Meeting Notes from September 8, 2016 Stakeholder Meeting
Posted October 5, 2016

Meeting Information

Meeting Date:	September 8, 2016
Topics Discussed:	Outdoor Light Sources, Outdoor Lighting Controls, Indoor Light Sources, Indoor Lighting Controls, Lighting Alterations
Meeting Time:	10:00 – 4:30 PM
Meeting Host:	California Statewide Investor Owned Utility Codes and Standards Team

Attendees

First Name	Last Name	Contact	Organization
Utility CASE TEAM			
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Mudit	Saxena		Vistar Energy
Philip	Hall		Enlighted (manufacturer), Philip Hall Images and Light (lighting designer), Certified Lighting Controls Acceptance Test Technician (CLCATT)
Chris	Primous		Maxlite (manufacturer)
Harold	Jepsen		LeGrand/Wattstopper (manufacturer)
George	Nesbitt		HERS & Green Rater, Energy & Passive House Consultant, Home Performance Contractor
Unknown			Capitol Light National (stakeholder - account distributor)
M.	Webb		Representing manufacturers
Unknown			Digital Lumens
Paula	Proteau		Capitol Light
Tanya	Hernandez		Acuity Brands (Manufacturer)
Alex	Benningfield		Benningfield Group
Anna	Brannon		Integral Group
Doug	Avery		Avery Energy

James	Benya		Benya Burnett Consultancy
Chris	Bradt		BKI
Susan	Callahan		LEDVANCE (Manufacturer)
Michael	Jouaneh		Lutron (Manufacturer)
Michael	Mutmansky		TRC
Edgar	Ventura		BKI
Matthew	Hargrove		CBPA
Safdar	Chaudhry		RHA
Wes	Sullens		StopWaste
Alex	Boesenberg		NEMA
Richard	Haring		Philips (Manufacturer)
Becky	Rainer		Eaton (Manufacturer)
Cori	Jackson		CLTC
Konstantinos	Papamichael		CLTC

Meeting Agenda

Time	**Topic**
10:00 – 10:30	Introduction: Overview of 2019 Title 24 Development; Summary of stakeholder outreach purpose and procedure
10:30 – 11:30	Outdoor Light Sources
11:30 – 12:30	Outdoor Controls
12:30 – 1:00	Lunch Break
1:00 – 2:00	Indoor Light Sources
2:00 – 3:00	Indoor Controls
3:00 – 3:15	Break
3:15 – 4:00	Alterations Discussion
4:00 – 4:30	Wrap-up and Next Steps
4:30	Adjourn

Key Takeaways and Action Items

1. Outdoor Light Sources
    a. No major issues raised regarding the general proposal to set LPAs that would require most outdoor lighting to meet LED-level efficacies, though stakeholders

commented that the move to LED needs to be more clearly defined and individual applications may need exceptions or unique requirements.

b. New LPAs should not preclude emerging lighting technologies, particularly those that are designed for health benefits. A range of products should be able to meet the new LPAs including 2700/3000K lights and tunable lights.

    i. This would benefit from a power rating method for tunable CCT products.

c. If the CASE analysis does any of forecasting of LED efficacies to 2020 projections, it should take care to consider luminaire efficacy and performance, glare issues, etc., not only LED chip efficacy forecasts.

d. The CASE Team needs input on typical real-world outdoor LED fixture lifetimes.

2. Outdoor Lighting Controls

    a. No major issues raised regarding proposed measures and analysis methodology.

    b. Stakeholders are aware of products that are rated for large detection distances – over 100 feet.

    c. Stakeholders believe the vast majority of Title 24-regulated outdoor lighting is 40 feet or lower, 30 feet is average.

    d. Noted action items include following-up with and pursuing feedback from:

        i. Law enforcement agencies regarding safety implications of occupancy-based outdoor lighting controls;

        ii. Acceptance testing technicians identify if this measure would impact them; and

        iii. Additional manufacturers regarding sensor coverage and capabilities.

    e. The CASE Team needs input and data on high performance sensors and technology trends, product pricing, controls installations above 24 feet, and feasibility issues.

