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BEFORE THE
CALIFORNIA ENERGY COMMISSION

In the matter of:	)	
	)	Docket No. 10-BSTD-01
Staff Workshop on Draft Lighting Revisions for Possible Inclusion in the 2013 California Building Energy Efficiency Standards	)	

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

MONDAY, APRIL 4, 2011
10:00 A.M.

Reported by:
Peter Petty

APPEARANCES

Commissioners

Karen Douglas

Staff Present

Mazier Shirakh
Martha Brook
Gary Flamm
Ron Yasny

Staff Contractors

James Benya

Also Present (* Via WebEx)

Attendees

Jon McHugh, McHugh Energy
Owen Howlett, Heschong Mahone Group (HMG)
Catherine Chappell, HMG
Joshua Rasin, HMG
Mudit Saxena, HMG
David Wilds Patton
David Goldstein, NRDC
Pamela Horner, Osram Sylvania
Mike McGarraghan, Energy Solutions
David Watson, Lawrence Berkeley National Laboratory
Charles Knuffke, Watt Stopper
Neall Digert, Solatube International, Inc.
Gene Thomas, Ecology Action
*Francis Rubenstein
Peter Schwartz, LUMEnergy
Bernard Bauer, Integrated Lighting Concepts
Mark Lien, The Lighting Solutions Center
Patrick Eilert, PG&E
Ernesto Mendoza, Philips Lighting
*George Nesbitt, Environmental Design Build

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P R O C E E D I N G S

APRIL 4, 2011 10:13 A.M.

MR. SHIRAKH: I'm Mazi Shirakh. I'm the Project Manager for the Building Energy Efficiency Standards. To my right is Gary Flamm, he is the Supervisor for the Standards Development Unit. And Martha Brook is acting like a Commissioner; she is my partner in managing this effort. Not present in the room is Bill Pennington, who is the Office Manager for this project. And sitting in the back is Patrick Saxton, he is a Senior Mechanical Engineer, he is also part of the management team -- he is an Electrical Engineer, I'm sorry, I'm a Mechanical. And Ron Yasny, he is the Contract Manager for this 2013 Standards and he is also running our audio-video.

So, we have a pretty full agenda. We're going to start with some introduction. Ron, next slide, please. There are various policy goals that we're following as a guideline for this round and the next few rounds of the Building Standards and most notably is the Zero Net Energy Policy that has been set for us by various legislation and Executive Orders. The goal of zero net energy is basically for residential dwellings, by the year 2020, and for non-residential buildings, it is 2030. And the definition for zero net energy has yet to be defined, but roughly it's going to be that we're

going to try to make the building envelope and mechanical system and plug loads as energy efficient as possible, in a manner that is cost-effective by 2020, and then the remainder of the load will be met by renewable sources. Do you agree with that, Martha? That definition? [Nods her assent] Next slide, please.

So, there's, again, other goals with the Green Building Standards Code, which was published in July of 2008, and that set the goals of the Reach Standards, which is also part of this effort that we're doing. The Reach Standards have two levels, Tier 1 and Tier 2, which go beyond the base standards and so we're actually going to be presenting topics from the Reach Standards as part of these proceedings, too. And all of this is supported, again, by various laws and Executive Orders, and Governor Jerry Brown's Clean Energy Job Plan clearly supports the goals and efforts of the staff related to the Building Standards and zero net energy goals. Next, please.

Our major collaborator for Building Standards are – and you've all been familiar with the stakeholder meetings, I'm sure you've been attending those, there have been several of them, and these are efforts by California's IOUs, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and the gas

company, Southern California Gas – LADWP – have been participating in these efforts and they're helping the Energy Commission with these standards. PIER is always an integral part of this process, you know, they help us with the research and development and the field studies and other types of field research that we need to justify the standards, and we also received a substantial amount of input from the general public. Next, please.

So, these are familiar, the Rosenfeld Graphs, and now it is updated, you can't see it, but it goes all the way to 2010 and this is one of the reasons why we actually bother with buildings and appliance standards, and basically if you look at the graphs before 1976, before the introduction of the first appliance standards, the green is the California per capita energy consumption, the red is the U.S. average. Basically, they had pretty much the same slope, increasing at the same rate.

So, what happened in 1976 is, when California introduced the first appliance standards, and that's where you see the first blip, and ever since then, it's roughly the California energy per capita has remained fairly constant, around 7,000 kilowatt hours per person, largely – not entirely – due to our building and

appliance standards, whereas the rest of the U.S. has generally increased. Next slide, please.

This graph shows the per capita energy consumption by 50 states. At the very top, the green here, you see that's the California number, and this is the U.S. average, around 12,700, ours is just under 7,000, and here is the State of Wyoming, I don't know why they're using so much energy, but basically, you know, we think that part of the reason why we're here is some of it has to do with our climate, but certainly a lot of it has to do with our building and appliance standards. Next, please.

So, again, the major goal that we are pursuing for this round is zero net energy and we're looking toward 2020 and we're hoping that with each cycle of standards there's going to be this one, 2013, there will probably be one in 2016, and one in 2019, and with each step we're hoping to save anywhere from 15-25 percent energy relative to the previous cycle. And the 15 is more for non-residential buildings, and the 20-25 is more for residential buildings. And, again, we're going to have Reach Standards as part of this and future cycles.

Another thing we're doing this time is we're aligning our timelines with the Building Standards

Commission's timeline. Title 24 has 11 parts; the Energy Part 6 is only one part of it. In the past, we haven't been in sync with the rest of the Building Code and now we're trying to actually align ourselves with the rest of the Building Code, so it's going to be a shorter timeline, you have to stick to a three-year cycle, whereas in the past, you know, it's been anywhere from sometimes up to four years, so that's going to be interesting.

We're pursuing certain goals and policies as part of the 2013 standards and one of the things we're trying to address is compliance and enforcement issues, which has been a challenge. Part of that, you know, you've always heard the standards are too complicated and it's hard to enforce, so we've really tried to keep the new changes, proposed changes to the standard, as simple as possible. And we talk to our team and the contractors, rules about simplicity, numerous times. Some of the things we're trying to do to simplify the standard is migrate some of the prescriptive measures and make them mandatory measures. And the problem with prescriptive measures is they can be traded and they can change across climate zone boundaries, and so Building Departments don't, most of the time, know what the requirement is because it's not a fixed target.

So the things that we're thinking about migrating is mostly ducts sealing, refrigerated and charge air flow measurements, and some of the other residential HVAC issues. Another thing we are doing, we are looking at all the exceptions to the prescriptive requirements, exceptions, they are there for a reason, but also they tend to complicate standards. And many of them were put in there in the first place for a reason, but those reasons may not be there anymore and, in those cases, we're going to eliminate those exceptions. User-friendly compliance forms, and create online interactive forms, you know, our compliance forms have always been a source of complaint for complexity and the number of forms, so the approach we are using is creating an online interactive form. This is not unlike Turbo Tax that many of us are probably using to do our State and Federal taxes. When you do Turbo Tax, not to try to promote Turbo Tax, but any tax software, you don't really need to know much about the forms, you know, the software asks you a bunch of interactive questions and answer them, and the software will generate and fill out the forms for you. So, this is pretty much what that effort is all about is to create an interface that you answer the questions to the software and it will generate the forms, and you don't have to go through the

massive forms to try to figure out which ones to fill out and which ones not to.

And we're also trying to simplify our performance software interface, you know, we have a number of residential and non-residential performance software programs, many of which are not very intuitive when you want to do – especially when you want to do alterations, so the idea here is to create an interface with a series of checkboxes that you can quickly explain what your project is. For instance, if you want to do tradeoffs between Cool-Roof and building envelope and an alternation, you simply tell the building that you're not interesting in any of the mechanical or hot water issues and the software will neutralize those fields, and only leave active the fields that you are interested in doing tradeoffs. So, that would hopefully really simplify or help people with their existing building improvements.

We're also going to be relying more on third-party verification acceptance requirements. Another new aspect of the 2013 standards is going to be improved electronic recordkeeping and CEC central document repository for both residential and non-residential buildings. With the 2008 standards, we used to do that, the requirement for registration with the HERS

providers, data registries for certain buildings that required the HERS verification measure; we're expanding that and also creating a central repository where all of the data that goes into those registers will be automatically transferred into the repository, which will be available to both Energy Commission, local governments, utilities, and you can do enforcement actions, as well as program evaluations, and many other types of activities.

And another new area that we're considering is integrating energy efficiency with Demand Response controls and this so-called control ballasts that many of you have been attending is an example of that. Next, please.

We're trying to capture some non-energy related – like greenhouse gas emissions benefits and that are not directly energy related in this round of standards, and these will be presented in a workshop later this month. We're also for the first time going to have water saving measures, directly, that are not necessarily energy-related, as part of these standards.

Another big measure is going to be roof tech insulation in residential buildings, in addition to the ceiling insulation that you normally see, encouraging proper building orientation probably as a compliance

option, and treatment of photovoltaic panels for the first time, in part of Title 24 and in response to a SB 1 requirement that we have to prepare a report to the Legislature and the idea here is to allow photovoltaics into the building standards in a manner that does not compromise the energy efficiency of the building, but would allow PVs in exchange for things that go beyond some of the prescriptive measures like excessive west facing glass, or total fenestration limits of the standards. Next, please.

This is the schedule for the 2013 standards. In this area right now, we're doing the staff workshops, and all of this activity is going to be completed. The dates that are marked in red are probably the most important ones, the adoption date of the next standards are going to be March 1, 2012. The publication of the entire Building Code is going to be July of 2013, hence the name "2103 Standards." And the effective date of the standards is going to be January 2014. Next, please.

As usual, we do have to do a lifecycle cost analysis for each and every measure for climate zone, for all of our mandatory and prescriptive requirements. We had a staff workshop in November, November 16th of 2010, where we presented the updated weather files,

updated the Time Dependent Valuation, or TDV values for both base and Reach Standards, and updated lifecycle costing methodology. Before the 2013 cycle, this was mostly an Energy Commission show where, from the onset, you know, we had anywhere from 15-20 staff workshops, and many of you have attended those workshops which were very similar to this. We're doing things a little bit differently this time. Next, please. This time, because the IOUs, the Investor Owned Utilities, are sponsoring the vast majority of the measures that are going to meet 2013 standards, they actually have at least two, sometimes three, or even four stakeholder workshops in advance of these workshops, and the idea was for them to actually engage the stakeholders, look at the proposals, and try to resolve as many of the issues as possible before we get to the CEC workshop, which starts today. And hopefully, you know, we'll find out whether that process worked or not, next month. Can you go back one?

We're going to be holding seven or eight days of workshops this spring, as opposed to almost 20 in the past and, so, again, the intent is to keep the staff workshops as short as possible. Next, please. So, these are the schedule of the workshops that will be coming up the next two months, today is the April 4th,

Res and Non-Res Lighting, April 11th, which is next Monday, is going to be Non-Res Ventilation Boilers and Data Centers, April 18th, which is two weeks from now, another Monday. Then there is Non-Res Acceptance Testing, Design Phase Commissioning, Refrigerated Warehouses, and Supermarket Refrigeration, Solar Rated Buildings and Solar Hot Water Heating. The last April meeting is going to be on the 27th, HVAC Cooling Towers, VAV Systems, Energy Management Control Systems, Air Compressors, May 5th, 2011 is going to be Non-Res Water and Space Heating, Radiant Cooling, Non-Res Envelope Measures, including Roofs, Walls, and Fenestration topics. And it's going to include residential domestic hot water systems, so if you are interested in that residential topic, you may want to be here. May 24th, May 31st and June 9th, 2011, are going to be residential topics, the agenda is yet to be developed or determined, so just stay tuned for that, but if you're interested in residential topics, it's going to be later in May. Next, please.

So, developing the compliance software has always been a challenge, having it in time and this time we're fortunate to have Martha Brook working diligently around the clock to determine, and I'm going to turn it over to her to explain this part, these next two slides.

MS. BROOK: Okay, thank you. This will be just real quick. And if you've been paying attention to your software development plans, you'd know that we are trying to do things a little bit differently. We're trying to do more of a collaborative development process with other parties in the state and around the nation that do public goods software development activities specifically in this building energy analysis space. We think there's a lot of leveraging opportunities and we really haven't been taking advantage of those in the past, so we want and intend to develop all of our compliance software to make available in an Open-Source Software license, and we actually have two solicitations out to bid right now to do both the residential and the non-residential compliance software that's necessary for the 2013 standards. You can go ahead to the next slide.

We are trying to get the compliance software completed as close to the adoption date as possible. We probably won't meet that, it's a very aggressive schedule and, you know, we have a year to 18 months to meet that schedule. So, we hope that many of the stakeholders that have been involved in our software development plans are planning to partner together to respond to these solicitations, which will be coming in later this month, we'll start the work this summer and

go as hard and as fast as we can, given our limited resources, to get compliance software developed later in 2012.

MR. SHIRAKH: Thank you, Martha. Next slide. And because this is a mostly lighting workshop today, all your comments should go to Gary Flamm, there is his contact information and we ask you to provide your comments by April 18th, which is two weeks from now, we would appreciate it. So, that concludes my presentation. I'm going to turn it over to Gary Flamm to start the real stuff.

MR. FLAMM: Thank you, Mazi. So, while I ask Ron to get the Internet up for me, I just want to say that the purpose of today's workshop is to go over the proposed lighting language. Now, a little over a year ago, the utilities started having workshops where they were vetting their ideas. We asked them to do something different this year. Instead of bringing ideas to us and then a lot of stakeholders not learning about the ideas until we have a staff workshop, and then only then do we have this dialogue between various stakeholders, the utilities have done a really good job of being transparent, of inviting everybody that wants to participate, they have vetted their ideas, they have shown their cost analyses, the technical issues, and so

that's been going on and a lot of you have been involved in those. And so, all of those efforts were prior to the staff workshop, so those have all been pre-rulemaking activities.

Now, this continues to be a pre-rulemaking activity in that, until we open a formal rulemaking, we consider this pre-rulemaking. So, today, myself and Jim Benya are going to go through the proposed language. I wanted to just take a minute, I'm going to change to a different microphone and go over the website.

MR. SHIRAKH: While Gary is doing that, the time we've allotted for each topic includes both the presentation of the topic and some time for Q&As, and at the conclusion of each topic, you know, you can come up to the podium here, but for the benefit of the Court Reporter, we ask you to identify yourself each time and your affiliation, who you work for, and preferably give them a business card so you can get a proper spelling of your name and your company.

MR. FLAMM: And, to that end, Mazi, we seek your comments. We are here to present the proposed language, and we seek comments. Now, obviously we have a lot to cover today and so we're not going to – you know, if we get off on a particular topic, just because we move on to the next topic does not mean that there are no more

opportunities to make comments. We want to stay on an agenda, as a matter of fact, we're already behind, but we want to try to keep this moving, if you have comments, in the last presentation which will be posted online, there's contact information for me. There's no need at this point yet to make formal comments – you're welcome to, as always, you're welcome to make formal comments – but you're also just welcome to send in formal comments directly to me, either call me, or send emails to me.

So, what I want to show everybody is how to find this information online. So, if you go to the Energy Commission's website, Energy.Ca.gov, so that's www.energy.ca.gov, and then I'm going to back up just a little bit, from there, you go to the Building Energy Efficiency Standards, you pull down that menu, and that will take you to the Title 24, Part 6 website. And then, on the left here, everybody sees where I'm highlighting, there is the 2013 Rulemaking. You can go to that website, to that link, and here is background information about this rulemaking. Also, on the left here, highlighting where it says "workshops," that's where we are today.

If you go to that link, we are on the April 4th workshop, so if you look at the April 4th website, you're

going to find the notice. There will be today's agendas there, there's draft language, this is actually the lighting excerpts from the language, and that has been printed up as a handout that everybody here has a copy of. This is the language we're going to trudge through today. There was also one subjection, Lighting Definitions, that I failed to get online, it's not here as a handout, but it's just definitions in Section 101 that are lighting-related, so you might want to look at that.

Here, we have a section called "Documents and Reports for Review." This is where we are housing all the case analyses, so each one of these, if you want to open one of them, this is where you're going to find the issues about the process that they went through contacting public, responding to comments, the cost-effective analysis, the technical issues, they're all embedded in each one of these presentations – these documents. So, that's where you can find things online. Today's – Masi's Powerpoint presentation will be put here, and then the next workshop is going to be April 11th, and there will be another subsection created here for the April 11th. So, all the information that you need is available online. If you can't find something, contact Masi or myself and we'll help you find it.

So, with that, Ron, I want to – do you want me to just pull up the document here, the draft language? Okay. Nope, that's not the one I wanted. Okay, now I'm in Never Never Land. I went to Draft Language, Lighting Excerpts. Ah, there it is. And, Ron, do you want to scroll down this? I'm going to go sit down.

So, the first language we're going to go through is Section 150(k), changes to the Residential Lighting. As Masi pointed out earlier, one of our goals is simplification and clarification of the standards. There's a lot of strike-out in the residential language. For the most part, I got rid of all the language that had to do with high efficacy and low efficacy, the calculation, and I replaced that with a table. There's a new table 150-C, it basically says in this column is high efficacy, by default, and in the right column is low efficacy. The Hybrid Luminaires, that language is taken from some of the language I deleted, so that's just clarified and moved. Here is a change, Recessed Downlights, it says that "recessed downlights shall not contain medium screw-base sockets." So, that's new language that's in the Residential Lighting Case Project that is online.

Scroll down for a while. All of this language is just scratched out. Then we're at Luminaire Wattage,

pretty much the same, a little clarification language, Electronic Ballasts, the same. Night Lights, I got some feedback, why do you require 5 watts or high efficacy, just require 5 watts max, and I agreed with that and so I scratched out for simplification, again, so the 5 watts is the same. The Integral Fan language is the same. Switching and Controls, just some clarification language, nothing significant. Again, a lot of simplification. Lighting in Kitchens, we still have the 50-50 calculation, high efficacy and low efficacy. But, because we are going to require utility-type rooms to be both high efficacy and vacancy sensor, the trade-off now for the extra 50 or 100 watts does not require these spaces to be high efficacy because they're already going to be high efficacy. It just requires them to be controlled by vacancy sensors –- actually, no, it's just the kitchen lighting has to be controlled by a vacancy sensor dimmer Energy Management Control System (EMCS), or a programmable multi-scene. Again, some simplification language. Lighting Integral to Cabinets, some clarification language, what is the length of a cabinet? Is it the horizontal width? Is it the vertical height? And so we added some clarification language to that, to explain what we meant. Lighting in bathrooms was broken out, bathrooms were combined

together with a garage, utility, laundry, and bathroom, were broken out as a separate classification now, and it says a minimum of one high efficacy luminaire in bathrooms. "All other lighting installed in each bathroom shall be high efficacy or controlled by a vacancy sensor." The only difference is, now, that one luminaire has to be high efficacy. The next section, you can see we scratched out Bathrooms and Closets and removed that. The requirement is that these utility-type spaces have to be high efficacy and controlled by a vacancy sensor, that's different. And it says, for Garages, that the vacancy sensors shall use only direct line of sight type technology, some scratching of exceptions for simplification. Lighting in Hallways, hallways have been broken out separate from the group they used to be in, all high efficacy or controlled by a vacancy sensor or a dimmer, that's the same as the current language. But it also says that pendants, chandeliers, sconces, shall not have medium screw-base sockets. So, then, some of these other classifications, we ended up stripping language from them, we stripped out "hallways," we stripped out "bathrooms." No, really, changes to Recessed Luminaires in insulated ceilings. Residential Outdoor Lighting, there was some confusion between multi-family and

single-family, so, for clarification, I broke that into two separate subsections. Also, somehow apartment complexes got left out of the Outdoor Lighting Standards, it was inadvertent. We require outdoor lighting for single-family attached to a building, we require outdoor sight lighting, which we have since 2005, and this just brings the apartment complexes into that fold.

