report?

MR. LEE: Yes, this is the staff proposed language.

MR. KNUFFKE: Okay.

MR. LEE: Yeah, this is the draft language, yeah.

MR. KNUFFKE: So, this is draft language that is available where? Is it on the stakeholder site or is it only in this presentation?

MR. LEE: It's all in the presentation, yeah.

MR. STRAIT: We will talk after this workshop.

MR. KNUFFKE: Okay. Because I think the approach in the CASE Study was a little clear about it because it really just called out that you had the all installed lighting had to be controlled by a photo cell. That you had luminaires in hardscape areas, sales lots, vehicle areas and others were controlled, and those were the ones that were dimming.

And there was no other requirements for these

types of lights. I mean, it called out hardscape areas, so I just thought that the draft was a little clearer instead of trying to comprehend this. Yeah, I would agree with Jim that this needs to be chewed a little bit more to be clearer. Thank you.

MR. STRAIT: Are there any comments coming online? Okay.

MR. LEE: So, I'll switch to the last topic. So, we're going to talk about Advanced Daylighting Controls. And I put the titles there, it's very different, daylighting and daylighting controls.

And we would first like to acknowledge the CASE Teams' efforts and for their inputs.

So, Title 34 recognized the benefits of having daylight in indoor space and there are measures for minimum daylighting requirements in large enclosed space, as well as automatic daylighting control requirements in Section 130.

In Title 24, daylit zones are defined as related to skylights and sidelit daylighting.

In most buildings, these daylit zones definitions can be applied quite straight forward. However, there are two situations that could be difficult to use these definitions.

One is atrium space with skylights. The other

is a space with overhang on outside.

For atrium space with skylight the question is about how should the skylit daylit zone be applied to atrium space? And for a space with very large overhang on outside, the concern is that the large overhang can cause loss of daylighting.

So, there are some discussions between CEC and the CASE Team on how to clarify skylit daylit zone for atrium space.

So, the CASE Team designed or come up with a building model. The building model has six floors and atrium space, and three variations of different size of skylight.

The CASE Team looked at the clarifications that the skylight daylit zone shall include the full area directly under the atrium.

And number two, the area of the top floor based directly under the skylight.

And number three, plus a distance of 0.7 times of the ceiling height of the top floor, in each direction from the edge of skylight opening.

And the Case Team ran some analysis using radiance and the results shows that in all cases the area below the atrium, on the first floor is well lit. So, actually, that confirmed the ideas on how to clarify

that the floor area directly under the atrium should be defined as a skylit daylit zone.

And this is the images of the three variation of different skylight size.

And then, the CASE Team also looked at some different atrium variations. You can see that on the image, on the right, is a fairly uniformly shaped atrium. The middle image has one of the top floor being more. And then, the image on the right, it has a very small skylight.

And here is the proposed language to clarify what should be considered for atrium space. And there is an exception. Resonating with Jim's comment earlier, if there is an area that's being shaded, there may be limited skylight available to the space so, therefore, we include an exception here for those special case of skylights.

And so this is Part 2 of the proposal, to look at overhangs. So, the CASE Team has approached the problems by analyzing a building model with different size of overhangs. The size of the overhangs range from zero feet to 20 feet.

And the results from the modeling, the analysis shows that the savings in primary skylit daylit zone can be reduced, dropped by 50 percent in the northeast and

west orientations. The impacts are less in south orientations.

So, the proposal is to add an exception to where the overhangs is too far out. If it is more than one window height out, the overhang is just too far out and there is significant loss of daylighting savings. So, for that kind of a situation the space is not required to meet the daylighting requirements.

And so that's for the overhangs. And now, let's turn to tubular daylighting device, short for TDDs. So, this is the IES definition of a tubular daylighting device. It uses cylindrical light pipes with very high specular reflectance material permitting daylight transmission through the space below ceiling.

There is an existing visible transmission requirement, or minimum VT requirements, in Title 24, but it is for plastic skylight. It's not appropriate for tubular daylighting device.

And the CASE Team proposed a change to align the existing Title 24 requirements to the new testing procedures in NFRC 203.