3. Indoor Light Sources

    a. No major issues raised regarding the general proposal to set LPDs at levels that would require most indoor lighting to meet LED-level efficacies, though certain applications may need exceptions or alternative design options.

    b. The issue with current limiters/LPDs and medium screw base lamps needs to be resolved since retrofits will rely heavily upon LED screw base lamps.

    c. Standby power draw is another issue to consider, but needs to be solved in a way that does not reduce utility and functionality of light sources, lighting controls, and built in controls.

4. Indoor Lighting Controls

    a. No major issues were raised regarding the proposed measures and proposed analysis.

    b. Action items for the Utility CASE Team include:

i. Follow-up with stakeholders regarding supporting data for energy savings from using occupancy sensors in restrooms.

ii. Follow-up with stakeholders regarding the details of the proposal to simplify automatic daylighting Title 24 code language.

iii. Reach out to building owners to get their perspective on automatic daylight dimming plus OFF measure.

iv. Consider adding a measure requiring timer-based controls to be commissioned as manual ON (vs. auto ON) at least for certain space types (e.g., office space, warehouses).

v. Consider including additional PAFs in the 2019 Title 24 code cycle.

5. Lighting Alterations
    a. No specific proposal was discussed; discussion of issues only.
    b. Action item for the Utility CASE Team include:
        i. Follow-up with manufacturers regarding information on new retrofit products that are available now and expected to be available in 2020.

Meeting Notes

These notes summarize the discussion at the Utility-sponsored stakeholder meeting that occurred on September 8, 2016.

Overview of 2019 Title 24 Development

1. Kelly Cunningham, PG&E, presented the overview of the Title 24 process.
2. Presentation available here.

Measure 1: Outdoor Light Sources

1. Nancy Clanton (Clanton & Associates, Utility CASE Team) presented Outdoor Light Sources
2. Presentation available here.

Comments and Feedback

1. Nancy Clanton: We will use Illuminating Engineering Society (IES) guidelines as the basis of Illuminance criteria for our models and proposed Lighting Power Allowance (LPAs). We are watching the IES RP-20 process and waiting to see if it gets updated before the 2019 code cycle. If IES RP-20 is updated based on new research that is underway, the CASE Report will use the revised version for our models for the 2019 LPAs.
2. Konstantinos Papamichael (CLTC): We have evidence that illuminance is an imperfect metric and does not represent how we see. Can we make changes from illuminance to other metrics that are more appropriate for outdoor light sources, to use as the basis of our code development?
    a. Utility CASE Team: Yes, horizontal illuminance does not necessarily represent how we see. We see based on contrast. However, if people want the metric to change then they

need to get involved with IES and other standards organizations. We also need research money to go into this – IES cannot change standards unless there is solid research behind a proposed change.

   b. Mazi Shirakh (CEC): Agreed, this change would need to come from IES, ASHRAE, etc. rather than Title 24.

3. Utility CASE Team: We are looking for feedback on the mapping of the different RPs to different Title 24 outdoor lighting areas, for use in our models.
   a. Michael Mutmansky (TRC): The mapping used to be very complicated, there were conflicting RPs – but they have now been greatly simplified and it is now much more straightforward. One particular conflict is the safety and security document G1-03 – it conflicts with other RPs. When the IES standards go ten years without being updated, they are supposed to be phased out, and G1-03 was not updated in 2013, so it may not be an issue. This is something to look into.
4. Becky Rainer (Eaton): I am okay with the baseline moving to LED, but do you mean today's LEDs or projections of 2020 LED efficacy?
   a. Utility CASE Team: Our plan is for the models to be based on LEDs available today.
   b. Mazi Shirakh (CEC): Legal requirements state the product needs to be available when the standard becomes effective, so projections for what will be available in 2020 can be used.
   c. Utility CASE Team: We could consider using projected efficacies as an option available to use in our analysis. We welcome stakeholder comments on that approach.
   d. Jim Benya (Benya Burnett Consultancy): Lighting optics can change, luminaire light output can change and impact glare, etc. so projections should not be too aggressive because LED chip efficacy projections are not the same as luminaire efficacy increases.
5. Utility CASE Team: A variety of products should meet our new LPAs including warm CCT lights and tunable lights.
   a. Jim Benya (Benya Burnett Consultancy): Efficiency differences between lower and higher color temperature LEDs is rapidly decreasing. There is only about a 3 to 4 percent difference in efficiency between 3000K and 4000K LED light sources. So that should be easy.
   b. Jim Benya (Benya Burnett Consultancy): We need a mechanism for determining how health effects and lighting efficiency standards interact. We need a way to address unique products (for example variable CCT systems; they have additional LED chips, and therefore more total wattage, but they are designed so that all LEDs are never operated at the same time), and make sure energy codes do not prevent innovative technologies from being used.
   c. Utility CASE Team: Title 24 can lead on this issue of tunable LEDs, but we need help from NEMA to figure out how to test and rate color tuning products. Could we potentially leverage an approach like what is done for interlocking lighting controls (already in the code)?
   d. Jim Benya (Benya Burnett Consultancy): The interlocking standard is pretty crude. This is a rating issue – we need a rating for the maximum power that will be used at any given time – this could be a NEMA standard rating.