Multi-family buildings, there are some multi-family residential buildings that are predominantly dwelling unit and there are some that are not completely dwelling unit, so if you have more than 20 percent of the space is common area, then you meet the existing standards, which is high efficacy, or controlled by an occupant sensor. But if you are greater than 20 percent, that building shall meet the non-residential standards. Parking Lots, again, broken out for clarification. So, I believe that's about it.

Now, I deleted all this 30, 40, 50, 60 lumens per watt, you don't have to worry about that anymore for residential standards. And so, here is the table, if it's in the left column, it's high efficacy by default, if it's in the right column, it's low efficacy. So, this is going to replace the 30, 40, 50, 60 lumens per watt. Now, we also have a catchall table, proposed

table 150-D, that's for any new or unusual technologies that were missed in this other table, so it allows technologies to evolve. Also, reference Joint Appendix JA8, it's very similar to IES LM-79, which is a testing protocol for LED Luminaires. We deleted all of the existing JA8 language and we are now citing LM-79 because LM-79 was not an official document, it was not an adopted document when we went through the 2008 rulemaking. However, there are some testing lab protocol that we wanted to keep, there was language in Sections 119, 130, and Table 150-C, all having to do with manufacturer responsibilities for high efficacy LED, and that was all moved to reference Joint Appendix JA8. And the efficacy for LEDs to be classified as high efficacy, there is a minimum color rendering index, there is a range of color temperatures, and there is still the 30, 40, 50, 60 lumens per watt per the system.

So, those are the changes to the Residential Lighting Standards. So, does anybody have any quick comments about the Proposed Residential Lighting changes?

MR. SHIRAKH: If you have any comments, please come up to the podium.

MR. FLAMM: Right, if you come up to the podium, please state your name every time you make a

comment.

MR. SHIRAKH: How about online? Anybody on the phone who wants to make a comment? We have Dave Patton.

MR. PATTON: David Wilds Patton, David Wilds Patton Lighting Design. Is it necessary to put the medium base thing in the hallways if we're not having them anywhere?

MR. FLAMM: Well, it says Downlights. There are two components that disallow -- that are proposing to disallow medium base.

MR. PATTON: Right.

MR. FLAMM: One is all downlights, the other is chandelier, pendants, and sconces in hallways

MR. PATTON: Okay.

MR. FLAMM: Medium base are allowed according to the other rules, whether it's a vacancy sensor, a dimmer, Energy Management Control System, so there are like in the bedroom and the dining room places that the medium base sockets are allowed –

MR. PATTON: Just not in downlights.

MR. FLAMM: Just not in downlights.

MR. PATTON: Okay, that actually wasn't clear to me. I also have a question. Did you ever find out if the dual technology vacancy sensors for garages are

cost-effective?

MR. FLAMM: I did not follow-up on cost-effectiveness. We did get some input from the control industry and the new language was actually proposed by, I believe, one of the control manufacturers, I massaged it a little bit. So, I see Owen chomping at the bit, is there something you wanted to say about that, Owen?

MR. HOWLETT: Hi, this is Owen Howlett from HMG. We didn't do an extensive costing exercise on that, but from the initial data we looked at on cost, it was cost-effective.

MR. PATTON: Okay, and then my last question had to do with that new table, or, it's not a new table, but that JA.H?

Mr. FLAMM: Yes.

MR. PATTON: I still think that those values might be a bit high right now.

MR. FLAMM: So, those are the existing values. Do you think that we need to reduce the values for LEDs?

MR. PATTON: I don't think we're going to go there, are we?

MR. FLAMM: I would suspect not, but I'm trying to understand what you're proposing.

MR. PATTON: Then, we're good.

MR. FLAMM: Okay.

MR. PATTON: Okay, thank you.

MR. FLAMM: Thank you, David. Anybody online have – anybody else in the audience? Jon.

MR. MCHUGH: John McHugh, McHugh Energy. Since this is the first time that all the stakeholders, I guess, get to hear what the Commission has in mind for residential lighting, I was wondering, are you going to talk later on about what you have in mind for the Reach Standards?

MR. FLAMM: I was not planning to address Reach Standards today. It was not on the agenda, so, no.

MR. MCHUGH: Okay, so you're planning that for another meeting?

MR. FLAMM: Probably, yes. Yes.

MR. MCHUGH: Thank you.

MR. FLAMM: Well, it would have to be for another time. Anybody on the phone have questions, comments? Okay, and please, we want to hear from you, that's the purpose of this is to lay out the language, and to see if there's anything that we missed, any issues that we missed. So, I'm going to go on to Section 119, which are the –

MR. SHIRAKH: Gary, before you go there, one other housekeeping thing I forgot, when you came in,

there was a sign-in sheet, make sure you either sign your name or, better yet, staple your business card to it so we have a record of who is attending. Thank you.

MR. FLAMM: So, Section 119 has been a project that I've been shepherding, actually, for a couple years and the concept is that we are stripping out self-contained lighting control requirements out of Title 24 and moving them to Title 20, so there is a proposal for a Title 20 rulemaking in which self-contained lighting controls would be certified to Title 20. What would be left over in Section 119 would be lighting control systems, and so currently it's kind of clumsy because you have to certify self-contained lighting controls and lighting control systems to Title 24. And it's really clumsy certifying a system as a device. So, what we're proposing changing is that lighting control systems will have to meet the same requirements as a self-contained device, but one would have to go with acceptance testing. So, there will be an acceptance requirement for lighting control systems.

So, what we have here in Section 119 is what's left over after we strip out self-contained lighting controls. So, I'm not going to read all the language, you can see I just basically deleted everything. I will say that I'm thankful to the National Electric

Manufacturers Association Controls Committee, who we've met a number of times, we've had a number of conference calls, we've had a back and forth, and come up to a consensus on what the language will look like. So, this is the language where that's left over. Does anybody want to make any comments about the proposed changes to Section 119? Okay, seeing none, I'm going to keep moving.

So, the next thing I'm going to address are Section 130, Lighting Controls and Equipment – General. This is just an overview of all of the mandatory requirements for lighting control equipment. For the most part, it's just been some clarification language. In the Section 130(d), proposed to have fire stations, the dwelling units, meet the residential standards. We say that already in the Non-Residential Compliance Manual, however, we've never said it in the standards because fire houses are mixed use buildings, just like high-rise res, hotel, motel, so we're proposing to basically say here what we're already doing. Some language changes with line voltage track, some clarification language about, if you use line voltage track for the integral current limiter, you have to have acceptance testing; if you use the supplemental overcurrent protection panel for track lighting, you

shall have acceptance testing. There is some confusion over low voltage lighting, so I split out low voltage track lighting from low voltage individual luminaires for clarification. All the GU-24, most of the GU-24 language, has been deleted because, after we adopted the 2008 Standards, there were Title 20 Regulations adopted for GU-24 luminaire sockets and adapters, so all of this is no longer needed because it's in Title 20. Certified Lighting Controls – this is basically a global statement; instead of going through every single subsection of Section 131, to say "shall be certified to Title 20, Section 119, or Title 24," I just made a global statement and that allowed me to scratch out a lot of redundant language out of 131 through 133. And any comments on the Section 130 general information? Okay, Owen?

MR. HOWLETT: Owen Howlett from HMG. Do you have a definition of a self-contained control system?

MR. FLAMM: Yes, in both Title 20 and in Title 24, there are proposed definitions. And if you look at the definitions – that I didn't print, but they got posted this morning – those definitions will be there. Anybody online, Ron? Okay, hearing none, I'm going to turn it over now so you can have a different voice here, a more baritone voice. Jim is going to do some of this

language.

MR. BENYA: Good morning, everyone. First of all, in looking at your work on Section 119, it reminds me of an English Professor I had hears ago, that's the way our papers used to come back, all red lines. That's quite a bit of work.

I hasten to point out as we start this portion of the review that there have been a significant number of changes. This is probably one of the most active areas of changes in the Standards being proposed, thanks to a tremendous amount of work in the Case Study Teams, and a number of representatives of those teams are here today. And Gary once again has done quite a bit of crafting to put all of this together so that it makes a lot of sense. I'm going to try and highlight some of the key changes. Undoubtedly, you will find particular words, or phrases, or something as you review these in detail, and of course your ability to comment on those is definitely a very important part of how we get this right, so I will be highlighting the key points as we go through this. And as we get through each section, we'll take a break so that – I'll tell you what, we'll take a break after each major subsection so that we can have discussions in context before going on to the next section.

I'm going to start with Section 131(a), Indoor Lighting Controls That Shall Be Installed. The changes in this section, although there is quite a bit of line work here, one of the key things that these changes propose is a clarification based on not only the experience of staff, but also of some awareness raised by the case study teams. There's not really, I wouldn't say, anything profoundly important in this section right now. You can see this exception, for example, 131(a), Malls, Auditoriums, etc. These, again, are mostly – my opinion, and I guess I can speak for Gary a little bit here, too – clarifications that have been needed for some time.

This next exception here has to do with the – this is where we get into some changes that are forthcoming. One of the issues that you run into here is that emergency egress lighting, whether many of you know this or not, is actually able to be turned off under certain conditions and that's been part of the Code for some time. And historically we've allowed a significant wattage in a building to be left on 24/7 for the purpose of emergency egress. This exception begins to harvest that significant change in the Code so that, in other words, if a building is unoccupied, you can turn off the emergency egress lighting. There are a lot

of buildings for which this would be a significant contribution.

Coming down further, Separately Switched Lighting Systems, this one, in particular has been a little bit of an ongoing issue with us in the standard and this is making it super duper clear that there is an expectation that there will be separate switches for various lighting systems. This has also been moved forward from Section 131(D) for those of you who are keeping track.

Here is where there is going to be some fun. Section 131(b), multi-level controllable lighting. This is a rather significant study in which I participated as the case study principal team leader, and what this study is now proposing is that there will be a significant increase in controllability of lighting for all lighting systems. And so, the expression "controllable lighting" has been put in to suggest this. There will be a table that we'll be looking at shortly that tells you what that controllability means. This is where we make a major leap forward based on a case study. You will see a number of exceptions have been introduced and removed, classrooms, one of them that is important is classrooms were determined not to be cost-effective, necessarily for controllable lighting, but

virtually every other space type does seem to be – and the reason for classrooms, of course, is the limited length of the school day. You see we have an exception for school space that has only one luminaire with no more than two lamps, is the exception for the requirement for controllability.

The next group of strikeouts you see here have to deal with daylighting and daylight area, and this is being moved, we will get back to it in a little bit. It's been reorganized substantially, simplified substantially, so the deletions that we're looking at right now are just simply reorganized and they will reappear, don't worry, daylighting is still part of the standard. Oh, going back – I just want to make a note – Section 131(b), historically we've also allowed an exception for corridors, again, the idea is that corridor lighting needed to be left on 24/7 for safety or security, or something like that; again, that is no longer considered to be a Code requirement for egress safety, therefore that Code requirement has been reduced. There is still the ability to leave some lights on, however, the wattage you're allowed to do that is significantly lower than historically.

If I say something wrong, Gary, don't hesitate to jump in, there's a lot of stuff here. Okay, you see

again daylight – everything having to do with daylight has been relocated, so we'll take a look at that in a second.

Okay, Section C, Section C has been, again, the daylighting language has been relocated and the old Section C is now a few more lessons in simplification and clarification, and we'll get to it in a second. The new Section C is moving the shutoff controls forward, not any huge changes in the process, with the exception of Exception 3. Exception 3, this is where we get, again, in office buildings, up to .05 watts a square foot, in any area within a building may be continuously illuminated. This is getting at, again, what we see as a rather significant waste of energy by lighting being left on for "safety/security," [quote unquote] in buildings. Yes, there's probably a need in some cases for that to occur, however, we see that as being much less than it has been historically. When we're trying to light buildings at .6 and .7 watts a square foot, allowing half the lights to be left on would seem rather silly, so that's why this is being changed.

Section 131(c)(2), countdown timers, this is a staff recommended change because countdown timers apparently have been used as an alternative to other forms of automatic shutoff and, after some deliberation,

some consideration by staff, it was determined this probably isn't a very good idea most of the time, with several very important exceptions. Exception 1, electrical equipment rooms, and Exception 2, single-stall bathrooms. Under 131(c)(3), there is some clarifications, if an automatic control button device other than occupant sensor, etc., again, staff recommended changes based on experience.

Section 131(c)(4), areas where occupancy sensors are required for shutoff compliance. This includes existing requirements, corridors, stairways and aisles, and parking garages. The reason for this, number one, is staff clarifications. Staff felt that it was important that we be very explicit about where motion sensing devices are to be utilized, regardless or it's taking away other options. There's also a case study involving warehouses, and a case study involving parking garages and lighting controls that have been used to bolster this. So, in 4(A), you have in offices, (B), which is new, in corridors, stairwells, aisle ways to warehouses, etc. That's new and it's been added with an exception, and (C) in parking garages, parking areas, and loading and unloading areas, the requirement for occupant sensing, again, exceptions that tailor it to practical use. These have been supported by case

studies and by economic trial, and I can tell you from personal experience, these are practices I'm already using in my projects, and have never found them not to be a very very good idea. So, this is some pretty solid stuff and I think it's a real improvement.

Next up is going to be a very exciting new section, Automatic Daylighting Controls. We all know that daylighting controls is probably one of the next great frontiers in building energy savings and it's a frontier because, in the past, daylighting controls sections have been a little complex, a little hard to understand at times, and we haven't always been clear on what we require or how we require this. So, Gary has put in a lot of work along with the work done by HMG into the case study. This has been combined to create a very powerful new section that is, I believe, much clearer and really helps people understand what is required and what isn't. We still have the definitions of the zones that have been certainly maintained pretty much as they have been. But Item 2 here, luminaires providing general lighting, in or out, this particular section with all of its markups is really getting at saying, "Here's what you have to control" in pretty straight, simple, easy to understand language. As we move down into (A), it says it has to be shown in the

plans. A lot of this is relocated existing language. So, what we want to do is point out that it bore the necessity of moving itself to a single consolidated section where all of the requirements could be very very clear. So, Section 131(D) is not so much a lot of change as it is a great clarification and simplification of the process of putting in automatic daylighting controls.

This is a section, though, that does have a significant contribution in change, that's the parking garage daylighting requirements. As you can see in red, there's quite a bit of new language here. A heck of a lot of work went into this by the HMG team and they did a really really good job, and Gary has organized it and placed it into the standard in such a way that makes a tremendous amount of sense. I think you can see, parking garages, we all know, have had a tremendous opportunity for automatic daylighting controls, and now it's finally being placed into the standard.

Moving down to Section (e), Energy Management Control System (EMCS) being required when using the Tailored Method. An issue that is, I think, one that we've all been very conscious of is the need to reduce the amount of lighting consumed in retail, and the Tailored Method is certainly the primary means for

demonstrating compliance for retail lighting. This doesn't necessarily change that, our previous use of the Tailored Method, and the way it's designed, but it makes it super duper clear that if you're going to use the Tailored Method, you must use an Energy Management Control System that carefully segregates out the various layers of lighting used in a retail establishment. I think one of the questions I raised about this is a better definition of EMCS, if we can find one that works for small retail, as well as large. I think that's something Gary has been working on and we probably have a little bit of work to do on that.

MR. FLAMM: I would just like to interject that the definition of Energy Management Control System affects much more than just lighting, so the definition that we have now in Section 101 has evolved because of a number of influences.

MR. BENYA: Yeah. And I think this is one where, Bernie, you and I have talked about this many times over the last several generations of the Standard, and a number of us need to give Gary a little bit of hand in what do we do under certain circumstances. We all know that there are some situations where it makes a tremendous amount of sense just to have an Energy Management Control System; other times, lighting and a

thermostat may be all that's needed and we need to investigate that. I would say that, personally, is an issue I'd like to raise, otherwise this is a wonderful improvement. It makes it real clear what you have to do, as well, and I think that's great.

Okay, next up, Section (f), Demand Responsive Controls, and this is modified language, and the case study team again produced this. I want to point out that the red language here, "demand response signal shall conform to a nationally recognized open communication standard," this language is intended to make it possible, along with (1) up here, that buildings are equipped to respond, it doesn't mean that the response will necessarily happen, it means that they're equipped to respond so that, should the owner choose, to make the arrangements with the utility serving the building, that the building is now ready to go, and we don't have to start thinking about ways of implementing systems after the fact.

Section 131(g), there was a case study on task lighting that produced this one and I think most of us who work in office buildings, I certainly as part of Southern California Edison's *Office of the Future* project, I've become personally and professionally aware of the issues surrounding the growth of plug loads.

Plug loads now exceed lighting loads in watts per square foot and in energy use in most office buildings. And this gets at the ability to control those loads. There's a pretty significant change, a pretty significant improvement, in the standard relative to particularly task lighting, which is the appropriate focus of this section. This table reverts back to the controllability requirements and specifically this table says which luminaire type and what is the required control range, and what is the required level of granularity, if you will, of the control. This was part of the study that, again, I was a principal investigator for, so that I can tell you that we worked closely with, among others, the National Electrical Manufacturer's Association, as well as the IOUs to come up with this table, and we think it's in pretty good shape. It changed back and forth a number of times. We have established cost-effectiveness in all of these requirements, and so this is a table that's basically saying you don't have to put in dimmable ballasts for fluorescent, but you're going to have to have at least four light levels. And we have learned from the manufacturers that you're getting into an area where the cost differential between the two is not much. Other sources, the regulations are a little bit different

ranges, and those ranges are light source applicable so that we're not trying to ask sources to be controlled in a manner that they can't be. You can see that high, medium, low, are definitions that give quite a bit of flexibility. We did our best to try and make this match the technologies that are in the marketplace today, so that manufacturers have already invested in this level of flexibility are not precluded from carrying forth with those products to the best of our ability.

One of the other issues that comes up, of course, in addition to that, is the uniformity issues. In the past, the standards have always allowed, for example, lamp switching as a way of maintaining lighting controls that are at multi-level. In many cases, that makes perfect sense; in others, switching lamps only creates either an appealing appearance, at best, or, worse, causes non-uniform lighting. So, careful thought was given to the manner that lighting controls can be used. Going back up for a second, for example, if you look at the – we'll take the second group here, the fluorescent luminaire, this would be most of your mainstream of lighting systems, you can utilize step dimming, continuous dimming, or switching alternate lamps in the luminaire, and there is a footnote 3 which we'll get to in a second; whereas, certain others, you

are only allowed continuous dimming. This is so that, frankly, the lighting systems can be maintained in a reasonable uniform manner. We're not encouraging bad lighting practices by doing so. Footnote 3, for example, the fluorescent, says "luminaires with at least three lamps illuminating the same area and in the same manner." So, for example, if you want to do step switching, it will be possible not having controllable ballasts, at all, for example, but the luminaires have got to produce the same light, the same quality, and the same area. For example, High Bay T5 with six lamps in the luminaire and three ballasts, you may be able to meet those requirements, but you won't be able, for example, to have continuous roll lighting where every other lamp lights a different area, and turning off half the lights that way won't be permitted.

MR. FLAMM: I'd like to interject something, Jim. The last two tables are alternate options. One version was from the case team, which Jim was the primary author of, and the second one was my interpretation of that, and I had already parked mine in the language, and I didn't know what to do, I hadn't had a chance to dialogue with Jim, the best way to present this information. So, I'm looking for clarity and simplicity, and that's what I was going after when I

rebuilt Jim's table, so these are just two alternate options of relaying the same information.

MR. BENYA: So any input will be welcome. I think we finished with this section now and it's probably appropriate to take comments and questions. So, David is going to start, and others.