So, a couple of changes is proposed for the TDD, with a minimum VT of 0.38, and to add this to Table 140.3-C. So, here's the table. The part being highlighted is the addition for TDD, and you can see the

0.38 at the lower right-hand corner of the table.

And then, just one more item, advanced daylighting device. The CASE Team has prepared a proposal in their report for new power adjustment factor for some daylighting technologies and design.

One technology is fixed slats, or the more common name louvers. Another technology is daylight with redirection technologies. Some are made by 3M and other companies.

And then, the one other technology is clerestories.

So, we would like to seek inputs and comments from the stakeholders and consultants on this proposal.

And now, the time for questions and comments.

MR. DIGERT: Neall Digert, with Solatube International. I have to say today is a momentous day. I'm very excited by this.

The TDD and the VT annual rating integration is 18 years in the making, 18 years that we've been working on this. So, this is great. I applaud what you've done. This is tremendously exciting and the industry appreciates it. Thank you.

MR. BENYA: And, Neall, I would just like to thank you and your competitors for the great work you've done at, number one, getting to this point. Number two,

for the products that you've made and the contributions that they make to our goals here. And it's well deserved.

MR. DIGERT: Thank you.

MR. FLAMM: Gary Flamm. The definition of atrium, just a couple questions I'm not clear. In Section 140.3-C, you're required to have basically 75 percent of the floor bathed in daylight. Are there any conflicts with being able to meet that in an atrium that would meet the criteria that requires that atrium floor to have 75 percent bathed in daylight? I don't know the answer to that, I'm just curious. So, that's the first question I have, are there any cases where you cannot meet that?

Blank. Does that mean you're going to look into it or --

MR. BENYA: Gary, this is Jim. You know, I've been sort of scratching my head on this one, too. And I think we're going to take a really good look at it.

The work that was done was really quite excellent. It addressed a long-standing misunderstanding for the definition of what is an atrium and what does it mean.

As a general rule, I think you're going to find a lot of atria, you know, that may or may not meet the

minimum square footage test. But even if they do, sometimes the geometries of them are such that they're going to be very difficult to address in other ways. Like projecting the floors underneath the atrium and, yet, portion of the ground floor may be exposed.

So, we've got a little bit of work to do on this one, yet, but I think it's a -- you know, I want to compliment the team who put this together because they did some excellent work. It's really nice to see the radiance work that they did and what it's shown us. And I think we can pick it up from there. But all the comments, from all of you to complement this, would be appreciated.

MR. FLAMM: Right. So, which I don't disagree that it was good work. I'm just wondering if it created a conflict in Section 140.3-C, for which maybe there needs to be an exception under certain conditions for atria.

MR. BENYA: Gary, that's exactly what I was thinking about.

MR. FLAMM: Okay.

MR. BENYA: What is the difference between a large, open space, such as a warehouse or a -- well, I guess warehouse wouldn't met the square footage requirement. But let's say a commercial distribution

center, or something like that, these storage spaces. I don't see any reason why we couldn't compare and contrast them and try and come up with a list of what's in, what's out.

MR. FLAMM: Right.

MR. BENYA: I see Mudit's standing right behind you, so I think we'll get a little more information from him.

MR. FLAMM: Okay, before he comes up, one more question. If I have one wall on an atria that's an exterior vertical fenestration, is that still an atrium? So, all the diagrams he showed had floors on both sides. If I only have floors on one side and I basically have a -- is that still an atrium and does it -- I don't know. My question is does that still follow the same geometry?

MR. SAXENA: Thank you, Gary. Mudit Saxena, with Vistar Energy. I'm part of the CASE Team and made this effort.

So, the two questions I'll answer, the second one first. That is if you have a sidelit situation in an atrium, is it still an atrium? I would still think it's called an atrium. You would get a sidelit daylit zone projecting on the ground floor or the first floor of that atrium. And then, by definition, skylit daylit zones, when they overlap with the sidelit daylit zone,

the skylit daylit zone wins. Essentially, that's the one that the overlap is taken care of that way.

And the reason for that is that skylights, just by nature of the way they bring in light, just bring in more light over the course of one year, than any one orientation of a window or vertical fenestration can.