6. Utility CASE Team: We need help estimating the typical real-world lifetime of LED luminaires. What is end of life? Certain amount of light loss? Driver failure? Fixture replacement? Tenant improvement/space type turnover? What should we use for our light loss factors – L70?
    a. Matthew Hargrove (CBPA): Minimum code is forcing people to buy more expensive, longer lasting equipment, but this is a waste built into the code. In many of my member's buildings, products only last roughly 5 years until a new tenant moves in and replaces equipment. So is a 15 year LCC analysis representative?
    b. Peter Strait (CEC): We include replacement costs in our lifecycle cost analysis. Our guess is that expensive equipment with useful life remaining would not be thrown away but rather sold or re-used. Please provide us additional feedback. We would like to see data or analysis showing equipment is replaced (and thrown away) at a faster rate.
    c. Utility CASE Team: We could also consider constant light output controls – maintaining light levels through simple algorithms, rather than overdesigning, for L70 for example. They could even be programmed to burn out at a certain point when light levels drop too far.
    d. Alex Boesenberg (NEMA): Constant light output is offered from a number of manufacturers. To be clear, it increases energy use over time.
    e. Gabe Taylor (CEC): The increase in energy use is likely justifiable since it is saving energy initially. The calculations would need to include how energy use varies over time.
7. Utility CASE Team: We would be interested in feedback on the assumptions used for the total area of each outdoor lighting area type, and the break out of how much of each type of lighting is in each lighting zone.
    a. Jim Benya (Benya Burnett Consultancy): I think you will find that a larger portion of the state's construction activity is actually in Lighting Zone 2.
    b. Utility CASE Team: The 90 percent value for construction in Lighting Zone 3 came from the PIER project that Nancy Clanton worked on with Lisa Heschong. But if more granularity was used to determine Lighting Zones, then many of the Lighting Zone 3 area would actually be reclassified as Lighting Zone 2. RP-33 is now out, and it is more granular, and we could use it.
    c. Mazi Shirakh (CEC): Be mindful of enforcement issues. More granularity can make this much harder.
8. Randall Higa (SCE): Demand response will cover indoor lighting but not outdoor, however the advancement of the duck curve may mean outdoor lighting will be covered in the very near future.
9. Utility CASE Team: We will be holding additional meetings for specific topics. Please reach out to us by email or phone to get involved.

Measure 2: Outdoor Lighting Controls

1. Mike McGaraghan (Energy Solutions, Utility CASE Team) presented Outdoor Lighting Controls
2. Presentation available here.