MR. GOLDSTEIN: Hi, I'm David Goldstein, Energy Program Co-Director at NRDC. I've been involved in these proceedings just about since the beginning. Jim, this is really good work, I think Title 24 has been waiting a long time to have this level of controllability built in, for two different reasons, one, to create energy savings, but, two, because it also improves occupant satisfaction, so you're getting the best of energy efficiency and getting better energy services and significant savings. One number that would be interesting for me to see, and maybe you've done it already, is what is this section equivalent to in energy savings as a percentage compared to an LPD reduction? I have one comment, it appears to be missing, an opportunity that appears to be missing, but I'm not sure it actually is, and so I'm a little confused, and that has to do with hotel rooms. Everywhere I travel, except in the United States, it's almost impossible to leave the lights on in your hotel room because you have to

take the key out, and it would seem like the controls requirement set up a lot of the ability to do that, but don't actually require it. At any rate, it seems like it wouldn't be very difficult at this point to require that all of the lighting in a hotel room be turn off able when you exit, and with some preference that that's going to –

MR. FLAMM: If I could comment on that, this is Gary Flamm. That was actually discussed in the 2008 rulemaking, it was Commissioner Rosenfeld's – one of his pet projects, and we were kind of late in the proceeding to introduce it. The only reason it's absent right now was we don't have an analysis to support it, so we need a cost-effective analysis when you look at the technical feasibility. Even though I don't deny that it's a good idea for it to appear without supporting evidence is arbitrary, so nobody presented that as a proposal.

MR. GOLDSTEIN: Okay, well, consider it presented now. At any rate, I think the point is that my interpretation, perhaps incorrect interpretation, of the controls that are already being required, would eliminate the biggest barrier towards doing this, which is the circuiting, the fact that it's now possible to address ballasts individually, you know, from your computer or something, it would seem like you're already

requiring enough of the infrastructure that just putting in switches isn't going to be that tough.

MR. FLAMM: Again, I don't deny that it's a good idea, but an analysis is pretty thorough which looks at the environmental issues, it looks at state energy savings, it looks at costs, it looks at technical issues. We need an analysis to do that, so I think Cathy is going to respond to that.

MS. CHAPPELL: Cathy Chappell, Heschong Mahone Group. I believe that the Sempra case team has looked at that and so we had the analysis, and if we haven't submitted it to you, we'll do so. So we will investigate that.

MR. SHIRAKH: I just spent some time in Europe and you're correct, they have them, and it works really fine. They have some of the outlets, they're always on for computers and chargers and so forth. The rest of it is all controlled with a key card, alone, so they definitely save energy.

MR. GOLDSTEIN: Yeah, this has been discussed many times in the past and the cost issue was the separate circuiting, and the reason I'm bringing it up now is it's my impression that the rest of the controls requirements make it no longer necessary to do the circuiting separately, and so the cost would be a lot

less. But if HMG is working on this, then we should get an answer.

MR. BENYA: Thank you, David. Just a quick comment. There are other methods other than cards and you can use, if done correctly, motion sensing technology. I say “done correctly,” a simple motion sensor does not work, and we’ve had that discussion the last cycle, as well, but it didn’t make it to the final cut. I appreciate you raising the issue because it’s nice to know that Cathy is on it and we’ll see something before this cycle is over. Just a comment about controls, what I can tell you from recent personal experience is we retrofitted a Boeing building in Long Beach with lighting controls, it already had T-8 lamps and relatively low lighting power density, and we went after strictly the control opportunity, and the first month’s report from the owner was the lighting energy savings were 58 percent, strictly controls, they already had a fairly efficient building. I think that’s a little on the extremely good side, but to expect savings of 25, 30, 40 percent, I think we all know, is a reachable possibility with even a modest lighting control approach. That’s why we’re very excited about making controllable lighting mandatory.

MR. GOLDSTEIN: Yeah, and we’re very

supportive of that.

MR. SHIRAKH: Also, you'll see this afternoon in Section 146, you know, we have dropped LPDs, but our assumption is always the state-of-the-art technology, but you have to maintain IES recommendations, so we've gone as low as we can, we think. So any additional savings will come from the controls.

MR. GOLDSTEIN: Well, we'll get back to that in that session, but certainly the biggest savings are going to come from the controls, I agree.

MS. HORNER: Pam Horner with Osram Sylvania, and I'll give you my card momentarily. I have two comments, the first is to say something nice, well, and the second isn't to say something bad. I think I would speak for all of the manufacturers to say that the pre- the change in how this works, having the pre-workshops, having all the stakeholders work together in advance, has been marvelous, what a difference, and so here is one testimonial to the process if you want to have that in the positive checkbox. Regarding the table that Jim just put up, the infamous Table 131A, that's an example of coming to, I think, very good agreement through stakeholder work. But I did want to put on the record that there are a couple of areas that I think still need some consideration, and they will follow, of course,

with comments. The first has to do with HID because it's just HID as a big category, which includes two items of concern, one is the self-ballasted metal halide lamps that are extremely popular, that seem to be sort of a little bit of the dolphin caught in the net here, they're really not dimmable and they aren't really part of a multi-lamp luminaire, so I think perhaps there is some thought that needs to go into that particular kind of product, especially in retail. The other is low wattage metal halides, for example, it's very popular to come up with, say, 15 or 20 watt metal halides now. And to dim them is perhaps something we should consider and a suggestion might be to put a wattage cap in this area, or a wattage minimum, something above 40 watts, this would apply, something of that nature. The second is the induction product which, right now, is living amongst the linear fluorescent, but in application, induction lighting in the HID space and, having checked with a lot of our product development people, I've learned that there would be such significant technological changes that would have to be done to the induction coil to make it controllable down to the level mentioned. I think it would be wise to look at placing that particular source type with HID. But, again, thank you for all the pre-work, we appreciate it very much.

MR. SHIRAKH: Okay, any other comments on Sections 131 and 132?

MR. RASIN: Josh Rasin with HMG. I think I would just like to point out that the case team would like to request that the exception to 131(f) be removed for demand responsive controls. Thank you.

MR. YASNY: There are a couple of questions online. The first question, “Will plug load controls be addressed?”

MR. FLAMM: You want to state that again, Ron, please? I’m sorry.

MR. YASNY: Plug load control?

MR. FLAMM: What about it? What’s the question?

MR. YASNY: Will that be addressed during this meeting?

MR. FLAMM: That was actually – there is a case proposal and it’s for the circuit controls for receptacles used for task lighting. So, there are requirements for certain receptacles to be controlled, to have separate controlled and uncontrolled circuits. So, that is proposed and there is a case report to support that.

MR. YASNY: Okay. And the second question relate to the cost-effectiveness of daylighting controls

in parking garages. “Since LPDs are already low, and since dimming and ON/OFF controls reduces component life, what kind of documentation is there regarding cost-effectiveness?” And that comes from Kevin Madison.

MR. FLAMM: Actually, the parking garage lighting and controls case study, done by Clanton and Associates, Michael Mutmansky, did extensive cost-effectiveness analysis on that. As a matter of fact, that’s one of the bigger case studies. So, if Kevin would like to look at that analysis and would like to discuss that with myself or with Clanton and Associates, you’re welcome to do that, Kevin. But it is actually a pretty extensive analysis.

MR. BENYA: Yeah, I’d just like to chime in, too. Keep in mind, one of the things that went through this case study period for all of us was the fact that the case studies were overlapping in their content and the results. When you add the controllable lighting into the mix, we had several meetings on this, when you add controllable lighting into the mix, the controllable lighting, just so that you all know how this worked, controllable lighting is essentially paid for by tuning, all right? For all intents and purposes, and we can get into the details in the study if you want to read it,

but for all intents and details, just tuning alone pays for now the cost of putting in controllable lighting, particularly with respect to our main target, fluorescent systems. Therefore, in the other energy savings that are taken advantage of by using controllable lighting, belong to that application. So, daylighting, for example, then harvests savings over and above that, that is used to offset the incremental cost of putting in daylight sensors. But keep in mind, and I'll say this because this has been a 20-30 year issue with me here in this very room, has been that we've been waiting for the day that we could afford controllable lighting in the first place, and to make it mandatory. This is that time – thank goodness. We've been saying for the longest doggone time that, if we could only have a fluorescent controllable ballast that cost $25.00 or $30.00, that we could do just about anything that happened for the first time ever. So, that is one of the big breakthroughs of this Standards session from any other we've ever had before. So, when you talk about adding daylighting controls, what this means is you're adding the daylight sensor in the logic, but you're not adding the ballast. And that's important when you start saying how cost-effective is it, because of the low cost of the new electronic technology in sensors, both

motion, vacancy, occupancy, as well as daylighting, all of a sudden the economics are much easier than they've ever been, so that's a general response to many of your questions about cost-effectiveness. Keep in mind that cost changes alone have been very favorable to these longstanding ideas that we've always wanted to see in the Standard.

MR. SHIRAKH: Just to add to Jim's point, this last light fair in Las Vegas, we actually had an opportunity to speak to many of the manufacturers and the story was pretty much the same, that the cost of these controllable ballasts and other controls have significantly come down, and that's why we are so excited about this.

MR. FLAMM: So, Kevin – excuse me, Kevin Madison, I believe you're still with the University of California, the University System, if I remember correctly? Forgive me if I'm wrong, but I think it might be worthwhile if you would look at that report and then maybe have a conference call with myself, with the folks from the California Lighting Technology Center, with the Case Team, and anybody else that – and the case team that wants to be involved with that. So, I would look forward to a conference call with you on that.

MR. MCGARRAGHAN: Can I just add something to

one of those questions that came in? Mike McGarraghan, Energy Solutions. I just wanted to follow-up on the question about plug load controls. Gary mentioned that there is a proposal here for circuit controls for receptacles used for task lighting and that's for non-residential applications, and I just wanted to add that there is also a residential plug load control proposal that is not being discussed today, but will likely make the agenda for one of the residential workshops that the CEC holds in May.

MR. SHIRAKH: Thank you, Mike. Sorry for the delay.

MR. WATSON: Dave Watson, Lawrence Berkeley National Lab. I'd like to ask for a clarification on the comment by Josh Rasin about the case team requesting deletion of the demand responsive lighting controls. I wasn't sure exactly which – oh.

MR. SHIRAKH: Can you repeat what the exception is so the audience knows, if you would come up to the podium? He said 131(f) exception, we remove. Can you repeat that?

MR. RASIN: Yeah, this is Josh Rasin with HMG. So, the section 131(f), demand responsive controls, we were just – the Case Team was requesting that the exception to that subsection be removed, and that

exception states that “luminaires that are not addressable, luminaires receiving a dimming signal from a device other than demand responsible lighting control, for example Photo Controls or wall dimmer.” So we’re just requesting that exception be removed from the language. That’s all.

MR. WATSON: Thank you.

MR. SHIRAKH: So any other questions or comments related to 131 and 132? Anything from online? So why don’t we move to the next section – okay, Jon.

MR. MCHUGH: So, I just had a few comments. This is Jon McHugh, McHugh Energy. A couple of comments about the language here. By the way, I think this is much simplified and much more clear than the last round of standards, so kudos, Gary. The first one is Section 131(a) for Area Controls. My understanding is that this section, what it’s supposed to be doing is indicating that basically all lighting is manually switched by a switch that’s inside, or a manual control, it’s inside of the enclosed area that contains the lights. So, this first part of the language talks about requires a manual ON/OFF control for all switch legs, the issue isn’t really the switch leg, it’s really that I’ve got a manual control for all lighting that’s in the space, so I could have a number of switch legs that could all

manually controlled, but only control half the lighting in the space. So, I don't think that's getting the intent of what you're trying to get there in 131(a), but for your thought. The next one is down on separately switched lighting systems, 3(b) talks about floor and window displaying being each separately switched on circuits that are 20 amps or less. That could be interpreted to mean that, if I had lighting that was on a 30 amp circuit, I didn't have to switch it. I know that's not your intent, so just, you know, that they be on 20 amp circuits –

MR. FLAMM: Right. So that language has been unmodified, just moved, so that is existing language that was in 131(d) was moved and I didn't change it. So, if you want to pow wow on some clarification language, we could do that.

MR. MCHUGH: Right, thank you. Let's see here. Then, on parking garages, there's language about all general lighting be controlled by occupant sensors, and there be one control step. I think the intent there is that each luminaire has one control step, so I'm thinking that, where it says "general lighting shall be controlled," each luminaire of general lighting shall be controlled by occupant sensors." In addition, there's an exception to 131(C)(5)(c) and, there, it specifically

is exempting [quote unquote] “parking garage emergency egress lighting.” That could be interpreted to mean essentially all the lighting in the parking garage because you could declare that all of that is a path of egress. So, this would be a loophole that you literally could drive a truck through.

MR. FLAMM: It depends on the head height of the garage.

MR. BENYA: Short truck.

MR. MCHUGH: Yeah. So, I would recommend that this exception be stricken and there’s a number of reasons for it, first off, so we’re controlling the light to approximately half of its lighting power, which, if you look at the egress lighting proposal that is defined for interior lights, you’re looking at .05 watts per square foot, so even the light that’s left on, after you’ve controlled the lights with these motion controls, you’d still be above that .05, so there’s no limit placed on this exception. So, this would be really problematic, essentially a non-requirement requirement.

MR. FLAMM: So, I hear what you’re saying, Jon, I would like the author in a discussion to be able to defend that proposed language, so, you know, perhaps the three of us need to discuss it.

MR. BENYA: Jon, one quick observation since I'm involved in designing a number of parking garage standards these days. The problem is that the IBC path of egress, lighting level requirements under normal power conditions are very very similar to the light level requirements for electric lighting in IES RP-20; as a matter of fact, they're almost identical. So, it does sort of – this gets into the whole big question of whether the area is occupied or not and it's a complex one, and I think this does deserve some additional attention, thank you for bringing it up.

MR. MCHUGH: Thank you very much, Jim. You've kind of hit the nail on the head, which is the intent of this is to dim the lights during unoccupied periods, and I'd be remiss in not noting that, you know, there's a million square foot parking garage down by John Wayne Airport that's been using motion controls since 1992, and just turning lights all the way off, so this is not rocket science or some really weird technology.

Moving on to automatic daylighting controls, as Jim has brought up, there's been fantastic improvements in technology over time, the cost, it's kind of like – I've forgotten the guy's name, was it Groves law, or whatever, with the processors where the costs are going down and the capabilities are going up –

anyway, the issue here for daylighting is that – I've done a number of studies on how daylighting controls work and where they don't work, and what I've found is that, when there are situations where the controlled zone has areas that are not receiving full daylight, that the response to that situation is that the controls are disabled, and my recommendation is that we have – that we keep all the language that's here and just add to this that, for those luminaires that are behind obstructions, that those luminaires are separately controlled. So, we're still controlling all the area, it does not reduce the area of the daylit zone, it just says that there are additional controls. So you could still have the same controller, it just has an additional control zone on that same controller, so the incremental cost is miniscule. We just talked with a manufacturer who says that they make a four-zone controller, so if you had a space that was side-lit, if you have a primary zone, a secondary zone, you could have obstructed zones in those two primary and secondary zones, and you'd still be able to meet all the control requirements with that single controller. So, you know, the technology exists and what that does is it protects the savings of the luminaires that are in the day-lit zone, that they're not – because you've got really two

choices if you don't re-circuit your lights, which is you either leave someone in the dark, or you control to that darkest part of the zone and now you're essentially losing most of the savings associated with the rest of the lights. Thank you.

MR. SHIRAKH: Thank you, Jon, good comments.

MR. KNUFFKE: Good morning, Charles Knuffke with Watt Stopper. Thank you for the opportunity to come before you and make some comments. I just had very few ones, but before I even lead off into them, in regards to feedback, would you prefer a single email in regards to any issues to have in the Code? Or would you prefer emails specific for each section so that they can be treated separately?

MR. SHIRAKH: Send us all in the same email.

MR. KNUFFKE: The same email is fine, okay, very good.

MR. SHIRAKH: And to Gary and to myself, please.

Mr. KNUFFKE: One thing in regards to the shut-off controls, section (c) now, it talks about shutting off the lighting when the building is unoccupied. I actually think that having the building unoccupied is a rather large caveat, I've actually suggested that be "when the space is unoccupied."

Second one, in regard to countdown timer switches, I actually would like you to reconsider whether or not those should be automatically exempted from having automatic shut-off control. I believe that there are several areas, in fact, data centers, which often because of racking concerns, may actually prefer to have a countdown timer set at the section of the rack so that, when somebody goes into the racking, they override the lights, the lights are only on for two hours, or an hour, whatever that time may be. So, I do believe that the case is that countdown timers are actually applicable for certain applications, so I would ask that we reconsider whether or not they should be eliminated entirely. And I notice that you've excluded electrical rooms, which is wonderful for all the electrical brethren out there, I do pity, however, the poor mechanical engineer that is inside working on an HVAC system, whose hands are inside a box and may, in fact, not have met that exemption and have the lights go off on them while they're working. So, again, I would ask that that be reconsidered.

In regards to the daylighting controls, I notice that the zone size, the exception to that, is when it is less than 120 watts at HMG's meeting two weeks ago, I believe on the 16th of March, I thought that

language was proposed as being 240 watts, so I just was kind of wondering why it's been reduced from 240 watts to 120 watts.

MR. BENYA: Charles, I can answer the last one first. That was my fault.

MR. KNUFFKE: The fault that it's in there at 120 or –

MR. BENYA: Yeah. I actually felt it could be even lower, that was a compromise, but my cost-effectiveness study says that 120 watts, for sure, are cost-effective.

MR. KNUFFKE: All right, I'll probably respond to that in an email, then.

MR. BENYA: Well, part of the reason why, to be blunt, 120 watts now constitutes the lighting for an area roughly 150 square feet, and I think of Kosta [ph.] and I were working on this together a few weeks ago, and Kosta [ph.] kept bringing up all of the office buildings with all the Class A spaces that are all lining the curtain walls and the number of luminaires, you look up and you see on in the middle of the day the spaces that have several hundred foot candles of natural light, and the fact of the matter is that many of these spaces will be adequately illuminated, you know, with two luminaires, each having two T-8 or T-5 lamps and there's

no reason why all of that energy couldn't be saved. If we didn't have a low enough threshold, people wouldn't put in their sensors.

MR. KNUFFKE: Okay. Thank you very much.

MR. FLAMM: So, I would like to respond also. The daylighting is going to start off this afternoon, so we're going to be revisiting some of this and expanding significantly. We really made an effort to simplify the daylighting language and I think we succeeded at that, and so the 120 watts became a proxy for day lit area where we – we used to require the building inspector to look how many square feet of windows do you have, and it was – how can we simplify that, and so it was basically coming in a simpler way to say the same thing.

MR. KNUFFKE: Okay, thank you very much.

MR. SAXENA: Mudit Saxena, Heschong, Mahone Group. I just wanted to add to the point here that, at the meeting that you were talking about, Charles, the 250 watts that was presented, we built in a lot of conservatism into getting down to that number and, based on the feedback we got from Jim and others, even at 250, we still have quite a bit of conservatism built into our calculations, and I can share our spreadsheets with you and you can take a look at all the conservatism we have. But 120 is still quite fine.

MR. BENYA: Thanks, Mudit. And just, again Charles, this is one of those where, once you've already bought the controllable light source some other way, once you've already bought the dimming ballast, the additional – the incremental cost of adding the sensor to the circuit is what we're trying to amortize.

MR. SHIRAKH: I'm sorry, Charles, you need to – sorry.

MR. KNUFFKE: Sorry, I thought I had gotten away there. One of – I guess the only issue is, I understand that, I'm just wondering whether or not existing technologies that are actually required for those spaces have been taken into account, such as if we are talking about individual offices, there is a mandate for an occupancy sensor currently in that space, whether or not the time off that the occupancy sensor provides was included in that calculation? So I understand that the controllable ballast gives you great freedom and latitude, the question is whether or not, though, the calculations did include things that already mandated in the Code that are already affecting the energy savings.

MR. BENYA: Yes, there were.

MR. KNUFFKE: Thank you.

MR. BENYA: And when we look at an office occupancy, we're looking at the statistically reasonably

verified number of typical occupancy hours during daylight.

MR. KNUFFKE: Right, but you're using – correct me if I'm wrong – this is the data for that? Is that –

MR. BENYA: I can't quote it.

MR. KNUFFKE: Right, and so I just would like to check that. Thank you.

MR. FLAMM: Jon, before you get up, there's a question came over the Web and it has to do with where occupant sensors are required and, in corridors, stairways, aisle ways, warehouses, the lighting shall be controlled with occupant sensors, automatic reduced lighting power by at least 50 percent, each luminaire shall be controlled by no more than two occupant sensors. "Would the case author want to elaborate on the purpose of each luminaire shall be controlled by no more than two occupant sensors?" In the areas where occupant sensors are required for corridors, stairways and aisle ways and warehouses, the very last part says, "Each luminaire shall be controlled by no more than two occupant sensors." Could you clarify the purpose of that?