So, that's one. And then the second thing that you talked about, Gary, was whether this would -- whether atriums would be considered as part of that requirement where in large open spaces -- correct me if I'm wrong, Jon, but I think it says "large enclosed spaces". Is that right?

MR. MCHUGH: Well, it's large spaces and -- so, this is Jon McHugh, McHugh Energy. It's from memory, but my recollection is it's large spaces over 20 -- now, what is it, about 7,000 feet, 5,000 feet, with the ceiling heights greater than 14 feet that are directly underneath the roof. So, an atrium would meet all of those criteria.

And what I don't understand, Gary, and that's probably why I had a quizzical look on my face, was why is this any different from a warehouse? I mean, yeah, as long as you don't have obstructions, and that's actually a design issue in terms of the obstructions that you might build into the space, but you'd have the

very same sort of situation you'd have in any other sort of toplit space.

And maybe, Jim, you have some thoughts about what was concerning? So, it wasn't really quite clear to me what was concerning. So, thank you.

MR. BENYA: This is Jim Benya. I think we just have to mull on this a little bit. Like I said, this is very good work, it's very well documented. And you're absolutely right, what's the differentiate on it. I think we have to do a definition for atrium that is clear as can be. So that you either have the atrium or you have an ordinary condition.

MR. MCHUGH: And I would like to just mention, just briefly, Mudit, why don't you just describe a little bit about the background? Which is, you know, this comes from the -- go ahead, you tell it.

MR. SAXENA: So, I think what Jon was referring to is sort of the background of why we chose to address this, this round.

The background on why we chose to this, it really comes from the California Energy Commission and the hotline. And there was enough evidence that was collected through the hotline questions that people were getting stumped at this point.

Which is when you have an atrium space, how many

of those floors should we do the 0.7 times ceiling height on? What happens to the bottom floor, do we still do the 0.7 times ceiling height? And there were many different ways to interpret this and neither the code, nor the manual was giving any explanation on how to do it.

So, the radiance separations that we did essentially showed us that the top floor is the most reliably lit by skylights because it has the least amount of influence by any other objections in the atrium or the reflectances of the atrium surfaces.

We did see that lower floors also get enough daylight, especially in this case. But to be conservative, we chose to do a definition for daylit, or just do an interpretation of skylit daylit zone in atriums to be just the top floor. That way even if you have enough daylight present in the lower and middle floors, you're not required to put controls in there. Because if you had something like, let's say a stairwell, or some kind of a sculpture hanging from the atrium, which we've seen many times, or if it's an asymmetrical atrium that influences how much light reaches the bottom or lower floors.

So, just to be conservative we chose to just have it on the top floor and then the very bottom floor,

even though the atrium gets it.

So, that was the sort of reasoning behind how we can do this.

MR. MCHUGH: All right, thank you.

MR. FLAMM: Thank you, Mudit and Jon. So, Jon, I didn't have an answer for that, I was just honestly curious. You know, are there situations where you could not comply with 140.3-C? And I wouldn't know the answer to that, okay.

The second question I have is about overhangs that are too far for requiring the sidelight. I understand building inspectors do not like subjective standards. And so, I'm curious, who's going to make that call? How is it going to be documented? And what are building inspectors going to look for to be able to accept that documentation?

MR. SAXENA: Mudit Saxena, Vistar Energy. So, very much like the building inspectors look for the sidelit daylit zones and skylit daylit zones, they look at plans. They look at the window and the orientation and the size of the window, and the daylit zone that's drawn on it.

We expect that that same plan would also have the overhang showing on it, and then that overhang and its length can be measured on plan, and the exception

can be claimed based on the length of that overhang.

So, I think it's more of the building inspection -- it's more of the plan inspection than on-site inspection, which will capture this.

MR. FLAMM: So, is this going to be a table that is very black and white or is there going to be some subjectivity, that somebody's going to make a judgment call.

MR. STRAIT: Gary, please speak into the microphone. Sorry.

MR. FLAMM: I somebody going to make a judgment call whether the overhang is sufficient? In which case the building inspector's not going to argue with them?