MR. HOWLETT: Yeah, this is Owen Howlett, HMG. The purpose of that is that, without that exception, or,

sorry, without that clarification, a space would have networked occupancy sensors and it could require that all of the occupancy sensors read that the space was unoccupied, before any of the lights got shut off. So, we wanted to make sure that each one of those warehouse aisles is controlled separately, so that when that aisle is not in use, the lighting in that aisle gets shut off, the system doesn't wait for the whole building to be unoccupied before it shuts off any of the aisles.

MR. FLAMM: Okay, if the person on the Web would like to make further comments after this, please send them to me. Thank you.

MR. MCHUGH: Hi, Jon McHugh again. Under Section 4 where occupant sensors are required for compliance, Section B has corridors, stairwells, aisle ways, warehouses, and open spaces in warehouses, and I'd just like to recognize Sempra's – they have a case study on just this issue in terms of bi-level occupant sensing controls in warehouses, and my understanding is that the intent of that case study is to look at the issue of, for instance, a warehouse where you have forklifts or people moving around and the area is occupied, but the particular aisle might not be, you know, someone might not go into that aisle, you know, only a couple times out of the day. But, in terms of safety, they might

want to leave that aisle at 50 percent, especially if they've got HID type fixtures, or are wanting to have them dimmed, but not turned off. And the intent there is that this is reducing energy consumption while the space is occupied. Having this in the automatic shut-off control section implies that that space does not need to be controlled on some kind of schedule so that, for instance, after hours, all of the lighting is turned off. So, I would like the Commission staff to consider the idea that this is actually – this kind of section is actually moved to a separate section that is describing not that it's a shut-off, or the end of the day, but that this is during the normally occupied periods, so that a time clock would be layered on top of the motion sensing, bi-level motion sensing.

MR. FLAMM: Okay. We can discuss that, Jon. I would like to propose that we move on and any other comments on this section, send them to me, we're getting off schedule a little bit. And I know I'm pushing up against lunch, and so I'm going to ask Jim to move with the Outdoor Lighting, Section 132.

MR. SHIRAKH: Actually, the next topic is Section 133, it's Sign Lighting.

MR. FLAMM: No, we didn't do 132 yet.

MR. SHIRAKH: Oh, okay.

MR. BENYA: Okay, Section 132(A) Outdoor Lighting Controls. You'll notice a whole bunch of strikeouts here, particularly removing all of the exceptions for the most part. Now, correct me if I'm wrong, Gary, well, I'll let Gary explain why.

MR. FLAMM: So, we evaluated all of the exceptions. Exceptions, for the most part, exist because there were unresolved issues at the time the Standards were adopted, or there were unknowns and, so, rather than throw the baby out with the bath water, we created every kind of exception one could think about. Part of our effort in simplifying this, and this is so building inspectors don't have as much to have to be responsible for, a lot of this stuff –

MR. BENYA: Isn't the reason, let me just ask, because this one I didn't totally get, either, isn't it because you inserted the word "incandescent?"

MR. FLAMM: Oh, at the very beginning? Well, those are – right.

MR. BENYA: I mean, that changes the whole meaning of Section A.

MR. FLAMM: Well, Section A basically said, if you look between the lines of Section A, it basically said if you have mercury, vapor, or incandescent luminaires that were over 100 watts, you had to put it

on a motion sensor. And it was a way to promote people to use – if you're going to have a high watt lumen package, to use HID or fluorescent, that's really, if you read between the lines, that's what it says. So, because mercury vapor are basically no longer existing, this is basically saying, still, well, if you're going to use incandescent luminaires – let me back up – if you want a large lumen package, don't use incandescent because this only applies to incandescent, so a way to simplify this, instead of taking – it takes the guess work out of the, you know, between the lines, we don't want you to use high lumens for mercury vapor and incandescent, it just says if you're going to use incandescent, and it's a large lumen package, put it on a motion sensor. And so all those exceptions, you're right, basically applied. So now, if you want something equal, you know, over 1,700 lumens, or whatever it is, use a fluorescent, use an HID, don't use incandescent. Or an LED.

MR. BENYA: Great, thanks. It's actually – I think this is a great improvement. I think you needed to understand that that was the gist of a major change in what (A) is supposed to be all about.

MR. FLAMM: Right, and this is the effort to simplify.

MR. BENYA: Okay, looks good. Section (B), cutoff requirements have been reduced to 150 watts. Let me find that – there it is, right up there. So, all outdoor luminaire lamps rated 150 watts in hardscape areas – it makes reasonable sense. Do you want to just add a comment?

MR. FLAMM: This is something we proposed in 2008 and we ended up dropping it. This is consistent with the metal halide luminaire standards in Title 20, it's basically, on a number of levels, 150 watt has become a threshold for integral controls, etc. And so we wanted to again propose going down to 150 watts. Anything above 150 watts would have to be cut off, so we had for two cycles of the Standards 175 watts, anything greater than 175 watts had to be cut off, which means full cut off, or cut off qualified. And so this is trying to put all those pieces together where the real threshold and other elements of this Codes and Standards is 150 watts.

MR. BENYA: Section 132(C) Controls for Outdoor Lighting. You've added large permanently covered outdoor areas subject to occupancy, 24/7, so you are allowed to leave lights on in those circumstances. Now, here's a whole bunch of stuff. So, getting rid of some original language, all permanently installed

outdoor lighting circuit and switch turnoff independent of other electrical loads, all permanently installed outdoor lighting with two or more luminaires used in automatic lighting control systems shall be used with some exceptions. Permanently installed outdoor area lighting, meeting all of the following requirements, shall be controlled with motion sensing control, in addition to photo cell, the dual control system shall be capable of reducing lighting power by at least 50 percent. Pretty good changes.

MR. FLAMM: And this is also supported by the outdoor lighting case study.

MR. BENYA: Anybody have any questions or comments? Online, any questions or comments?

MR. SHIRAKH: No.

MR. BENYA: Jon.

MR. MCHUGH: Would you go back to 4(A) for a second? So, I think the intent of the case study was that the control system be capable of reducing the lighting power of each luminaire by at least 50 percent, so I think that little change, I think that would more accurately capture the intent of that case study. Thanks.

MR. SHIRAKH: Thank you.

MR. BENYA: I'm not necessarily going to go

with you on that one. I designed a number of facilities where I turned off large areas of lighting because you have reduced needs. For example, a hospital, many types of businesses, you only need a small portion of your parking lot, you know, from normal business of 9:00 to 10:00 p.m. until dawn, and I think the intent is to give some flexibility to the designers here.

MR. MCHUGH: I think that this section is around the motion sensing portion of the control. I absolutely agree with you in terms of scheduling controls in that it does make sense to look at turning off portions, you know, turning the lights all the way off in some portions, but my understanding is that all the cost-effectiveness and the evaluation that went behind this is, you know, based on the PIER work that was done, and I guess as part of the lighting specification for parking lots at the UC System where the feeling of security is maintained by having bi-level control and the relatively uniformity of the lighting, and that areas that could be turned completely off, that that is something that is more of a scheduling opportunity, but I think we can probably have some more discussions about that later. Thank you.

MR. YASNY: Gary? Gary? There was a question online as to whether any of the lighting standards

relate to underwater lighting in swimming pools, spas.

MR. FLAMM: So, the standards in a number of places have just excluded underwater lighting. It says lighting regulated by California Electric Code 680, I believe it is. And a lot of that exceptions I deleted because it wasn't an area of lighting anyway, it just – it was language there for no reason. Even in excluding the exceptions of underwater lighting in a couple of cases, I don't see that it's really impacting the Standards. However, if we had a standard for underwater, I'm not confident that we need to allow only low efficacy lighting, but the Standards aren't going there, even so. The Standards are really silent. So, I don't see any proposed standard that will require underwater lighting to be regulated.

So, if you look at Article 680, if I could elaborate, basically, it has been misinterpreted by some people saying, "If I have a water feature somewhere, all the lighting is exempt." Article 680, as cited, is basically lighting that is inside the water, or lighting directly above water, or lighting within five feet of the edge of water, that's the only – those are the only areas that are exempted according to current exceptions, so I think the way it currently is stated is broadly interpreted and I don't believe the exception is needed.

MR. BENYA: And I'll support that because of one major change in our marketplace. Actually, I put that in 20 years ago, by the way, but the reason I did is because, up until fairly recently, the best way to provide underwater lighting for swimming pools was with a large tungsten source, typically 300-500 watt luminaire is used. You can now accomplish roughly the same level of lighting underwater with about a 50 watt LED, and the reason why is change of spectrum, for those of you who are interested. Remember, the water absorbs red, yellow, and incandescent spends most of its energy generating red, yellow, and so if you generate primarily shorter wavelengths, they actually do a far better job of lighting underwater because the enter isn't absorbed by the water, it's simple. It took me a little while to figure that out, but that's why this makes a lot of sense. By putting lights under the water that are spectrally tuned for the application, you don't need the kind of wattage we used to have. So, I support this.

MR. FLAMM: Okay, I'm going to go hopefully pretty quickly through the proposed changes for Sign Lighting standards – somewhere down here, I keep scrolling. So, Sign Lighting Controls – these are Controls for Sign Lighting – there was actually a typo that was adopted in 2008 in the outlining of the control

requirements in that Subsection (5) was kicked over as to the language related to Subsection (4). In doing that, the language is actually nonsense, subsection (5), so I kicked that back over the outline, so that basically corrected the Errata. And the current language was kind of clumsy, I have to admit, I had to interpret it to the sign industry and I had to go through a lot of mental gymnastics to understand what we meant, so I made an attempt to simplify the language and I broke out indoor sign lighting controls from outdoor signed lighting controls with basically really no changes, it's just a simplification of language, so the correction of an Errata and simplification clarification. Does anybody want to say anything about the Sign Lighting Controls? Okay, anybody online, Ron? Okay, so I shall move on.

The next section is Nonresidential Lighting Control Acceptance. Now, this section definitely needs more work. There's a domino effect when you change subsection names that have to be reflected. I think that this needs some definite wordsmithing. There are a few things, the work I've been doing with Section 119 for lighting control systems for track lighting integral current limiters, for supplemental overcurrent protection panels, those all have to be added to this.

So, the requirements for acceptance testing of lighting controls has been elaborated a little bit, but this section definitely needs some more work. Any comments on that?

MR. SHIRAKH: So, if there are no more comments, we can adjourn for the morning. We're about 15 minutes ahead of schedule, so that gives us a good one hour for lunch. Please be back at 1:15, one hour from now, and we'll start the afternoon session. Thank you.

(Off the record at 12:17 p.m.)

(Back on the record at 1:15 p.m.)

MR. SHIRAKH: Again, the agenda this afternoon starts with Daylighting and Jim Benya is going to go over the proposed Daylighting language, and then, after that, we'll get into the prescriptive requirements for Indoor Lighting, Outdoor Lighting, and also proposed changes to Section 149, which is Additions and Alterations.

MR. BENYA: Okay, welcome back everybody. I'm going to return us backwards to Section 131(C) Automatic Daylighting Controls, excuse me, I'm going to go back for a section, Section 131(C), as you'll recall, this was rearranged into the new Section 131(D) Automatic Daylighting Controls. Daylight Zone definitions have

been cleaned up a little bit. One of the problems we historically run into is, all of the stuff you might have to put on the drawings to identify daylight zones, and the process by which you determine those, so this has been simplified. And the mandatory measures, as you'll see coming up here throughout this and other sections all now dovetail, work together. As I pointed out earlier this morning, we looked at this before, Section 2, this clearly defines which luminaires must be controlled. And this is where, among other things, some of the points we discussed this morning we addressed. So, I'm not going to spend a lot of time on this, but I wanted to remind you about this important section here because we're going to move, as we move forward, to look at Sections 141, 143, and 146, these become very applicable. Specifically, in Section 141, first of all, there's a new method for determining what the daylighting controls must do, and in the past we've had a fairly complicated formula. Again, some case study work done in the daylighting team led by HMG and Mudit, in particular, had developed a pretty nifty new model of something that is called "Watt Method," and basically it uses some of the familiar language, but in a formula that allows for one to calculate the wattage that needs to be controlled by automatic daylighting controls,

based on all the typical fenestration factors that are needed.

Section 141 is the first place that embodies this and that's very important because what it means is that the method is applied to the performance method per section 141, as well as throughout Section 143, as we will get to in a second. Next up is Section 143. Section 143 made headlines with previous additions of the standard when it said that you have to provide daylighting for certain spaces. That has caught on, on a national level, and I'm pleased to see other standards have followed through on this, but Title 24 was the one that really started all this. That has been expanded and modified in the Section 143 as proposed here, it has minimum daylighting requirement which modifies our existing minimum skylight area requirements. If you look at number one, it says at least 75 percent of the floor area will be within a horizontal distance of one head height from windows with .7 time average, ceiling height from the edge of rough openings of skylights. That's pretty significant because it's now increasing the area of certain building types that must actually have daylighting. And it expands it somewhat into allowing our clearly simply measures for how much fenestration you have to have, either skylit or sidelit.

The all skylit daylit zones and the primary side daylit zone shall be shown in the plan, general lighting in daylit zones shall be controlled in accordance with 131(D) that we were just looking at. So, a bit of simplification here that really, I believe, helps with daylighting's mission and will increase the number of uses.

One thing I'm going to go back to for a second, this is something that some of you may wish to discuss, you'll notice that I'm circling it right here, that an 8,000 square foot area has been identified as the minimum. We know that 90.1 and other standards are looking at smaller areas and that maybe someone will want to discuss that, I certainly would like to flag that as an important difference right now between Title 24 and other standards. And we can stop here if you'd like to discuss that? Sure, go ahead. Mudit?

MR. SAXENA: So, some late analysis has been done by us and Jon McHugh, it shows that if you look at the analysis that we did in the last round to get to the 8,000 square feet, with the updated costs, the Photo Controls, and cost of energy, it is actually cost-effective all the way down to about 1,000 square feet. So, by moving it from 8,000 to 5,000, I think we will be pretty much within a great extent of conservatism and

also, additionally, be consistent with ASHRAE 90.1. So, I think we have two things going for it and I would just like to put it out there, that's a reasonable change that we can make.

[Commissioner Douglas joins meeting at 1:31 p.m.]

MR. SHIRAKH: Thank you.

MR. BENYA: Would anybody else like to speak to that? This is a pretty important number, folks. And I'm very excited to see it, but I'm almost – maybe I'm a little aggressive, I'd like to see an even smaller number. Can I hear a smaller number? Is anybody bidding a smaller number? David, do you want to bid a smaller number?

MR. GOLDSTEIN: David Goldstein, NRDC. If it's cost-effective down to 1,000 square feet, we've got a zero net energy goal that we're reaching for, why do we want to do anything other than the 1,000 square feet?

MR. SHIRAKH: Because we've got another 20 years before 2030.

MR. MCHUGH: I think, actually, when we looked across the three ASHRAE climate zones –

MR. FLAMM: Excuse me, please remember everybody to introduce yourself for our Court Reporter.

MR. MCHUGH: Thank you, Gary. Jon McHugh,

McHugh Energy. When we looked at the three ASHRAE climate zones that is in California, 3(c), 2(b), 4(d) and 5(b), oh, well, I guess there's one more, anyway, when we looked across those climate zones, we found that it was cost-effective down to 2,000 square feet, so I just wanted to clarify that. But you also reduced some costs, too, Mudit, is that right? And you got to 1,000 feet? I just –

MR. SAXENA: Right, we updated the cost of Photo Controls, which, Jon, you had not looked at when you were looking at your spreadsheets. So, I just wanted to also note that we will – this is a late analysis that we recently done and we will send out our analysis to stakeholders and get some feedback from them because that hasn't happened in the process of the three stakeholder meetings that we have done until now, so that's something that we will do. But, just to finish up the point here, that by updating the cost of Photo Controls, there are about 1,000 square feet is where we are.

MR. SHIRAKH: So, a follow-up question on that – when you did your lifecycle cost analysis for buildings down to 1,000 square feet, are you considering acceptance as to commissioning costs because, you know, as the building gets smaller, these costs become a

larger portion for the building, so have you taken that into consideration?

MR. SAXENA: Yes, so we've taken it into consideration, the cost of commissioning ballasts, and that's the cost to put – well, we considered the cost of Photo Controls, the cost of wiring, and then also the cost to commission each ballast, so with the smaller area, actually, that cost is a little smaller, it's a bigger percentage of the cost for the building, but the cost is smaller, with smaller areas. The cost for Photo Controls is the same. Now, we do consider the lifespan of the envelope to be 30 years and we consider the lifespan of Photo Controls to be 15, so we have an additional cost of replacing Photo Controls, and that's been factored in.

MR. SHIRAKH: Thank you. Please.

MR. FLAMM: Could I just interject, please, and welcome Commissioner Karen Douglas to our staff workshop.

COMMISSIONER DOUGLAS: Thank you, Gary. I'm glad to be here.

MR. SHIRAKH: For everyone's information, just one second, Karen is the current Presiding member of our Standards Committee. And she is the only Commissioner, we only have one, so welcome, Karen.

MR. DIGERT: Great, good afternoon. I am Neall Digert with Solatube International and I am very excited to see the potential reduction in area sizes with daylighting mandates. But I would also like to request that the Commission continue to look at lowering the ceiling heights, as well, for mandated daylight spaces. We routinely apply products to ceiling heights that are 10 feet, or even nine feet in height, and we'd love to see getting a more aggressive stance on these for daylight.

MR. SHIRAKH: So, I think the case team did look at lowering the height. Do you want to respond to that?

MR. SAXENA: This is Mudit Saxena from HMG. Yes, we did take a look at reducing the ceiling height, but we couldn't complete our analysis because of limitations of assimilation software that do not allow for us to really look at the benefit of products like tubular data devices like Solatube has, or other specula light wells, so, without look at those products, when we just looked at regular skylights with traditional drywall light wells, the cost-effectiveness did not pan out. So, we brought it up to that point and, after that, we couldn't do the last bit. Now, there are other pieces of evidence that exist, some studies have been

done for PG&E by HMG and others that show that there is monitored energy savings from these tubular data devices, but they're not comprehensive enough for us to expand that into a 16-climate zone wide study that we typically do for a case study, but there are pieces of evidence that exist that show us that these products can successfully provide daylighting in less than 15-foot ceiling heights. So, this is where we are right now.

MR. SHIRAKH: Thank you. Any other questions? Jim.

MR. BENYA: I was just going to say are there any other comments.

MR. GOLDSTEIN: David Goldstein, NRDC. I wanted to elaborate a bit on my previous comment about the subject of what is a conservative error in the context of Title 24. I would submit broadly across all disciplines we're covering that post AB 32, a conservative error means something different than it did in the last Code cycle. Every kilowatt hour that we don't save is a zero carbon generation source that we are committed to buying someplace else, which is going to be pretty expensive. I would argue there are no conservative errors, you try to get the right answer as best you can, and you don't fudge it one way or another for uncertainties, you just come as close as you can to

what the truth is, and base the standards on that.

MR. SHIRAKH: I think your comment is welcome, now, we're going to be looking at that again, and what we have heard is from one to two thousand square foot is cost-effective, so we'll look at the threshold again and see if we can come up with something more aggressive, that saves more energy.

MR. GOLDSTEIN: Thank you, Masi.

MR. SHIRAKH: Thank you.

MR. BENYA: I just want to remind everybody, these are mandatory requirements for actually putting in glazing, not lighting controls, because if you put in the glaze, then you have to put in the lighting controls, so I just want everybody to remember, this is about glazing, it's not about lighting controls, but the interaction between the two is hard to deny.

MR. SHIRAKH: Just one comment related to David's, what we're finding is there is going to be a competition on the roof area between skylights, mechanical equipment, plumbing, and PVs, so that's another thing to keep in mind because skylights actually take up a lot of space because there has to be access around them, they cannot be used, and you cannot put PVs right up to the edge of the skylights, and same thing goes for mechanical, so the roof is going to be a pretty

crowded place as a result of some of these changes we recommend. That's another thing to keep in mind. Jon has a –

MR. MCHUGH: I won't belabor this too much. When we look at the area of skylights, we're looking at something that's essentially no more than five percent of the roof area. Admittedly, there's still the access area around that, so maybe that's 10 percent if you think about walkways and things like that associated with the skylights. The transmittance of a skylight is around 50 percent and the efficacy of sunlight is around 100 lumens per watt, so if I use PV, which has an efficiency of 10 percent, and then I'm then using that to generate electric lighting that has a luminous efficacy of, you know, somewhere about 70 lumens per watt, you're talking about that same – you're able to essentially get six times more useful light per square foot of skylight as you would be for that same square foot of PV. So, thank you.

MR. BENYA: Jon, that's a good comment. We actually finished a project which we skylighted a gymnasium and received the same rebate as if we had for a PV to power the lighting in there and the payback period is about five times faster. So, this is a very exciting idea. Daylight is available for both PVs and

for daylight, and when it's not available for daylighting, it's not available for PVs, so your logic is great, thank you.

Okay, next up, we're going to move into Section 146, you know, for – you didn't warn me about all this. Section 146 has, again, been our section where some of the most important discussions about lighting occur. What we see here is some very important changes that have occurred, and one of them is the simplification of the daylighting calculations. I think this is fundamental, I've asked many an architect if they even understood what these sections had to say and many an engineer on how they applied them, and I got a lot of cross-eyed looks. So, I believe the importance of what we're looking at right here is getting rid of a lot of that language and replacing it with much simpler language and much more logical connection between the Sections 131, 143, 141 and, finally, of course, 146. So, all of this stuff goes away and it is replaced with this simplified language.

Automatic Daylighting Controls and Secondary Daylit Zones. Here is the big simplification, I want to make sure everybody is really clear on this. You are now required to put in automatic daylighting controls in the primary daylighted zones. Okay? By Section 131.

Section 146 is changed dramatically because, throughout the last 25 years or so, we've had power adjustment factors for utilizing automatic daylighting controls. Now that they are mandatory for the area where they have the greatest benefit, the whole process is dramatically simplified, that's why all this language has been struck out and we're now looking at (d) being an automatic daylighting controls in the secondary daylit zones. This is where you will get power adjustment factors as you've gotten them before, but you no longer get power adjustment factors for your primary daylighted zones. This is profound. The impact upon projects is really really remarkable. So, I want to stress everybody really clearly understands why we're showing you these things in this particular order. Does anybody have any questions at this time? Because we're going to be moving to other sections, otherwise. Jon.

MR. MCHUGH: So, Jim, my understanding is that, in addition to reducing the threshold for the mandatory requirements for daylighting controls, you know, it went from 2,500 square feet, which would have been essentially airport concourses, down to – was it 25 feet of glass, or 120 watts, for the secondary sidelit zone, we're actually not talking about power adjustment factors, we're actually talking about a prescriptive

baseline that these controls would be prescriptively required in the secondary zone and, if you use the performance approach, then you can then use the performance approach, the computer software method, to conduct tradeoffs between whether or not you use those daylighting controls, or you put in better glass, or better air-conditioning.

MR. BENYA: Yeah, I stand corrected. The PAF is all gone for that, I was going on my last understanding. You are right. My new understanding is exactly what you just said. Thank you.

MR. SHIRAKH: To kind of recap, the primary site of control, they are mandatory requirements, right? You have to do it, you can't trade away. The secondary daylit controls, those are prescriptive requirements?

MR. BENYA: The secondary controls are prescriptive if you use Section 146 prescriptive method. If you go to the performance method, then you get new tradeoffs –

MR. SHIRAKH: Get tradeoffs.

MR. BENYA: That's very important, thank you.

MR. FLAMM: Right. I just would like to summarize. I think the daylighting changes are significant. We had a lot of language for Section 141 Mandatory Daylight Controls, and that's where

everybody's eyes were glazing over about ratio well area ratio and visible transmittance, and a lot of things that people really didn't have to worry about, unless they were trying to get out of doing the control, even so, it was causing grief for a lot of people. Significantly simplified Section 131 in deleting all of that language. It basically says in 131 that primary daylight area, sidelit area, and skylit area, you shall have a control, period. It gets rid of all the tradeoffs, all the exceptions, and then, in 141, if you have exceptions, you can always go now to a new performance method. And in the performance method, one of the challenges the software generators had was in trying to convert a geometric standard into software, and I don't believe any of the software vendors got that right, and so the new wattage calculation method proposed by HMG will now be the new performance methods, that's significant. So, we don't have to worry about all these exceptions that we used to have to try to write into the Code because, if you've got exceptions, then you go performance. And that's a significant simplification on what we had, so a lot of the terminology that people were having heartburn over goes away, and so I think we landed in a very elegant place.

MS. BROOK: Hi, this is Martha. I can't find

that wattage calculation method in this paperwork, so can you tell me –

MR. FLAMM: It's not in the paperwork, it's going to be in the ACM.

MS. BROOKS: So, and this part of the Code uses – goes to the ACM, and have you actually documented that? And is that part of the case report? Or is that something that's going to happen later?

MR. SAXENA: This is Mudit Saxena from HMG. Yes, we have documented as part of our case report.

MS. BROOKS: Okay.

MR. SAXENA: And it has to be done into ACM language which is our next step, but the process has been documented and we've tested it multiple ways in many many places, so we are very comfortable.

MS. BROOKS: All right, thanks.

MR. BENYA: Okay, further comments, questions on this – we will come back to Section 146 after we finish talking about daylighting. I think you've noticed that there's been a really positive rearrangement of sections here, so the daylighting is in specific sections and so we're kind of sticking with the daylighting topic for the moment. The next one is Section 149, daylighting required for alterations. Gary, do you want to make just a comment about your

thinking here?

MR. FLAMM: Sure thing. So, we still need to develop language for 149. Section 149 has to do with alterations and additions and, in our last few conference calls, it was brought to our attention that there are exceptions for alterations, needed for alterations that do not exist for new construction. And so, in our effort to keep the standards simple, as Section 131, instead of trying to identify every contingency possible in 131, we said, “Okay, let’s look independently at alterations of daylighting.” So, what I imagine we’re going to do in Section 149 for alterations is come up with some language how to deal with existing obstructions, how to deal when you don’t know the visible transmittance of the space, of the fenestration. So, there needs to be some further development on Section 149, how to fold the daylighting requirements into alterations.

MR. BENYA: So, suggestions will be appreciated. Any other comments? Yes.

MR. THOMAS: Gene Thomas, Ecology Action. Yeah, I would just hope that you could have stakeholder involvement in that part of determining what language would be appropriate, and that also – and we will probably get into this as we go through the rest of the

section – that you try to get as much stakeholder involvement into some of the other language with regards to retrofit.

MR. FLAMM: Thank you for bringing that up. We do value your input and we have a core group who have been participating in this for a year. Anybody in this audience, or anybody on the phone who wants to be a part of these discussions, please contact me because we want you involved in these discussions. Thank you.

MR. BENYA: Further comments about Section 149? Okay, we're going to slip back into Section 146 and now talk about a few other things. So, first up is the – okay, early on, it says "Lighting power tradeoffs comply with (b) and general lighting and secondary sidelit zones complies with lighting controls requirements in (d)." So, again, this is distinguishing between the two different ways of providing lighting controls. Working our way down, now, 146(a), okay, as we know, those of us who have been with this process for many years know that the portable lighting in office buildings, in particular, has always been sort of an enigma to us, and we've tried to handle this several different ways. In this case, the requirement for the actual indoor lighting power is the total watts, subject to the following specifics, and the first one that comes

up is our exception, "…up to .3 watts per square foot of portable lighting for office areas shall not be required to be included in calculation of actual lighting power density." Okay, so what this is doing is this is making that task lighting exception, but there are some rules that go with this, multiple interlocking lighting systems, reduction of wattage through controls with power adjustment factors, and a number of other adjustments as you see here. You'll notice that (e)has been stricken for automatic daylighting control, power adjustment factors, because of course, we now are already requiring automatic daylighting controls. I think everybody is clear on the concept that you either require controls, or you allow them to be used with a power adjustment factor, but not both. If something is required, you cannot take the power adjustment factor for using it. So, that resulted in the striking of all this language, which we looked at a little while ago, that's why all this is gone and I think we can probably all say for the better. Okay, moving along.

Section 146(a)(3), lighting wattage excluded. There are several minor changes in here, lighting installed by the manufacturer in refrigerated cases is now struck, walk-in freezers, vending machines, etc. remains. I'm sure that was something that came up often

in –

MR. FRAMM: Well, refrigerated cases have been moved away from the group that was into a separate group, and refrigerated cases less than 3,000 square feet are regulated by Title 20, so, to be consistent with Title 20, I pulled out that language out of the group and re-entered it below as a standalone.

MR. BENYA: Under Item T, you see lighting in a videoconferencing studio has been reduced from 2.5 to 1.5 watts per square foot, specifically for video conferencing. I presume this was done because cameras are that much better?

MR. FLAMM: This was proposed in 2008 by Lee Hedberg, he was our subject matter expert in developing this. And we actually landed somewhere different than he proposed. We ended up a watt larger because he thought that this was the entirety, he didn't realize that this was in addition to the general lighting power allowance; so, he said, "You know, you guys have got it wrong, you're giving a watt greater than my analysis justified in 2008."

MR. BENYA: Yeah, and with videoconferencing starting to become more popular, thank goodness, because it reduces carbon footprint, but some work that I'm doing with the infocom industry, tell me now that the

cameras are working very very well at lower light levels than ever before, so I don't see any problem with this.

Okay, we're going to come down to the complete building method, just a few minor corrections down here. The complete building method, we're going to see some modifications to the tables for both complete building method, the Area Category Method, and the tailored method, and we're going to just note a few of these as we go through. In complete building method, that's just a table number change, Area Category Method, and pretty much table number changes until we get to (b) –

MR. FLAMM: I want to interject something there, Jim. All of the table numbers in Section 146 have changed because tables 146A and B had to do with skylights and specular skylights and there were two look-up tables, and because we deleted all that language, it caused a domino effect. So, a lot of the changes that you see scratched out in a different table number were just because of that resulting domino effect of deleting existing tables 146A and B.

MR. BENYA: Okay. Sub (b) here in the red, additional lighting power, if I understand this correctly, this is just more or less solving a problem that has been a result of the way the category has evolved, with the additional lighting power allowances.

It's really not new, it's just clarifying the intent. Am I correct?

MR. FLAMM: That is correct. This language was taken out of the table as extensive footnotes in a table, and we just moved it here to simplify the language in the table, and basically to clarify the intent of those task lighting allowances.

MR. BENYA: Does everybody understand this doesn't mean much, what it does is it clarifies that the additional lighting allowances permitted for the Area Category Method, so in other words, you get a general lighting allowance plus certain additional allowances under certain circumstances. Those additional allowances are "use it or lose it" allowances, and the clarification in the rules here will make it easier for the rules to be interpreted and used in the field. Everybody clear on how that works? Any questions? Okay, so that's what all that red stuff is.

Okay, moving down into the Tailored Method, again, a little historical perspective, once upon a time, the Tailored Method was our predominant method for calculating interior lighting power allowances. It took a lot of time, required a lot of calculations, and frankly, it had a few loopholes in it, too. It has been narrowed down in its focus over time and today's focus

is, you still can use it pretty much the way it was always intended, but it's limited in scope, you can no longer use it quite the way you could have used it some 10 or 12 years ago. We're going to see some different values coming up and then there are some – could you explain what happened here in sub 1, Gary?

MR. FLAMM: Sure thing. So, in sub 1, the way the Tailored Method is constructed is you have a general lighting allowance, which is typically lower than the area category, and then you get layers to add upon it. So, sub 1 was how to calculate the general wattage allowance, and there used to be sub (1)(a) and sub (1)(b), (1)(a) was if we gave you an a, b, c, d, e, f, g, that would be the category of classification of illumination you would use. And in the sub (1)(b) it used to be, if it said IESNA Handbook, you could go to the IESNA Handbook and, from there, derive an a, b, c, d, e, f, or g illuminants level. Sub (b) has been stricken out because it has been taken out of the table, so what we have left here is (a)(1) is how do you determine general wattage allowance based upon the new table a, b, c, d, e, f, g. And it goes into the room category ratio calculation, etc. So, it is an explanation on how to derive your general wattage allowance, using the new table.

MR. BENYA: Is there any plan to modify this or update it when the new handbook comes out?

MR. FLAMM: It would make sense. Now, I was privy – IESNA did send me some documents, minor selection of documents, and we could update the table, the numbers in the table, and I believe the Case Teams are looking over that IESNA data right now that we have. Now, the Tenth Edition Handbook is supposed to be out in – yeah, two months ago – and so it is my hope that we cite the Tenth Edition Handbook instead of the Ninth Edition Handbook that we currently cite. So, as soon as it's published, we're going to change that cite again and we hope that it's in the right timeframe.

MR. BENYA: Good. Any other questions about the Tailored Method? Okay.

MR. FLAMM: Jim, do you want to relay his comments for the Court Reporter?

MR. SHIRAKH: The gentleman said he had some comments about the entire section, but he's going to do it –

MR. BENYA: In a couple minutes. Let me finish he section.

MR. SHIRAKH: Okay, I just wanted to make sure the Court Reporter got his name or his comments.

MR. BENYA: Yeah, Gene Thomas will be invited

up here as we finish Section 146. Section 146 has a number of other minor improvements in the Tailored Method here.

MR. FLAMM: Subsection (B) are the layered allowances for wall display, floor display, very valuable merchandise, that is all sub (B), that all stays the same. The new information is the sub (C).

MR. BENYA: Here we go. So, sub (C), then, provides for general lighting allowances using IES and, by the way, we're going by IES now, are we not? Not IESNA anymore? So change to IES? Okay. This is a method to be used to determine the general lighting using the criteria and, as you can see, this is a – I would describe it as a clarification of something we've been saying pretty consistently for the last couple of editions of the standards, so this is not really new, this is organization and clean-up.

MR. FLAMM: This is all of the IESNA criteria, generic statements that were in the table were taken out of the table, and inserted into this Sub (C).

MR. BENYA: Good. (D), we've already discussed, the automatic daylighting controls and secondary zones. I hope everybody noticed that the threshold is 120 watts, like we discussed earlier. Striking out all of the well efficiencies. Now, here

are some lighting power adjustment factors. Again, this – what is tricky about this is, when you make certain things mandatory, you can't get a correction factor for using them. So, this has been fixed to correspond to mandatory automatic daylighting controls. That's all the strikeouts you see in there. This does not change.

MR. FLAMM: Okay, Jim, before you go on, I've not asked the question yet, now that we have the controllable ballast, the controllable lighting stuff, and this was something we developed with Francis Rubenstein in 2008, saying that if you had a dimmable ballast, and that dimmable ballast was earning a power adjustment factor, that dimmable ballast had to be certified that it met this minimum relative system of efficiency. We need to discuss what that means to this language, I don't know the answer.

MR. BENYA: Should this move to Section 131?

MR. FLAMM: Are we still going to require a relative system efficiency for some ballast? We don't have to discuss that now, but when I put this language together for this workshop, I realized that this is an unanswered – unasked question, rather.

MR. BENYA: Does anybody have an opinion they'd like to express? Okay, so we'll – Owen?

MR. HOWLETT: This is not on the relative

efficiency, but you skipped over one thing, which people want to know for the area category changes that are coming up. At the top of the table here, we're proposing the new Power Adjustment Factors there for occupant sensors used in office open areas. So, depending on how – these are occupant sensors looking down the cubicles, basically – depending on how many cubicles the occupant sensor is controlling, you get a varying Power Adjustment Factor, so probably you get the highest PAF of .4 when it's controlling basically one cube and 25 square feet, and you get progressively less Power Adjustment Factor as the occupant sensor controls more cubes. Now, that's important because that is part of the justification for the area category reduction for offices coming up.

MR. BENYA: Yeah, thank you for reminding me of that. Yes, we had this discussion the other day and this – one of the things that we're beginning to run into, we're seeing this in some of the offices of the future test projects, is that you will have – an open office area will have –

MR. SHIRAKH: May I ask the people on line to please mute yourself? We're getting a lot of background noise in here, it's very loud.

MR. RUBENSTEIN: Actually, that may actually

be me. This is Francis. Can you hear me?

MR. SHIRAKH: Yeah, we can hear you loud and clear.

MR. FLAMM: Hello, Francis.

MR. RUBENSTEIN: Okay, sorry about that. I just – I heard my name and, yes, to answer that question, yes, RSE is still necessary, you still want to have an efficiency – a minimum efficiency that you require for controllable ballasts, yes, that definitely needs to be in there.

MR. FLAMM: Thank you, Francis. I was hoping you'd answer that. Now, how do we apply it, because the current language, it doesn't apply it to anything. We have to figure out how to apply it now. So, we can discuss that offline.

MR. RUBENSTEIN: Okay.

MR. FLAMM: And to Owen's point, what you point out is a deficiency in the language, still, in the fact that we added some language to the table for which we do not have corresponding narrative in the very beginning of this section. So, what we need to do is we need to make sure we have a corresponding narrative to this table.

MR. MCHUGH: So, now that we're back to Table 146(A), I'm going to ask the question that the RSE

brought up, so are we giving credit for having dimming ballasts, if dimming ballasts are required under the control of the lighting proposal?

MR. FLAMM: Well, the answer is yes right now only in the fact that we haven't discussed it. So, the current language has not removed that language, so that's the question I'm asking. It was an oversight that I just recently recognized.

MR. MCHUGH: Yeah, it might be an oversight, I mean, if something is mandatory or even a prescriptive requirement, you wouldn't give a credit for something that you already require, so something definitely for later discussion.

MR. FLAMM: Okay, Peter is getting excited.

MR. BENYA: Well, before you go, Peter, I want to point out, Table 146(B) now, used to be (D), is minimum required system efficacies for certain combinations of lamps and ballasts, in other words, there are ordinary electronic ballasts, there are efficiency electronic ballasts, and we're trying to force people into using the efficient ones. So, that's the question that Francis opined on, and we want to get more thought about this, I was asking, does this belong in Section 131, or should we be moving it forward because it's going to apply to all controllable

lighting, not just in Section 146. Now, coming back to the point that Owen had made about these occupant sensors in small offices, this is new language and a new concept, and I think that everybody ought to give some thought to whether these numbers are – whether the concept is a good idea, or whether the numbers are a good idea. I happen to like them a lot and I've done projects this way. To the point you were just raising, though, for example, dimming systems, you have manual dimming systems, you still get credit for that in certain facilities, perhaps we want to continue that, but here you see manual dimming of dimmable electronic ballasts, all building types, 10 percent. And the question is, do we persist with that or not. The reason why is, the ability for the user to make the adjustment is different than the lighting being controllable by some automatic means. Okay? And the question is whether this is a valid contribution with the power adjustment factor is something opinions would be valuable on. Thank you.

MR. SHIRAKH: I do have one comment directed at credits for occupant sensor, there are three layers in here, and I don't know if the case team has looked at this for the sake of simplicity, having one number, maybe .3 that would apply to all sizes, whether that

would change the dynamics?

MR. SCHWARTZ: Well, I've been standing here for a while, so if you don't mind, I'd like to interject. Peter Schwartz with LUMEnergy. Just to go back on the comment about the power adjustment factors and with dimming ballasts being mandatory and whether or not we should give credit for controls. You know, it's a similar thing as putting in the demand response, enabling technology, but then giving credit for actually using it. Well, we can have dimming ballasts that are mandatory, but to take advantage of them, we need to provide credit for the systems that control them. In the case, you know, Jim has been referring to the office of the future, and as we look ahead and push toward net zero, we see a lot more office buildings going to heavily bent sensor networks, and work station specific lighting, we need to allow for power adjustment factors in those circumstances. So, it's not only just having the dimming ballasts, but how do we employ them, whether the granularity, the sensors tied to them, and the rest of the controls. As we're, again, trying to move away from the manual, the other piece of it that you were just talking about it personal control because, if we have work station specific lighting, we can now have applications on their laptop, or their smart phones,

that enable them to tune their lighting to their particular preference and get additional savings. We want to encourage that and the only way to do that at this point is through additional power adjustment factors. And this goes beyond just, you know, a slider on the wall. So, I would say let's be careful and use proper semantics about which piece of the control systems that these credits are going towards. Thanks.