MR. SAXENA: So, the plan is pretty straight forward. It's basically what is your window head height? And if it's the same as the overhang depth or more, then you're exempted. So, I don't see a need for a table. But I think the clarity of this should come from the plan, itself, and the readout from the plan. That if you see an overhang depth that is more than the window head height, then you can claim the exception.

MR. FLAMM: That should be pretty straight forward, yeah.

MR. BENYA: Jim Benya. Just one question. You proposed the value of 1.0. What happens if it's 0.98,

or 0.75? I've had enough experience doing daylighting calculations to realize that, you know, it's a declining value. And once you start getting significantly above that 0.2, you start having real impacts. And it definitely not only affects the amount of daylight, but also the quality of the daylight.

Is that 1.0 a real great number you're totally in love with, or does it need a little bit more work?

MR. SAXENA: Yeah, so the 1.0 is based on the calculations that came out of the radiance example that I did here. I looked at all four orientations and on the south façade, as you can image overhangs actually do benefit when you start off, when you have a 4-foot, 6-foot, 8-foot. After a point about 8-foot they start to decline in benefit. And then there was a decline going down.

East, west, and north had no benefit from overhangs. It was all declining. As the overhang starts getting bigger, the savings start going down. So, there's no real benefit of an overhang in those orientations.

We looked for the point where you've lost 50 percent of your energy savings, which is the 50 percent point was used in the 2013 Code for determining cost effectiveness of photo controls.

So, I was looking at that 0.5, or 50 percent savings dropped. And very roughly speaking, at about that 1.0 you had -- you'd lost it in the east, west and north. We were at 0.4 or 0.45. In south we were still at 0.6 to 0.8 I think.

So, we could have gone with a code language that had a different depth for the south façade and a different depth for the north, east, west. I chose to just keep it really simple. For the sake of compliance, just have it a very memorable number at 1.0. It seems like something easy to remember for building officials, so we kind of drew the line there.

MR. BENYA: Jim Benya. That's a good answer. The other thing I want you to consider, and it just popped into my head so I haven't done any thinking on it myself. Is when many times, whey you're designing a facility that's got a porte-cochere, like a hotel, a porte-cochere is an overhang. And there are windows underneath and adjacent to it. Any many times those windows don't go all the way up, so they're actually much, much lower, or some of them are much, much higher than you might think because you may have two or three stories of windows.

Have you thought about how you would deal with multiple stories against the overhang?

MR. SAXENA: That's a good point. That's something that we should take a look at. Which is, if I understand you correctly, Jim, you're talking about the head of the window ending and then some blank wall, and then the overhang coming above that, is that correct?

MR. BENYA: Yes, either the blank wall or another story.

MR. SAXENA: Another story, yeah.

MR. BENYA: And how does relate because you'll have different effects on different floors. And, you know, take that into account, too. And realize, as you go around the building there's going to be certain orientations that are just horribly bad and some that are just reasonably good. So, thank you for doing that.

MR. SAXENA: Yeah, thank you for pointing that out. We should look at it.

MR. MCHUGH: Hi, this is Jon McHugh. Just, you know, some questions about compliance. Remember, the first path of compliance is with the architect, so the architect draws the daylit zone on the plan of the buildings. Then there's a couple of other layers in terms of people reviewing those plans.

And the overhang, what it does is that it essentially allows you to exempt that section that's near there. So, you know, whether it's 0.98 or it's

.120, you know, Mudit's picked a middle point so that, you know, if it's a little short of that, well, having the control's not going to break the bank. It's not going to kill anyone. If it's a little bit longer and now you're not getting the daylighting for that particular space, you know, it's -- so, you've got to realize that some of this is not down to the third decimal point.

But what you do want is you want the standard to be clear. And what's being proposed is does it comply or does it not comply that I have a daylighting control here, and that's really what's key.

And just a little background. This question actually came up to the ASHRAE 90.1 Committee. And there were some thoughts about making an interpretation, and we didn't want to be in the situation where people are making interpretations because there really is no guidance by the standard. It would be, you know, an interpretation not based on the language in the standard. So, thank you.

MR. STRAIT: That's a good point.