MR. SHIRAKH: Thank you, Peter.

MR. HOWLETT: Owen Howlett with HMG. Just to answer Mazi's question about why do we have three different numbers for the occ sensors in open offices, those numbers correspond to control of either one, two, or four work stations by a single occ sensor, and the reason that we wanted to provide those three different numbers is that the savings change dramatically, depending on how many people are in that control group, because if you've got an occ sensor looking down on four people, all four of those people need to be gone for lunch or in a meeting, or whatever, before that, and the lighting is going to turn off, so it impacts the savings quite a lot compared with having one occupant sensor per person. So, it also represents a four-fold increase in cost, you know, having one per person instead of one per four people, so we thought it was justified to have

those three separate levels.

MR. SHIRAKH: Okay, thank you.

MR. BENYA: Owen, could I ask you a question?

MR. SHIRAKH: Pam has a – well, after Owen, Pam, you can come up.

MR. BENYA: Did you anticipate that this particular approach could be work station or desk mounted, as opposed to ceiling mounted?

MR. HOWLETT: Yeah, after Dorene Maniccia mentioned that, we did include that in our consideration, yeah. So, initially, we had language that said it was only a ceiling mounted sensor, and some people may remember from the first stakeholder meetings that we had, it had always been phrased as being a ceiling mounted sensor, especially for when you've got one per work station, it could equally well be a desk mounted or a partition mounted sensor, so all of that is now allowed by this new language that we have.

MR. FRAMM: So, I want to add to that, the concern that I've raised is that this is a building standard, and the builder needs to be able to build something and turn something over that they can get signed off, and this is all before the furniture is installed. So, we cannot hold the builder responsible for controls that will be put in after the building has

been signed off. And that's the challenge with controlling cubicles. And so, I believe it's a good concept and there's probably other vehicles by which we can get there, except I don't see how we can fit anything beyond the building into a building standard, and that's been my concern.

MR. BENYA: Well, you know, Gary, I don't want to belabor this too long because we've still got stuff to cover here, but you have to pull an electrical permit to put in furniture systems.

MR. FRAMM: I didn't know that was a truism.

MR. BENYA: Well, the minute you start doing wiring on branch circuits, you know, hard wiring to the extent that that is involved, technically you are supposed to get a permit. And so, would we not want to consider how we might modify the standard to address two phases of the same project?

MR. FLAMM: I don't know the answer to that. I don't know if you want to speak to this. I have concerns because it is my understanding that permits are not pulled for office furniture.

MR. THOMAS: Gene Thomas, Ecology Action. I'm glad I heard you say what you said, Gary, about applying it to the building because a lot of this language is set to be applied to retrofit situation, and so you have to

be able to address that part of it, and once you get into a retrofit, it's a whole different set of cost effectiveness calculations in the real world, compared to a new construction kind of thing. And so we would be going into a situation with an office set up the way that it's set up right now, with either high partitions, or low partitions, or none, or as the case may be, and from what I can see, if it meets the triggers, then this is going to be applying to it, so that's something that needs to be worked out, too, in the context of how language is treating retrofits.

MR. FLAMM: I would ask that you read the retrofit case study if you haven't already. Thank you.

MR. SHIRAKH: Pam, do you want to – can you come up, please?

MS. HORNER: Pam Horner, Osram Sylvania. I have a question for Gary and Jim and Francis, if he's still on the line. This is relative to the new Table 146(B). My question has to do with what has both T-5 and T-8 fluorescent lamps, and, Jim, did I understand you to say that this could be applicable in Section 131, as well?

MR. BENYA: That's correct.

MR. SHIRAKH: Can you put up the table so people can see what we're talking?

MR. FLAMM: So, I want to clarify that that's an existing table that is not proposed to be changed, other than the name of it.

MS. HORNER: Understood, and that was my question of you three, is that the new Department of Energy ballast rulemaking that's going on right now for electronic ballasts, is moving to the efficiency metric, so is that something that is of interest or concern? Or not? Because I'm just saying we have one metric here and just regarding what's going on in another arena, we do have another metric, so I just wanted to bring that up. Thank you.

MR. SHIRAKH: Francis, do you have a reaction to that?

MR. FLAMM: Well, let me say something first there. If this is a credit, as it currently is, we don't push up against any federal preemption because it's a credit, however, if we move this to Section 131, as Jim is suggesting, we would be subject to any federal preemption, so, as a credit, we're free to have our own metric. As a requirement, we're not.

MR. BENYA: Well, let me just ask a question and maybe, Francis, we know you're there.

MR. RUBENSTEIN: I'm here, I'm here, really.

MR. BENYA: Maybe Pam or Francis can enlighten

us a little bit here. If the Federal rulemaking goes ahead, my guess is that these numbers will probably be close to the Federal rules. Does this whole idea become superfluous? I mean, this won't be the first time we've gone through this, I know.

MR. RUBENSTEIN: No, this is Francis, no, and first of all, while the dimming ballasts – the current rulemaking that is going on, the one that Pam was referring to, that actually – this does not cover dimming ballasts at all. So, that part of it is not going to be covered. But Pam is right that they are considering a different metric, rather than BEF, or relative system efficiency, it's going to be ballast efficiency – I have some gripes about that, but that's another question – but I think the bottom line is that, whatever the Feds come up with as a rulemaking, we would need to show deference to what they're doing, we'll have to recalculate these numbers to make them correspond to whatever is happening at the Federal level. But for the moment, the dimming ballasts are not part of the ballast rulemaking.

MR. FLAMM: So, this is Gary. We have to know what we need to know in the course of our rulemaking proceeding, and so if there is something ongoing, we need to have some intelligence about where that might

end, and hopefully we land in the right place with what we adopt because –

MR. RUBENSTEIN: I'm hooked into that process and I will provide you input into that, Gary.

MR. FLAMM: Okay, thank you.

MR. RUBENSTEIN: Okay.

MR. MCHUGH: This is Jon McHugh. Just to clarify what I thought I heard Francis saying, is that regardless of what occurs with the Federal rulemaking, t won't preempt Title 24, so if you decided to put this in 131, that would be okay, and it doesn't even have to match the Federal standard because the Federal standard is covering static ballasts. But –

MR. RUBENSTEIN: That is true. That is true.

MR. FLAMM: Okay, this was a worthwhile discussion and we need to identify a subgroup to discuss this after this staff meeting.

MR. BENYA: Okay, any other points? Okay. Let's move along. These are the proposed changes in the lighting power density values. Each time we go through the standard, we look at changes in technology or something else that allows us to reduce the lighting power density standards. As I have told a number of you, there have not been any significant changes in the efficacy of light sources that we have available right

now for these applications, since the last time we went through this. So, the numbers are not going to be going down much. The energy savings that are going to result from this generation of standards are going to become more from controls, mandatory and otherwise, that are going to come from lighting power density. Now, that said, this is kind of a slippery slope because we've got to make some decisions now, based on technologies that will be available three and four years from now. And that's a little bit hard. Solid state lighting has proven itself to finally beginning to achieve some of its long promise of higher efficacies and more cost affordability, but it isn't quite there yet and we would be guessing as to whether or not it would be there and how it would be there by 2013 and 2014. So, at this time, the power density numbers for the most part are going to remain the same, these are the whole building numbers, and you can see only two of them change, and these were fairly well researched. Office buildings, one of the reasons why office buildings can change, folks, to be blunt, is there have been some changes in luminaire efficiencies, so not so much lumens per watt, as it is the efficiency of the luminaires putting those lumens into the space. In office buildings, we're seeing a drop from .85 to .8, but it is reasonably

possible to light an office building at .8 and that's not a big deal. Parking garages have taken a big jump downwards from .3 to .2. And, again, from my personal experience, this s easily done in standard practice today and I don't see any reason to particularly question it. Any comments about Table 146(C)? David?

MR. FLAMM: I want to interject something there. The office, both in a complete building method and in the Area Category Method, the office LPDs went down, which corresponded to the task lighting allowance going from .2 to .3. So, that kind of happened in tandem.

MR. GOLDSTEIN: Yeah, this is David Goldstein at NRDC. And I want to suggest an avenue for some small additional reductions in LPDs with the appropriate humility that I may be remembering some of this incorrectly, and in any event, I certainly would agree with the prioritization that you've expressed in all the presentations so far. The big savings are from controls and from the daylighting improvements and the retail Tailored Method adjustments. What I'm suggesting would be relatively smaller. But I do seem to recall that I asked Jim earlier whether there was a new LPD calculation spreadsheet compared to the previous go-round, and he informed me that that hadn't really

changed since 2005. It's my recollection, and I've looked very carefully at that 2005 spreadsheet, you folks in the room can take credit for the fact that the Chinese lighting power densities are about 10-20 percent below where they would have been, because the lighting experts there were able to use that spreadsheet and verify what you did. But I seem to recall that the luminous efficacy for the fluorescent lamp category, which was the biggest one, was not based on the latest generation of lamps and ballasts, but was based on a ballast that was one generation below what you can do today, which I believe would be cost-effective today, even if it wasn't in 2004. So, I would encourage you to go back and look at that, and see if that is correct.

MR. FLAMM: If my memory serves me right, I believe, in the 2008 standards, those models which use linear fluorescent, we use 90 lumen per watt, third generation T-8, is what I believe was used.

MR. GOLDSTEIN: I think, in terms of the lamps, it was series 800 T-8s, in terms of the ballasts, it was not the state-of-the-art, as I recall, so anyway, we can check and – it's not a big effect, it's probably a 5-10 percent effect, but –

MR. BENYA: I think you're partly right. I think we harvested out the 2008 standards, we didn't

exactly go through the spreadsheets, but we did actually go through and see, you know, extreme circumstances, office buildings, and office buildings went from 1.0 to .85, going from 2005 to 2008, so there were a number of rather substantial changes that occurred going from 2005 to 2008, to take advantage of that very change you're talking about, so I think we already harvested those back in the 2008 standards.

MR. GOLDSTEIN: Well, let's check. When I was looking at the numbers, what came into my mind was the non-office occupancies, particularly since the case studies emphasized office retail and parking garage, I didn't really look at anything else.

MR. BENYA: You know, I'm just going to say, one of my bigger concerns about the non-office occupancies is our calculational methods and our modeling make me a little nervous, you know, offices and schools and certain space types are relatively easy. When you start talking about libraries and restaurants and a lot of projects like that, we don't go after them quite so aggressively because primarily, one, they don't use linear fluorescents, they tend to use smaller and more point sources. And I think we're going to see a big change in the next few years as LEDs step into the point source marketplace more. But until they do, I'm

not sure we can make a lot of difference. I think we took advantage of it in 2008. I would be glad to look at it with you.

MR. GOLDSTEIN: Yeah, I think it's worth checking because, again, while I agree with your philosophy that you can't rely on LEDs for broad basing of this standard upon them, you can rely on them as a compliance option to at least allow people to build a project if we're getting too tough on the LPD for a particular project.

MR. BENYA: Yeah, but the problem is we have to prove they're – if we start to make a standard that effectively requires them, we've got to prove the cost-effectiveness.

MR. GOLDSTEIN: Right.

MR. BENYA: We're not there yet. We are in a few places, but not generally.

MR. GOLDSTEIN: Thank you.

MR. BENYA: Thank you.

MR. FLAMM: So, I would like to interject there, again, that I suspect that the Tenth Edition Handbook changes in foot candle levels is probably going to be more impactful than the technology change because I believe Jim did a lot of models in 2008, and I think that's where we really should be looking.

MR GOLDSTEIN: Well, that's one of the reasons, I completely agree, that's one of the reasons I mentioned the spreadsheet, because the spreadsheet would allow you to make those change if there are some pretty directly, so I would encourage that step as well, yeah.

MR. SHIRAKH: Thank you. Bernie.

MR. BAUER: Yeah, Bernie Bauer with Integrated Lighting, and also one of the key members from the utilities Code and Standard group. And to speak to Handbook 10, one of the other things, if anybody looked, when you looked at our retail studies, in addition to looking at technology, for example, CMH, heavier use in retail, because we had privy to – I was on the committee, still on the retail lighting committee – we used RP211 which is in print right now, as our guideline, therefore, at one time, and the reason I'm coming up to speak in terms of whole building is because we didn't address whole building, but possibly a couple for those areas in whole building, that are attuned to retail, such as grocery stores, might have a tick to be dropped because, again, under the old RP2, you had 100-foot candles for a grocery store. There is nothing in RP211 now that suggests that electric lighting, general lighting, be higher than, let's say, 50-foot candles. So that might be one of the things we might want to

explore is to look at that. We did do that in Tailored Method, and when Jim presents that, you'll see that we've played around with that, lowering some Tailored Method retail, as well as lowering area method retail, and then putting those ticks back up for certain kinds of retail that might need a little more power density, but, again, thinking in terms of big box, which is monolithic, bringing them in line with both what IESNA, or just IES, is saying for current retail, as well as what new technology is saying. Thank you.

MR. FLAMM: So, I'll take a tangent from where you went, Bernie, you were talking about RP2, 2011, any documents that we cite in developing our standards, we have to own a copy of, so we cannot cite future documents, so we need to make sure the documents are publicly available by the time our standards go into effect.

MR. BENYA: Okay, good. I was wondering where that was headed, so that's very good news. Any other comments pertaining to whole building method? I'm going to move forward, then, and we're going to take a look at the table next for the Area Category Method, and you can see one of the first things is there has been a restructuring of some of the footnotes to correspond in part with the changes in the language, and to correspond

in part with changes to the table. We see some commercial and industrial storage has been removed, parking garages have been changed, retail merchandise sales has been dropped quite a bit, grocery dropped quite a bit, and then the footnotes have been modified to refer back to the language which we saw earlier. Any particular questions? Well, let's stick with this and we'll do the footnotes next. Any comments or questions about the body of the table here? We'll look at the footnotes.

I hasten to point out that, you know, office areas and other things, there are a couple of rather significant drops here, and I presume those have as much to do with changes as I pointed out, in some cases, technology, but also in practice. Okay, slipping down into the footnotes, when the Area Category Methods began to evolve, the idea was that we sought to find sort of the best way to do most of the calculations, so you break the building up into various space types, and so the space types have a general characteristic, we separate toilets from work areas, and things like that in the calculations. Then, over time, we have moved more and more building types and project types into this by taking them out largely with the Tailored Method, and in some cases out of the whole Building Method, because

it made more sense. And, in doing so over time, we've added additional allowances for certain space types to provide for task level lighting and similar decorative lighting and a few other things. So, I want you to just take a quick look at this. It doesn't look like there's – Gary, is there a significant departure from this? Are these numbers a lot different than we've had?

MR. FLAMM: No, the numbers are not that much different. What we did is we gutted the Tailored Method. In the Tailored Method, there were a number of different constructs into one table, and we moved some of that into the area category. So, what we left in the Tailored Method was general lighting, which has several other layers, floor allowance, wall allowance, there were some – you know, we kind of filtered the tailored method and there were some that had only one layer of allowance. There were some like schools, you know, and then you allow a white board, and so, in those cases, it didn't make sense to leave that as a Tailored Method, but to move it into the area category, and to give an allowance for white boards and chalk boards. So, in the simplification of the Tailored Method, some of the data entered up into the area category method.

MR. BENYA: Right. So, we have .2 watts per square foot for specialized task work, .5 for a

different type of specialized task work, .5 for ornamental or special effects lighting, .7 for chandeliers and sconces, 1 watt a square foot for precision commercial and industrial work, 5.5 watts per lineal foot for white boards or chalk boards, accent display and feature lighting, luminaires, be it adjustable or directional, .3 watts a square foot, and .2 watts a square foot for decorative lighting primary function decorative, in addition to general illumination. They apply to different types of spaces, some spaces are not allowed any additional allowances, and some spaces have rather specific ones that allow the light and power levels to be increased, depending upon need. Any questions about this? Gene?

MR. THOMAS: Yeah, Gene Thomas, Ecology Action. Have you given any consideration to aged eye aspects in any of these? I haven't seen anything related to senior facilities.

MR. FLAMM: There have been no models done differently than in previous as far as the aging eye. That poses a philosophical question in the fact that any building can be assumed to have somebody with aged eye, so do we build all of our buildings with extremely high light levels because of aged eye? Or, do we allow aged eye illuminants through task lighting and other methods?

We have not – that's a pretty slippery slope that we've never opened that door.

MR. THOMAS: And facilities that are dedicated strictly to seniors?

MR. FLAMM: And there is in the Area Category a senior allowance – a senior – Jim, do you want to go up to that Area Category Table? Senior sleeping area, housing, public commons area, that is dedicated – the lower left there.

MR. THOMAS: Oh, is that senior, [comma] sleeping area? Or is that senior sleeping area?

MR. FLAMM: I believe, to tell you the truth, I am totally confused by that whole subsection right there. What our intent was in '05, what our intent was in '08, and I've asked you this, Jim, I think it's worth that we look at that whole classification of dormitory senior, etc. So I would like to look at that.

MR. BENYA: Yeah, and from what I have heard of the Tenth Edition Handbook, I've heard rumors to the effect that the concern of the aging eye is going to be more pronounced in the handbook. This is a worrisome area because the work that's been done in this area has been limited, it's controversial, IES has published a document, RP28, which is very insightful. The big question is, how much impact should it have upon

standards development. I have worked in a number of senior facilities and one of the issues that comes up, and I've heard this over and over again, is there's a lot of pressure to increase the light levels in certain areas, and yet the people who live there don't want you to do it because they – many of them don't want to work or live in facilities that make them feel like they're institutions. And so there' a balancing act between people wanting to live normal lives and people having enough light to see what they need to see. It's a tricky one, a slippery slope was a very good phrase for it. So, I think we'll put this on our to do list, Gary.

MR. SHIRAKH: Jim, obviously there are people that need more light, but must that be hardwired into the general lighting? Or can it be provided through task lighting, modular lighting, you know, there's other means of providing – in my own eyes, it's kind of – you need more light.

MR. BENYA: This is difficult because, first of all, to which facilities does it apply? Does it apply to a middle school that has adult education in the evening? Does it apply to, you know, community centers because you might have a senior class there, one out of 20 might be for people over the age of 70? I don't know. And this is part of what makes it difficult.

MR. SHIRAKH: Peter, go ahead.

MR. SCHWARTZ: Peter Schwartz of LUMEnergy. First, I think it's more troublesome and wearisome to Jim because, when we started this process, 20 blah years ago, we didn't have gray or falling out hair, so it's more worrisome because we're reaching that point. But, with that said –

MR. BENYA: You had to remind me, didn't you?

MR. SCHWARTZ: Well, you know, it's been a long time. One of the things we have to keep in mind is the intent with the energy savings that are coming out of this round of proposed changes to the standards, more important, is the advancement in lighting quality because of the types of systems that are being promoted here, so having spent much of my career crawling around on the field in a wide range of facilities, and putting a lot of senior facilities and skilled nursing facilities, one of the advantages of the systems that are being promoted here is more comfortable and controlled lighting, we're not dealing with systems where we have the glare bombs of exposed troughers with K12 lenses, where, again, as Jim points out, to seniors that are experiencing institutional feel, you know, we're now able to dim lighting to appropriate levels, eliminate a lot of glare and too much, you know,

inappropriate contrast ratios in different spaces, so we're getting more comfortable lighting so they can actually see better. And I think that's an important thing. The other thing is, you know, I work on a lot of very large facilities with Union issues and older workforce, where they do have to adjust the lighting. The beauty of the controls is you can adjust them up or down, the overall advantage, however, is the whole system on a whole building is way down with these types of controls, which is what we're driving at. So, I think at this stage, to kind of split out the aged workforce is a little bit difficult to wrestle with for the reasons that were just mentioned, how do we know whether it's a youthful or an elderly workforce in the building, and how do we know that won't change upon building sale or change? So, we need to understand that the controls will get us a long way there and, as Mazi pointed out, if someone needs specific additional lighting, there are task lighting that can deal with that and we have a lot of very efficient LED sources doing that in the field right now.

MR. SHIRAKH: Exactly. There are facilities that are designed for older folks, that is one thing, but for buildings like this and I'm finding I need more light to do things for reading, fixing stuff, and

finding task lighting is perfectly suitable for that task. Bernie.

MR. BAUGH: Yeah, Bernie Bauer again with the Utilities Codes and Standards Team. First of all, by way of an explanation, and, Jim, you mentioned both retail and grocery, the significant drop, and then we picked up these pointers, if you build that back up, we really haven't suggested cutting it that significantly, but what we've done is we've put this into the category now, "use it or lose it," so those simplistic retail and grocery store spaces that are using these monolithic lighting systems will have a stretch, coupled with daylighting to do good lighting design, and yet when we get these other retail spaces that, let's say, are not necessarily to the point where they need to jump in the Tailored Method, but they do have some secondary and third layers of lighting, they can still do that responsibly. And then the other thing, which we never did tackle, and I think on my part it was an oversight because we were not dealing with areas specifically, but I believe that when we had this .7 for decorative lighting, that is kind of archival, back to '01, and that my suggestion would be that we just roll in .3 and .4 and make both – just add chandeliers and sconces to that terminology, and put the .5 watts per square foot

as the use it or lose it allocation, as opposed to the .7.

MR. FLAMM: As long as we have a rationale that is shown for doing that.

MR. BAUER: Yes, that rationale would simply be the same when you look at the models that we did, simplistic models for various types of decorative lighting, and this has also been supported out by a number of the stakeholders I talked to that, if it was a dimming system, and as long as we allowed some kind of an incandescent mode for that, which, i.e., is the use of halogen because there are a whole plethora of halogen lamps now, even in the incandescent market, that can allow us to take a 25 watt candelabra and essentially do what a 40 watt candelabra has done up until now. So that is just the carryover, and I take it, just because we were not tackling areas specifically, or whole building, that kind of number just went besides us, but I would say that I recommend that we just fold those two together and use it as the .5 watt.

MR. FLAMM: So, my point is that the case analyses would have to be updated so that we have a document which shows that proposed change.

MR. BENYA: Other comments? Okay, we’re going to move down now into the Tailored Method allowances.

In this case, let's see, commercial industrial storage is going away, correction facilities are going away, dressing rooms, education facilities, at least in part, food service facilities – as Gary says, everything that didn't have layers went away. Libraries should have layers. We could arm wrestle about some of them. So, offices are going away, medical and clinical care – in all fairness, you know, what this – this probably isn't the most profound set of changes in the world. As we've migrated from the Tailored Method to the Area Category Method, over the years some of these have become fairly redundant. And so, I'm not having any heartburn with any of these, myself. The one thing that -- we'll get down to the next group down here, here we do, retail merchandise sales and wholesale showrooms, this has always been the battle of the standards development for the last two code cycles. And Bernie and Jon and I have gone around and around and around. I see the numbers going from 17 to 14, 1.2 to 1, and .7 to .5. I think I'll ask the question, is that far enough? Is that – would you describe that as consistent with 90.1? Jon, you're very knowledgeable about this, would you say these values are consistent with 90.1 2010?

MR. MCHUGH: So, this is similar to 90.1 in terms of the reductions, but what's different is that,

in California what we do is we look at regulating the space type, as opposed to what is sold inside of the space. ASHRAE 90.1, even though it has a completely different format and it's based on the types of products that you sell inside, so it has a certain general lighting allowance, and then it has certain watts per square footage in terms of the types of product that you sell, and I've been participating with the lighting group for a number of years now and, even though to some extent I like what they've done, but at the end of the day the problem I have with that format is that the LPDs are based on the products, and it's hard to tell in advance what those products are and, you know, for instance, just about any store sells china, but you get this extra credit if you're selling china, so regardless of whether you're selling Wedgewood or you're selling, you know, sort of the bottom of the – whatever, so that's kind of problematic. And I think I'd actually rather turn the speaker over to Bernie as he has done a fairly detailed comparison of the proposal here, ASHRAE 90.1 2010, and also the Washington State Energy Code, which also has a fairly stringent set of – and you worked up on Washington, so you're familiar with that, as well. So, Bernie.

MR. FLAMM: So before you get up, Bernie, I'm

just going to ask you to make it really short, we're getting behind on our agenda and we need to push through. That's not to stop dialogue, you have comments, please send them to me, or work with the case teams. So, comments continue to be welcome, but we need to move the agenda.

MR. BAUER: Okay, so what I'll do is refer you for the details of what I'm going to talk about to our case report, I don't – I get this blown up on my iPad, so I don't know the exact sheet it's on, but it's toward the end and it says comparison where we took a full comparison of our basic AGI models and we looked at those against our proposed 213 numbers, and Washington 210, and ASHRAE 210, and, for example, the high atrium space, that one is a little bit higher than the two Washingtons, but a number of them, especially the higher end retail spaces where precious jewelry, we're at 3.84 for our model, vs. we would be allowed 4.05 under Washington, and 4.056 for that same model under ASHRAE, and then that goes through to the rest of them. We did not put it in the report, we were working on it, but did not get into the draft report right now looking at our second series of models, which are the Excel spreadsheet models where we have surveys and we can easily calculate and change numbers from what we found to what other

things could be in there, and the 70 or 80, those models, and knowing from these models and knowing from other experience, I could guarantee that a good 70-80 percent of those models, when they ran through Title 24 to ’13 as we are proposing, will be equal power densities, if not a tick lower. Again, the big thing is that we have to remember, because of the way Title 24 Tailored is done compared to ASHRAE, you start out with a higher base, we start out with this very low base; in theory, you can layer all this stuff on and get this super high number, but that’s in an almost hypothetical world that’s never built.

MR. BENYA: So in your qualitatively speaking, you’re saying that this particular proposal in 90.1 ASHRAE IES 9.1 2010 are very close.

MR. BAUER: When you run the models out. And one of the things we have done, if we were to talk, I believe ASHRAE has taken 100 percent CMH as their model, we did not do that because of, again, what we termed last time as the Mama Papa lower end retail and so forth, and so we did look at the stretch there using the next generation of IR, using again the design models from the new RP-211, which said, okay, if you’re willing to do lower ceilings, less general lighting, then you might be able to do that with some fluorescent and some

advanced generation halogen and just touches of CMH. If you want this 50-60 foot candle store and accent lighting besides, in the 12 or 14-foot ceiling, you will use you metal halide.

MR. MCHUGH: So, I just want to follow-up, Jim. Are you suggesting that we should be looking at lower display lighting allowances than we have currently in the proposal? Was that kind of the line of reasoning that you were investigating?

MR. BENYA: No, all I'm trying to do here is show there is a correlation between Title 24 and 90.1. I consider that to be, you know, pretty important these days. ASHRAE IES 90.1 has significantly increased its stringency under a lot of pressure from Congress and other places, and to the point where I want to make sure we are tracking and not lagging – for sure, not lagging in areas.

MR. MCHUGH: Thank you.

MR. BENYA: Okay, there are adjustments for mounting height above floor, these changes are relatively small, they are meant to be clarifications, these aren't bothering me any. The luminous categories, this is just a change in the table number. So, any further comments about Section 146? Bernie.

MR. BAUER: Yeah, Bernie Bauer again, and just

a reminder, coupled in to IES Handbook 10th Edition, because I have seen – I don't remember what the numbers are, but I know those luminance categories we have right now, if one were looking at really reducing wattage, everybody would love it because, for example, (D), I think, in the new handbook, which is we convert to a .9 watts per square foot, would be something like .1 watt per square foot. So, we will need to get, as soon as we can, that Handbook 10 information and get our numbers -- our letters -- lined up accordingly.

MR. BENYA: Okay, great.

MR. SHIRAKH: So, we're allowing these conversations to take place because they're important, we're not trying to cut off discussion, but we are running behind schedule, so we may actually run over our agenda time, so be prepared for that.

MR. BAUER: Yeah, one more, quickly, on the mounting height, and with the Commission's agreement, we might want to look at doing away with that 20-foot mounting height, and reworking something, let's say, the 16 to go to a 17, and dropping that 1.5 mounting height because, again, the assumption being that most of the – especially as a couple retail things that are mounted at that height, you're not going to be doing tons of display lighting and you're going to be definitely using

CMH at that point.

MR. FLAMM: Okay, we could discuss that later.

MR. BENYA: Okay, moving into Section 147, a few minor adjustments, one of them is a lot of lighting power based on local ordinance, our experience has been that there are no local ordinances that have undertaken this change, or this particular bullet point, so number three goes away. In calculation of allowed lighting power and the sum of the additional power lighting allowances – okay, this has just been clarified language. And the numbers have gotten, in a couple of cases, smaller. Now, personally, I can tell you, I spent a lot of time working in the area of outdoor lighting standards and I think that there's quite an opportunity to reduce general lighting coming up in the near future and from what I've heard of the handbook, this might affect these values, as well. Unfortunately, what I've heard about the handbook is good, effected either way. So, we'll have to take that under advisement as it comes out. Any comments or questions about Section 147? Changes in values? Here are the additional lighting power allowances. As you can see, the way it works is you get so much for general illumination and then you get a use it or lose it allowance for certain types of outdoor lighting. I can

tell you that some of these values, I have heard through the grapevine, that particularly vehicle service station canopies and outdoor sales and others, the new handbook values are going to be significantly lower and these values will need to be adjusted accordingly. This table goes away because, of course, we're removing the option for individual ordinances in various communities. Comments or questions about Section 147? Hearing none, we shall move on. Gary.

MR. FLAMM: This is Gary Flamm. I'm going to finish the last two modules. Section 148 Requiring for Signs, there's only one minor change. In the option of using an approved list of technologies as the alternate to watts per square foot, the language was constructed so that you had to use electronic ballasts in addition to high color rendering index lamps and, to clarify that, we said you could use either electronic ballasts or ICR lamps, that is the only change in the sign language. Anybody want to make any comments about that?

The last section, additions, alterations, there are some changes here. The note upfront that we've had there forever, saying that replacement of lamps and ballasts, etc. was – I was always having to navigate people to that note, it was really – it evolved into a poor place, so that language was moved down here

into the body of the standards. However, two significant changes in alterations, currently if you change or remove and replace – relocate 50 percent of the fixtures in a room, you have to meet the new standards, that's going down to 10 percent. And so, if you change 10 percent of the fixtures in a room, you have to meet the current standards; sometimes that means the lighting power densities, sometimes it means controls. The other change is that ballast replacements for basically 30 ballasts or more under one time, has to meet the new lighting power density requirements, and some of the control requirements. Some of the control requirements have changed in that we now have – we don't have to pull hard wires all the time for controls, for shutoff controls, there's power line carriers, there's radio controls. So, the alterations have change significantly, so controls are required more often than they currently do, lighting power densities have to be met at 10 percent alteration, and ballast change-outs are now affected, except if you are at 30 ballasts or less. So, those are the alteration changes. What's still missing are the daylighting changes. Now that we have simplified the daylighting language, we have to translate what that means in alterations, and I believe there are a couple more things that are going to change

there. So, does anybody have any comments about the alterations?

MR. THOMAS: Yeah, Gene Thomas, Ecology Action. We're doing some analysis on sample sites for PG&E to help inform part of this process, and that's not yet totally complete, and just by way of background, Ecology Action is implementing a number of different programs for utilities and local government partnerships and municipal utilities. And a lot of what we do is lighting. And so, we and some other implementers or other stakeholders that have been involved in this process have some real difficulty with primarily the elimination of the ballast exemption, so I went and looked at all of our lighting that we had done in 2010, and looking at just the linear fluorescent fixtures, indoor wet ballast retrofits, eliminating those where we'd put in new fixtures, or 5A's or whatever, and so that was 495 sites, that was about 16 million kilowatt hours of savings, and then I looked at how many of those were 30 or fewer luminaires that were affected in 31 or more, and so it was almost exactly 50 percent that was 30 or fewer and 31 or more, but 90 percent of the savings, 89 percent of the savings, came from the one with the 31 or more, and we feel that that – imposing both a daylighting controls requirement and imposing a

dimming ballasts requirement on those retrofits puts at major jeopardy that achievable savings. You know, maybe 25 or 30 percent of those customers will go ahead and go with it, complain, or whatever, they're not forward thinking that they'll do it, but we feel really strongly that another 40 or 50 percent will look at that cost and say, you know, sorry, I'm not going to do that, and then you will not get the savings that you're looking for. So we looked at just the cost for the ballasts, so we only specify third-generation energy saving ballasts in our retrofits, and the cost of those for a typical site, just the cost of the ballasts to the customers, $2,637.00, on average. If those were dimming ballasts, and that's just taking the $30.00 cost that they are saying they can get to, and adding a contract or mark-up, that's $5,813.00, so it's a 220 percent increase for that, and then if you layer on controls, that's going to be another $.50 or more a square foot, and people are just – they're not going to go along with it, so we feel very strongly that you should really think carefully about imposing this in retrofit situations. I mean, it's almost like if you were to – somebody broke a window and you would tell them, "Well, now that your window is broken, you can't just replace that window, you have to replace all of the windows in the building

with argon fill," you know, it's that kind of thing, or, "You can't add insulation in your roof, you have to add insulation in your roof and poke holes in your walls and put it in your walls, and put it under your thing, and people would say, "Oh, I guess I won't, I'll just turn up the heater instead." So, we're still completing our analysis on these sample sites to go back and do another walk-through, do another audit, and specify what the real costs would be of that new Title 24 compliant retrofit, and provide that information to the utilities and other stakeholders, but this is very problematic. And, although I think there's been a good effort on the part of getting stakeholder involvement, there still has been surprisingly minimal involvement from the major players that are out there doing retrofits. So, not a lot of involvement from BOMA, and not a lot of involvement from Nesco and Sylvania, and so on. And I think once this starts continuing through the process here at CEC, and these people become more aware of it, I mean, just one of the major players when he found out, he said, "Even though I'm located in California, we'll just stop trying to get business in California, because we won't be able to cost-effectively go out and do that. So, I would be interested to hear what you folks have to say about that.

MR. FLAMM: So, have you reviewed the assumptions put into the case analysis for retrofit?

MR. THOMAS: Yes, and realistically, we think that, you know, we commend your efforts and we think what you're suggesting has great applicability for new construction, but not retrofits, so it's – if you were to make allowances, if you were to say, well, for example, we wouldn't have a problem getting down to the watts per square foot of Title 24, we can do that with fixed ballasts, and we can do that with switching of the luminaires, even putting photo controls in there on the perimeter parts, to switch off, you know, every other luminaire and still get perfectly acceptable uniformity, but it seems like the Code is precluding those approaches, and those would be the ones necessary to get the kind of traction in the retrofit market that you're looking to get. So, I mean, it's a very significant expense and typically these owners of the facilities, or the operators of them, two out of three are leased space that we serve, if it's not a year payback, most of them will say no. And you're talking about cost-effectiveness of, well, if it's within 15 years, or the lifecycle, they would just laugh at that, so it's really something to think about.

MR. FLAMM: Okay. What I would ask you to do

is look at the analysis. I know that they put a lot of time into looking at cost, and find work with us and the case team, if you disagree with any of those assumptions that would be helpful.

MR. BENYA: Well, but what he's saying, though, I think we need to remember this, is that one-year payback is a whole lot different than a three-year payback, or a five-year payback. And I think that's the strength of Gene's point is, is that when owners expect a one-year payback, you have to do pretty basic stuff. The Boeing project I talked about earlier, which was very successful, including incentives from Southern California Edison, is a three-year payback. They had to put in all dimming ballasts and controls, but it's a three-year payback after incentives.

MR. THOMAS: Yeah, we're not saying that we wouldn't do any of those, but we're saying that a lot of the jobs, that's one that especially in this economy that they would put off.

MR. BENYA: Then that's a critical point. If Boeing said, "For us, this is a good time to make an investment like that –

MR. THOMAS: And I think you'll find the people that do that, if you look at this whole 500 jobs that we did, the people that are going to be most likely

to say, “Sure, we can do that,” are going to be the people at the very top end who have real healthy facilities management budgets, and so forth. I mean, we’ve just moved into really the greenest existing building in Santa Cruz, our new headquarters, with Cruzio, an Internet provider, we share the building, and you’ve got continuous dimming on one side of the building, and step dimming on the other, to demonstrate that, we’ve been there for six weeks, it’s still not working right. So, in this market, you’ve got a lot of people that are responsible for facilities maintenance that English is their second language, and if you put in a requirement for real complex controls, it’s problematic. And the thing I think to keep in mind is, if you can look at retrofits and say, “In this Code cycle, let’s really be concerned with getting them to the target, watts per square foot, and make our biggest inroads in new construction, and for retrofits, get them down to kind of the watts per square foot that we’re looking for, and the controls that we mandate, and let them be a more simplified way to get there,” so fixed ballasts, alternation of luminaires with simple photo controls, and occupancy sensor, and I think you can get 95 percent of what you’re looking for.

MR. FLAMM: So, looking at the proposed

language, the controls are kind of graduated according to how much work you do. If you have a single switch leg, you have – and then you're not touching that, you're just replacing ballasts, do you have less that you have to do than if you're doing a more comprehensive change-out?

MR. THOMAS: Our typical – our meat and potatoes is four lamp to two lamp retrofits with new reflectors and that's a huge part of what we do. And eight-foot conversions to four-foot, and so on, and we'll do some checker-boarding and alternating lamps in a strip fixture to get, you know, that's something that makes a lot of sense for perimeter areas for retrofits, and even the mom and pop places will go along with that.

MR. FLAMM: So, I think the proposed control construct takes into account the complexity of the retrofit as to what kind of controls you need, so the basic shutoff control is required, you know, the ON/OFF switch, the shut-off, and then there's another threshold you meet where you need to do multi-level, and then the daylighting controls and such are really much higher on the hierarchy where you have to pull out individual luminaires. So, from what I see in the proposed language, it does not look like the control requirements are going to be onerous for a simple ballast change-out.

MR. THOMAS: Well, it's like Jim said, once you've got dimming ballasts in there, then the cost-effectiveness of the controls is there, and that's one of the major expenses in the retrofit if you're bringing them into it that is going to be stumbling block.

MR. FLAMM: Okay –

MR. THOMAS: If you could do everything for, you know, $25.00 or $30.00 net cost to the customer, including contractor mark-up, but not labor, that's one thing, but it's going to be -- not even the manufacturers are projecting that.

MR. FLAMM: Okay, so would you like to continue a dialogue with us?

MR. THOMAS: Absolutely.

MR. FLAMM: So why don't we have you and the case team work on this and anyone else who is interested, discuss this offline.

MR. THOMAS: Great, thanks, Gary.

MR. FLAMM: Okay. Peter.