MR. KNUFFKE: Hi, Charles Knuffke, WattStopper. First off, thanks for particularly on this section exploring atrium and overhangs. This is one of those areas where the code doesn't always fit exactly. The

code's a little bit more round and trying to go into a square hole. And truly, this has been one of the more challenging areas for designers, when they run into one of these situations of just trying to figure out, you know, tell me what to do and just make sure it's not wrong.

So, absolutely, I think that this is a great idea to go in and try and get these details.

I would ask, actually, to try to expand some of these considerations. Two of them that come up is limited exposures. You get into San Francisco, you've got buildings in light wells where there are windows, and a window by itself doesn't even, sometimes when it's over 24 feet of glazing, doesn't always guarantee good daylight coming into a space.

So, some sort of metric to determine whether or not daylighting is actually being effective in a glazed area would be helpful.

The other one that seems like it was in the code previously, and it dropped out, was there used to be language that said if you have a wing of a building that is all encased in glass that the daylighting zones, the primary and secondary were separate, based on the orthogonal direction. So, north, south, east, west. That somehow dropped out in the code.

And so, there in fact is an illustration in the compliance manual that shows, you know, a right angle of a building and it shows the primary daylit zone as going around that. And I do believe that what that engenders is people then trying to use one photo cell to control different cardinal directions. And that's -- you know, the recommendation is please don't do that because you may have saved some money, but now you've got something that isn't going to work properly.

So, just really, you know, good work and just recognize that daylighting is a bit more architectural than some of the other things we deal with, and to try to get good answers to everybody would really be appreciated. So, thank you.

MR. MUTMANSKY: Michael Mutmansky, TRC Energy. I first want to comment on just these measures and, you know, taking the effort to actually add clarity and more specificity to the daylighting portions of the code, which I think clearly had a lot of questions. And you're solving problems here and I think that's really excellent, so I want to applaud that.

Jim sort of stole my thunder a little bit on the second thing. Damn you, Jim. But I see the overhang issue as being really sort of a geometry issue and I've got a couple questions on it.

The first Jim sort of mentioned with the porte-cochere concept. And that is how far away from the top of -- from the head height of the window does an overhang have to be before it's not an overhang anymore? There's no definition for that and we need some kind of definition for that.

And the second is, it's currently, as I understand it, being defined off of window head height and there's no sort of definition or consideration of the bottom of the window, so the cross-sectional height of the window.

And actually, if you look at it in cross-section and treat it as a geometry sort of question, and solar benefit, it's not related to head height nearly as much as it's related to window cross-sectional height.

So, my question is, well, why are we disregarding window height relative to the overhang depth? And I know that there's probably sort of mathematical calculations that Mudit has done to do that, so he'll probably explain it here.

But once you sort of treat it as a geometry question and address this issue of distance from the window upwards towards the overhang, and outwards from the overhang, the bottom of the window then becomes relevant as well. So, I just wanted some clarity on

what the thinking was there.

MR. BENYA: This is Jim Benya. Michael, that's brilliant. And so, let me just run with it a little bit further and start thinking about the window width versus the overhang width. Redesign architects do it all the time. What they're do is design shading devices, call them awnings or anything else you want, that are the width of the window. And they serve that projection requirement, you know, pretty well.

But at the same time they don't necessarily shade the window throughout the year and throughout the course of the day.

Start thinking about how that sort of physical device, which is a very good sun control device when designed correctly, and a very good solar gain device really works great in the right orientation and right design, as you well know.

So, think about that, too, because there's a larger context here that Michael just unveiled for us. And how does that fit into your theory?

MR. SAXENA: Yeah, thank you, Michael. Thanks Charles. Great questions and great feedback, actually.

So, I think the width question is a very important one. And I have to say I looked at it very briefly because when I first started it off I had the

overhang just be just a little window and I had to increase it.

Because what happens when you make it that small, the orientation makes a very big difference, even a few degrees of change in orientation.

Keeping the overhang wide enough gave me the ability to give you a very simple answer, which was one dimensional.

But really, the question is three dimensional, so perhaps the answer needs to be a bit more complex.

So, it looks like the feedback I'm getting from you is to go deeper into this and to look at other dimensions, as well as just the depth. So, we will do that. We'll take a look at it a little bit more and see if we can still keep the code simple.