MR. SCHWARTZ: Yeah, Peter Schwartz with LUMEnergy. I'd like to speak to a couple points because I've managed and run a lot of utility programs over the years, recently some advance technology programs. And one of the things we have to keep in mind is that we're talking about 2014, we're talking about an electricity

market environment that is changing to a Smart Grid era with real time pricing. And one of the things we have to look at with the business owners in California, at the end of the day, are we going to enable them to function in a Smart Grid real time pricing environment if we stick with static solutions? Are we doing them a service or disservice with doing just simple static replacements? And I understand that there's a challenge to doing things cost-effectively, but I think with what Gary was saying and with the limits that we're talking about here, you need to imagine these projects when you have real time prices going on, the payback has changed substantially. So the question isn't how is it doing today, but how is it going to do in 2014, in 2015, in 2015, 2016, on out. Because the systems that we're putting in are going to be in there 20-30 years. So, even mom and pop, you know, imagine them trying to function when the price of electricity is north of $1.00 or $2.00 a kilowatt hour on peak? You know? What's their answer going to be? How did you leave me in this situation where I have to close my business because it's too expensive to turn my lights on? That's one thing. The other is, looking ahead, you know, Jim talks about that we're able to put in cost-effective advanced controls now, whether it's new construction or retrofit,

because I've got to tell you, 99 percent of the projects we deal with are retrofit, ranging from small projects all the way up to a million square feet. And I think what we need to keep in mind is, we're not doing the premium package on the smallest spaces, but we do need to bring them up to a point where they do have the controls necessary to move forward and function in this new environment. And the fact that you're talking about one-year payback, we have to remember that we do not invest in buildings, we do not determine the building's value by simple payback, we don't buy stocks that way, we don't buy houses and cars that way. So, yeah, there's a mentality that we have to deal with simple payback, but that's why the utilities spend all this money on education to talk about proper evaluation of energy efficiency, and that's also – to get at your point – is the cost-effectiveness here is relative to previous code. When we go into retrofits, they're making decisions based on their existing equipment, they're getting bidding the actual savings and value out of those projects, not relative to Code, but relative to their bill. The cost-effectiveness for this process is relative to previous Code. So, if it's cost-effective relative to previous Code, it's only going to be more cost-effective relative to reality, so I'll just leave

it at that. Thanks.

MR. SHIRAKH: Thanks, Peter. There is a gentleman there, then Pat.

MR. FRAMM: So, I would like to open up now –

MR. SHIRAKH: Are we done with the –

MR. FRAMM: Well, after this, let’s just evolve straight into comments for about 15 minutes, general comments, and then I’d like to open the line on the Web.

MR. BENYA: We’ve got a couple of new comments.

MR. FRAMM: Okay, let’s deal with the comments for retrofit, first. Sure thing.

MR. LIEN: Thanks, Jim. Mark Lien with The Lighting. I was asked to come out here by one of our companies that is headquartered here in California because their customers that have heard about this draft were very concerned and their customers are primarily retrofitters, one of our divisions deals directly with energy service companies. And so, through that company, I’ve asked that the Nalco people be on this call and they are, at this point, so that we get some of the energy service people involved. They may be able to help with metrics here, as well. I applaud everything you’re doing in this document, I think, Gary, what

you've done and, with Jim, is taken a very complicated issue and the refinement to Title 24 is important in terms of simplicity and aggressiveness. The only aspect of it that we are concerned about is the 10 percent number for alterations. And it's our belief, although it's intuitive at this point and it would be good to get a metric on this, that if we get to a 10 percent number, as Gene had mentioned, many people are not going to do this because, even though it is just a culture and a mentality, return on investment is what motivates these retrofit jobs, and the smaller jobs, many of them will put off. The National Lighting Bureau says, and this is a statistic they came out with last year, that there are 2.7 million commercial buildings in this country that are 30-years-old or older, and 2.2 million of those have their original lighting systems. If you have one of those older buildings, and I'm sure there are a lot of them in California, and you have to bring it up to the 2013 Code, then the return on investment is going to be very long, and likely that project will just be not done. And so our concern is that this could hurt energy efficiency, not that it's hurting Hubble lighting, but I think the goal of Title 24, if people don't do the projects at all, even the small incremental ones, then it hurts energy efficiency long term. There is a

different approach, and I'm wondering if you've considered this, in New York City, they have the mandatory energy audit law that's recently gone into effect, every 10 years beginning in 2013, commercial buildings have to have their buildings audited for an energy audit, and they have to bring them up to current code within a certain period of time. In San Francisco, it's every five years now. So, we're starting to see it approached in a different way that forces those existing buildings to be brought up, people have a little bit of warning in terms of time, but it forces an ongoing process of making all existing buildings meet your most current goals. Is that something that was considered at all?

MR. SHIRAKH: That's basically for a local ordinance, I don't know if we can do that at the State level. But, you said the 10 percent is the problem area, do you have a different suggestion?

MR. LIEN: Well, if you were at 40 percent, you're still more aggressive than anyone else because typically it's at 50. It sends the message that it needs to be more aggressive, and I think that would be a good goal. Take it down incrementally. I just think going to 10 percent is radical and it may be counterproductive to your goal.

MR. FRAMM: Didn't the 10 percent, if I remember correctly, came from 90.1, it was a 90.1 proposal?

MR. LIEN: Yeah.

MR. FRAMM: So that's looked at nationally.

MR. BENYA: So, let's hear from Pat.

MR. EILERT: Thank you. Patrick Eilert from PG&E. So, first, I'd like to thank Gene Thomas for his assistance, we're looking at this issue pretty hard. We understand – we, the IOUs – understand this is a pretty big change and so we've been looking at how we could handle this from a program point of view, and it's pretty clear to us that, for now, there's no policy barriers to implementing what we would call early retirement programs, so these are the kinds of programs that are based in part on existing equipment for energy savings and in code for usually the last two-thirds of the measure life of the lighting project, for example. So, we're pursuing this as a bridge to get to the future, we sort of feel like codes, along with early retirement programs, will get more savings for the state than either alone.

MR. SHIRAKH: David?

MR. GOLDSTEIN: David Goldstein, NRDC. I wanted to speak in favor of this proposal for a couple

of reasons, first, of course, it's a large amount of energy savings in a triennium where there's probably not going to be that much new construction, and so retrofits become relatively more important, but primarily because it eliminates the problem we've dealt with, with utility programs over the years, and that the other commission has set up a lot of rules about, it's what they call "green skimming," it's doing the measure half way, like putting R-19 insulation in the ceiling when Title 24 calls for R-38. You're never going to make it cost-effective to go back and fix that, so, while you think you're getting savings in the short term, and you are, you're forever foreclosing the bigger savings that are involved in coming up to code. So, my concern would be, if you put in a static ballast right now, and ballasts last, what, 20 years, you know, you're going to be stuck with a non-dimmable ballast in 2030, and wouldn't be a lot better, even if the retrofit project waited for a couple years until people got the financing together, or the utilities got the programs together to solve the problems, to just wait until you can do it right, rather than doing it halfway and getting stuck with something that doesn't serve your needs, and then it would really be non-cost-effective to do anything about for a very long time in the future. So, I think the issue of

paybacks is important, but I would respectfully flip the argument made by a previous gentleman on its head; if people aren't investing in one-year paybacks, that's what codes are for. So, I would encourage you to look at ways you can address the comments, but do so in a way that recognizes that the purpose of handling retrofits in the Code ought to be to make an old building perform as well as a new building, so that it doesn't become obsolete, and then impose burdens on us 15 years down the road that are going to be much more difficult than they would have been if we did it right in the first place. Thank you.

MR. SHIRAKH: Thank you. Do ballasts last 20 years? I'd like to put some of those in my kitchen. We hear both sides, obviously, and we need to look at this and we'll probably have some discussions with various stakeholders so we can come to resolution on this one. Are we done with the language?

MR. FRAMM: That's the language. The last part of the agenda is opening it up to – I'd like to recommend to the floor first, and then to the phone.

MR. SHIRAKH: Well, basically, this is the part of the workshop that is open for any comment related to anything that was presented today, related to these topics. Anybody – Gene?

MR. THOMAS: This is Gene Thomas, just a follow-up and clarification, first, right now, for all of the IOU programs that are doing retrofits, they're already using existing equipment as the baseline, not code, minimum as the baseline. And lamp ballast retrofits, for us, I hear your point on the 10 percent, and that's somewhat of a problem for us, but less so than the lamp ballast exemption, part of it, because only about 13 percent of our savings comes from actual retrofits of fixtures as opposed to – excuse me, replacement of fixtures with new fixtures, as opposed to retrofits. So, and the other thing is with respect to retrofits, we're not doing green skimming, putting in third-generation high performance energy savings ballasts and 3,100 lumen low mercury T-8s and new reflectors, this is not a green skimming measure, it's what you want to have going on. And the other point is that a dimming system is inherently more inefficient than a fixed ballast system, and it gets less efficient the more you dim it down. It makes perfect sense to do that with solid state lighting, it makes a lot less sense in an existing building situation to mandate that particular approach because maybe in the next code cycle, we'll have linear LEDs that are actually affordable, and then that fancy dimming ballast will

just have been a waste of money because we can still implement a control system and one that takes daylighting into account with fixed ballasts. And I have yet to see, and some other stakeholders have yet to see, evidence that provides a real clear-cut case that dimming ballasts are a better solution in retrofits than fixed ballasts, so that was my point of clarification.

MR. BENYA: Now, just a comment, I'm not sure that you're correct on the IOUs using existing as a baseline, I know at least in some of my work with Edison, the baseline is code, not existent.

MR. THOMAS: If 50 percent of the fixtures are replaced, that's been the typical – the typical IOU response is, "Have you replaced more than 50 percent of the fixtures?" "No." "Then it's existing equipment." If now that's going to go down to 10 percent, if you kept the lamp ballast exemption in there, then we could deal with that, but because you're doing them both, that means almost everything that we do is going to trigger practically the full gamut of Title 24, and if it was cost-effective to take an existing building up to the current Code standards in every aspect, lighting, HVAC, insulation, everything, you know, we would be doing it. The fact is that it's rarely cost-effective to take an existing building and bring it up to the current

standards. The older it is, the more expensive it is. So, you have to fight your battles and decide where do you want to put your focus and what do you expect to get out of these existing buildings? And the cost-effectiveness calculation, unfortunately, it's not a TDV calculation. I mean, once again, most of these people that we're dealing with are in leased facilities, but many of them aren't even themselves paying the utility bill, it's – you know, they pay their rent to the landlord and the landlord pays that, we get their involvement anyway because it's so attractive, but if it moves into a five, seven, 10, 15 year payback, there's just not – many of them are not going to do it. And so you might get a quarter of them, the early adopters that will go ahead, but you're going to get half of them that are going to lag behind and it seems like, for them, once the solid state system's price comes down, and dimming is more efficient on those, the more you dim them down, then they don't need ballasts either, that's the time to try to harvest those.

MR. FRAMM: So, I have a question, Gene. Apparently you've looked at your data because you said earlier that the 30-31 ballasts is kind of the 50 percent mark –

MR. THOMAS: In terms of sites, yes.

MR. FRAMM: Okay. Is there another sweet spot where the numbers are significantly different, let's say, 40 ballasts?

MR. THOMAS: If you look at all of the gamut, that whole 500 sites, the average number is 79, if you look at the number of sites, there were 249 of them that were 31 or more, the average number of ballasts there was 155. I mean, I know one of the numbers that was floated in that earlier iteration was 100, that would be better, but still, you know, that would have a pretty significant impact. I think, if you can find some way to target it towards the upper echelon, you know, the top 20 percent, maybe, of buildings, that's where you're going to get your biggest traction. And I thought, well, maybe you could do it by utility code, but then I was told, no, you really can't write that into the E19S's and so forth that are the biggest customers, if it's 500 KW and above, you know, they've got to do the whole kit and caboodle. I was told you can't accomplish that in code. So, that would be one way because those are the ones that are pretty much going to go along with what you're putting in here. But the ones that are, you know, 200-300 KW, I mean, we primarily are serving for white lights, anyway, 200 KW and below, you know, a very large proportion of them, we really don't think are

going to. And we're on your side, we're the good guys, we want to see these savings happen.

MR. SHIRAKH: Just following on what Gary is suggesting, you know, we're going to have to have more discussions about this, but maybe 30 is not the right number. Maybe a higher number with a different approach. Obviously -- just a moment, Owen –- I think it would be a shame if a large building is retrofitting and we kind of miss that opportunity and go with static ballasts, I mean, those ballasts are going to be there for a decade or so. So, maybe there's a different threshold we need to use and I would encourage this team to regroup after this workshop and work through some of those numbers.

MR. THOMAS: I mean, one of the sample sites, I haven't got all the data yet for all of them, but one of them we got down to .41 watts per square foot, that's pretty darn good, and are you going to layer another $5,600.00 or $10,000 by the time you add the controls on and everything to that job and jeopardize even achieving it when you could have already gotten them down to that? That's the kind of balance that you want to try to keep in mind.

MR. SHIRAKH: Okay, thank you. Owen.

MR. MCHUGH: Owen Howlett, HMG. I just want

to clarify, we are intending to hold some more discussions on this, we know that this is a complicated one, and a lot of vested interest is at stake, a lot of markets at stake. I want to say a quick word about the 30 ballast threshold, the reason why we chose that particular number, the measure is actually cost-effective in terms of 15-year TDV payback, at a much lower number of ballasts. We picked that 30 ballasts number because we worked out the approximate cost of the total project of replacing 30 ballasts and it came out about the same as the cost of replacing a typically small HVAC system, and the reason we did that comparison was because we didn't want to impose onerous costs on building owners in terms of pulling permits for small jobs, so we wanted to make sure that the size of job which we are requiring people to pull a permit wasn't any smaller than the equivalent HVAC job on which they would be required to pull a permit. That was our kind of guiding principle on that, but also the 30 ballasts is also a design to exclude just routine maintenance, you know, if you got a bunch of failed ballasts, you might go around replacing some of them, typically that's just going to be a handful, so 30 or so allows us to exclude those routine maintenance jobs. So, for all those people who are intrigued by how we came up with

those numbers, that's how we came up with that one.

MR. SHIRAKH: Thank you. Any other questions or comments about anything that was presented today? And, by the way, just because the workshop phase of this proceeding has started doesn't mean there aren't going to be anymore stakeholder meetings that is probably going to continue until we resolve all the substantial issues that remain. So, if there are no comments, I would just note, I think that the stakeholder meetings we've had over the past year and a half seems like it was very successful, and I think this was a very successful workshop. I would like to thank the IOUs and HMG, you know, a great job. Hopefully this will continue for the future workshops, again, we're going to have almost one a week from here on out. And I have a feeling that some of the future ones are going to be a little bit tougher than this one because of the topics we're presenting. So, anybody on the phone that has any comments?

MR. FLAMM: I understand there are three people on the phone who would like to make comments.

MR. YASNY: First up is Ernesto Mendoza. Go ahead, Ernesto.

MR. MENDOZA: Yeah, when we were discussing about the metric for ballasts, I wanted to make a

comment that I support -- I have yet to have only one metric the same as the Department of Energy, otherwise, we have to attempt this further from many different ways, and then you are risking to be inconsistent.

MR. FLAMM: Excuse me, could you please identify yourself?

MR. MENDOZA: Ernesto Mendoza from Philips Lighting.

MR. FLAMM: Thank you.

MR. MENDOZA: Thanks a lot.

MR. YASNY: Okay, next we have George Nesbitt.

MR. NESBITT: Yeah, George Nesbitt, Environmental Design Build. On the residential lighting, I'm glad to see the 50 percent kitchen lighting to remain, there was, I guess, a proposal to change that, although the 50 percent is not perfect, I think it's better than what has been proposed. And on that and the bathroom, I'm wondering if we should add language saying that the high efficacy lighting should be the first switch so it's the switch you're most likely to flick, as opposed to having like the first switch the low efficacy, and then that's what always gets used.

MR. FLAMM: I can respond to that.

MR. NESBITT: Sure.

MR. FLAMM: We had that for years and it was so subjective, there were as many interpretations of that as there were people. It really didn't work, and that's one of the reasons we evolved to where we are. I think that it would just make the standards more complex because you end up getting in arguments "which is the first switch?"

MR. NESBITT: Right.

MR. SHIRAKH: Sometimes you can enter a room from two different directions and you can argue which is the first switch. So we kind of basically left that to the market, the builders, you know, to decide where they want to place the switches.

MR. NESBITT: Yeah, okay. A couple other – in the garage, the garage door opener lights, any –

MR. FLAMM: So, the standards – I believe it's in the manual, it says that if the garage door lights are on a timer so that they time out with the garage outdoor operation, then they're not regulated, however, if they're separately switched, so as to be work independent of the garage door opener, then they are regulated lights.

MR. NESBITT: Okay, and then the last thought I have at the moment is how the lighting rules relate to alterations. So, if someone changes a fixture or adds a

fixture, you know, without doing anything else, do these lighting requirements apply? Because the alteration rules are specific for some items, but don't really say anything about a lot of other stuff.

MR. FLAMM: Are you talking about residential or non-residential?

MR. NESBITT: Residential, yeah, all residential.

MR. FLAMM: We have some language in the residential manual which helps to clarify. I agree that the Section 151, is it, for res alterations –

MR. SHIRAKH: One fifty-two.

MR. FLAMM: -- 152 for res alterations does not have very much information. In the manual for kitchens, we say if you replace one fixture, that fixture has to be high efficacy until you reach your 50 percent high efficacy requirement. That's about the only thing we say about residential retrofits right now.

MR. NESBITT: Yeah, because I can tell you my experience is people add a lot of wattage, a lot of recessed cams and they're just dumping more and more watts in to their house.

MR. SHIRAKH: Well, I think that would be good to actually look at Section 152, Gary, rather than relying on the manual, we should put some language into

the code.

MR. FLAMM: Okay.

MR. YASNY: Last, we have Francis Rubenstein.

MR. SHIRAKH: Francis who?

MR. RUBENSTEIN: Am I unmuted now?

MR. FLAMM: Hello, Francis.

MR. RUBENSTEIN: Great, okay. Hi there. A few comments, by the way, a great meeting. Hearing from the phone, it sounds like there's a lot of good dialogue going on and I'm glad to see things are proceeding ahead. Just a couple quick comments. One of the previous speakers was discussing how dimming ballasts are less efficient than instant start and program start, that's a lot less true today than it was a while ago. Today's modern dimming ballasts at full light output are at only about four percent less efficient than the most efficient instant starts, so there is not that much of a gap between the two of them at this point. The speaker also said that, as you dim fluorescent ballasts, that your efficiency drops. That's true, but it's also true also with pulse modulated LEDs, as well, so you're not out of the woods with LED on that one either. And then, finally, I think one of the biggest points was the issue of – is the fixed level ballast going to be good enough for retrofit, I heard a lot of comments on that, and I

guess it is one where I would say fixed level is probably not enough, or isn't enough in my opinion, even in retrofit, by bi-level might be, and so that might be a conversation we would want to reexamine again as we go forward – with respect to retrofit, only, that the bi-level would be acceptable. One final point to Ernesto Mendoza's point about the efficiency metric that DOE is using. At this point, I'm not convinced that ballast efficiency that is being considered in the NOPR is even applicable to dimming, or to controllable ballasts, and so one would need to figure out whether that is applicable or not, and I think at this point, I guess the jury is not out on that, but I'd be happy to ask Dylan Webber [ph.] about that issue.

MR. SHIRAKH: Thank you, Francis. Good responses.

MR. FLAMM: So, I just want to say that I appreciate everybody's participation, both in person and on the phone. And this is not intended to be the end of it, we value your dialogue, we value your input. So, if you have comments that you were dying to make and didn't get to make them, you can send emails to me. I would like to see some follow-up groups. I've been working with the case teams on whatever issues are identified, so if you are in the audience or on the phone and you

want to dialogue on a particular subject, please let me know so we make sure you get plugged into that, and Cathy has something to say.

MS. CHAPPELL: Cathy Chappell, HMG, I have a follow-on to what you just said, Gary. What is your expected process and timeframe for dialoguing? Will you set up calls?

MR. FLAMM: I was afraid you were going to ask that question. I need to give it some thought because we don't have unended [sic] time, this is going to have to go pretty quick. You know, we're not having anymore lighting workshops –

MR. SHIRAKH: This was the last lighting workshop, I think. There are some unknown issues today that we need to organize the calls as soon as possible, I don't see any reason for waiting.

MS. CHAPPELL: So that IOU case team can work with you –

MR. FLAMM: Right, right, so we need to make sure that anybody that identified issues gets plugged in and we reach a conclusion on whatever those issues are. I'm not prepared to give a drop dead date, maybe by next Friday might be good, but I think we have a little longer than that.

MR. SHIRAKH: Okay, so any other questions on

the phone or in the room? With that, I'm going to close the workshop. Again, I'll probably see some of you next Monday, and we'll do this all over again. Thank you.

[Adjourned at 3:37 P.M.]