To get back to Charles on his question about orientations, I believe we never had this in code about the different orientations. But we did have it in the manual. And I think the manual's been the only place where orientation is mentioned and the fact that you should put a different control zone by orientation.

It's not been touched upon in code language, either here in California or in ASHRE 90.1. So, let's discuss this a little bit within the team about whether we want to go there. And if there's enough -- if you,

in your experience, see enough of a problem of people doing things like putting one controller, that controls four zones and four orientations, which would be pretty ridiculous in my opinion. But if people are doing that, then perhaps code needs to give them more clarity.

If we don't see this as a huge problem, we can skim back on trying to make the code more complicated in this part of the section, which I've heard is already perceived as complex.

So, we'll discuss it a little bit more here Perhaps, Charles, I'll give you a call and discuss more with you, and Michael Giovanni, and see if this is truly a problem that you're seeing in the field, and we'll go there from there. Thank you.

MS. CLANTON: So, Nancy Clanton, with Clanton & Associates.

So, if I'm reading this right, my daylit zone is reduced by 50 percent north, east and west orientations. What if I'm northwest, or southeast, or south southeast, what do I do?

MR. STRAIT: So, this is simply saying that the anticipated savings goes down by about half when you put that amount.

MS. CLANTON: Okay, but it's --

MR. STRAIT: So, for three of those orientations

one would presume if you're in between there's going to be some variation, but it's all going to be roughly in that same area.

Only in the south orientation do we see that you don't have as much of a hit. So, your southwest and your southeast are probably going to be better.

MS. CLANTON: Okay.

MR. STRAIT: But the rest of the span looks like it's going to still be a significant enough hit that we've got to --

MS. CLANTON: So, you're not trying to give information on the daylight zone, then?

MR. STRAIT: Ultimately, what we're trying to do is craft an exception to say, if you have this situation, you don't have to worry about putting a daylight control in the space because you're not going to save enough money from the incoming daylight to justify it's on that control.

MR. CLANTON: It's kind of clear as mud, but that's okay.

MR. SCALZO: Michael Scalzo, NLCAA. I'll tell you right now, 99 percent of the problems that we see in testing revolve around daylight testing. I'd say almost 95 percent of the north-facing cardinal windows cannot pass a functional test, even without some artificial

light to simulate daylight.

I'll tell you, from a testing stand point we have to do a lot of verification of the daylit zones. We actually, generally, have to redraw them out, clarify what luminaires are in those daylit zones. So, a lot of this responsibility, I know it's going to go through plan check, but the verification process will be done in the field.

So, I think clearly defining the requirements as in heights and widths, and also addressing issues that we run into is like in retail corridors, where they have arches beyond that area should be other exceptions that are brought into there.

So, just make sure you're clearly defining and allow us to do our -- give us the tools so we can do our job on the verification. Thank you.

MR. STRAIT: Actually, if there are other areas similar to the overhangs, where we should also look at places that, because of other architectural features, daylighting controls are going to be rendered ineffective, let us know. Because that's something, because we're exploring in general, we'd like to incorporate.

MR. FLAMM: So, daylighting is really a complex issue and the Energy Commission has been wrestling with

this for decades. And it got really complex. Earlier versions of the standards they were looking at overhangs, and other buildings, and effective apertures, and all kinds of off ramps.

And back in 2013, because the Energy Commission was deluged with complaints about the complexity of daylighting, the Energy Commission decided to make daylighting mandatory. Let's simplify it. Get rid of all these exceptions. Let's just daylighting everywhere, no ifs, ands, or buts, do it. And that was the primary rationale, in 2013, to broadly apply daylighting everywhere.

Now, we have a kind of middle-of-the road works sometimes, doesn't work sometimes. It does not answer all of the design questions. And I'm not confident that without getting the code extremely complex, and without making it unenforceable, I don't know how we're going to get back. We're moving back to where we were prior to 2013, and adding all this complexity to design. I think it's legitimate. I think the current daylighting code does not always work. It doesn't take into account design considerations.

But I'm not confident, without making the standards overly complex, that we can do this. Because I guess what I'm concerned with is I see we're going

back to where we were. So, that's basically what I'd say about that.

MR. BENYA: Jim Benya here. Gary's making a very, very important point and I think that I -- you know, I do daylighting calculations. I'm fairly familiar with the topic. And he's right, it is a complex part of designing buildings.

By the same token, if we think about what the whole purpose of the prescriptive standards are, prescriptive standards are designed so that a contractor can go to his distributor and buy one, or two, or ten, or a hundred and put them in, and follow the rules. And will comply with code and achieve the intent of the standards.

Once you get beyond, and get into things that are customized and specialized, unique to the architecture, et cetera, the performance method is supposed to step in and deal with that.

I think if we keep our heads on straight, we're going to follow that kind of thinking. And, for example, with the introduction of the space is at least so tall, and so big, and it's got to have skylights, that was brilliant. That was a great improvement of the standards. Simple, easy to follow, here are the rules, contractor you're going to go buy skylights. I think

every opportunity we have to do that is something we ought to be looking at and likely are today.

But by the same token, I think Gary's warning that we've been down this road too far before, sometimes, maybe ought to dampen our spirit a little bit, but we shouldn't stop looking at these.

So, this is some good work, it's inspirational. And thank you for all of us.

MR. STRAIT: Just one question to clarify your comment. You mentioned the prescriptive and performance approach. The current daylighting control requirements are mandatory in certain buildings. Is that suggesting we should consider moving them to being prescriptive so they can be traded away in a performance approach?

Or, recognizing within alterations you have a situation where you use the prescriptive requirements, but then in newly constructed buildings these are mandatory.

MR. BENYA: Yeah, this is Jim Benya. One of the problems with alterations, of course, is cost effectiveness testing. It's one thing to analyze the cost of changing a luminaire and controls, things like that. It's kind of universal and don't really matter.

I think this is pretty much limited to new construction and major remodel, working through a 40524

compliance documentation.

But that said, like the current daylighting requirements, I think if we can find more that are simple -- you know, frankly, a huge percentage of the buildings, you know, and overwhelming percentage of buildings out there are simple buildings. And we ought to think about simple buildings and simple, every-day solutions. And then the one-of-a-kind, over the top, golly, gee whiz buildings, let them deal with it in their way.

And I think as long as we keep our heads straight, we will provide most contractors, most architects and most projects a simple way to achieve energy efficiency better. That's all I got.

MR. WICHERT: We do have one comment online that I'm going to read. This is from Michael Warren, of Mark 3 Construction.

"With the passage of Proposition 64, and the expected massive increase in the U-4 indoor horticulture row classification, have any additional daylighting requirements been considered?"

MR. STRAIT: So, we're looking at those operations as being -- or those functions as being indoor horticulture as process, basically agricultural processes. So, that lighting is not what's -- how do I

put it? We're not looking at daylighting requirements -- the daylighting requirements we have on the books right now are about human occupants, not about greenhouses, for example.

So, if we need to add language to draw a brighter line for some of those new scenarios, we are looking at possibly doing so.

But the daylighting control requirements we're talking about right now are specific to human occupancy and wouldn't be applicable or aren't intended to be applicable in the case of any lighting for horticulture.

MR. WICHERT: That's it for online.

MR. BOZORGCHAMI: So, if that's all the questions, I'm going to open up the mic for any other comments or questions from other topics.

Mazi offered to do his karaoke.

So, that completes our workshop today. We will be having -- our next workshop will be on July 13th. It will be on hospital measures and demand response cleanup. I heard a few of you folks in the audience had some questions about demand response, and I think that will be the date to be present and participate in our workshop then.

And I would like to thank you all for participating and hope to get all your comments in by

July 14th. Thank you.

(Thereupon, the Workshop was adjourned at 3:27 p.m.)

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REPORTER'S CERTIFICATE

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 12th day of July, 2017.

_____

Eduwiges Lastra
CER-915

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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 transcribed by me, a certified transcriber.

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IN WITNESS WHEREOF, I have hereunto set my hand this 12th day of July, 2017.

Barbara Little
Certified Transcriber
AAERT No. CET**D-520