Comments and Feedback

1. Question on outdoor lighting jurisdiction
    a. Mazi Shirakh (CEC): We have jurisdiction to cover all outdoor lighting – since 2001, SB5X gave us authority, but we need to work with CALTrans, etc. for certain applications. Streets and roadways are currently not covered but they could be.
2. Jim Benya (Benya Burnett Consultancy): You may want to look at the wattage thresholds (currently fixtures below certain wattages are exempt). It may make sense to lower some of the thresholds to cover more fixtures, if it pencils out.
    a. Utility CASE Team: Agreed, we will look into that.
3. Discussion regarding current state of the market and controls on luminaires above 24 feet
    a. Jim Benya (Benya Burnett Consultancy): There are products, but my understanding is that performance is not always great.
    b. Harold Jepsen (Wattstopper): We have sensors that we will specify up to 40 feet above the ground. We publish what the coverage is at various mounting heights.
    c. Utility CASE Team: Many products are marketed as having 1:1 ratio of radius to mounting height. Typically, the coverage needed based on typical pole spacing is closer to a 2:1 or more (3:1, even 4:1). The question is whether a 1:1 ratio presents a coverage problem or not. We want to hear feedback from industry on this.
    d. Stakeholder: A lot of products can provide longer distance coverage, but they include multiple components (a system and not a product). The cost-effectiveness calculations would need to account for this.
    e. Konstantinos Papamichael (CLTC): There are a lot of products, even PIR, that have very large detection distance – directional over 100 feet – if they are mounted at a height half way up the pole. Would that comply with the code?
    f. Utility CASE Team: Yes, that is an allowed way to meet the code – they do not have to be mounted at the top of the pole.
4. Discussion on savings
    a. Michael Mutmansky (TRC): It is important to note that the larger your detection area, the more likely someone will enter the area and trigger the lights, which means there will be potentially less energy savings – increased pole heights mean increased frequency of detection.
    b. Tanya Hernandez (Acuity Brands): I agree with Michael regarding setting performance standards that save energy, not performance standards for the sensor itself. The control strategy seems like it is design based not product performance based, meaning you can achieve the saving you are looking for with a properly designed system. Not sure why the discussion is focused on the sensor.
    c. NEMA: We would like to see more detail from the studies that were cited, in terms of the specifics of the measurements, the exact savings that were calculated, etc. Ideally we would have a big pool of data.
5. Discussion about the distribution of pole heights in outdoor lighting
    a. Becky Rainer (Eaton): Generally, 30 foot poles exist for typical parking lots – we consider that about average, and we see 40 feet for large retail.
    b. Stakeholder: Typically, parking rows are spaced about 60 feet apart. So if you put poles in every other row, they are 120 feet apart, so you need 35 – 40-foot-tall poles. If you

put poles every three rows, that is 180 feet apart, you may need 50-foot-tall poles, but these days with LED, you could maybe get away with 40 feet.

   c. Stakeholders: General agreement that a 40-foot threshold would cover the vast majority of outdoor lighting covered by Title 24.

6. Mazi Shirakh (CEC): We recommend reaching out to local law enforcement to see if bi-level lighting & sensors actually increase safety/security. Davis Police have been supportive.
7. Michael Jouaneh (Lutron): This proposal should be as technologically neutral as possible – it should only require what is supposed to happen with the lights and not what technology needs to be used.
8. Stakeholder: In your demonstration projects you should ask occupants about compliance issues to be able to provide better education, awareness, etc.
9. Jim Benya (Benya Burnett Consultancy): The only people who know the actual costs of projects are the owners/operators and possibly the electricians, so be careful using raw fixture/sensor costs.
10. Chris Kuch (SCE): SCE might have a good customer pool to reach out to for the tall light poles projects. PG&E might have something similar.
    a. Utility CASE Team: We will follow up with SCE to discuss sites which have received a rebate for installing occupancy sensors on tall outdoor polls.
    b. Kelly Cunningham (PG&E): We can also incorporate surveys on security, user satisfaction, etc. when we reach out to customers.
11. Discussion on the definition of “area”
    a. Michael Jouaneh (Lutron): The code says that light must dim when there is no activity detected in “the area” – what does that mean?
    b. Utility CASE Team: We will look into this. We think this is determined by the lighting designer, but there are a couple ways this could be interpreted.
12. Discussion on Compliance Improvement and Impacts Stakeholders
    a. Chris Bradt (BKi): Third party verification and/or acceptance testing providers should be looped in – and any costs incurred should show up in the Life Cycle Cost (LCC) calculations.
    b. Utility CASE Team: Agreed from the perspective of other measures, though this measure does not intend to introduce acceptance testing requirements.
    c. Kelly Cunningham (PG&E): Acceptance Testing Technicians should be added as stakeholders, we should reach out to them to see how controls measures generally, not just outdoor, but all lighting, will impact their work. We will make a note to do that. Inspecting authorities have noted compliance forms are too complicated and should also be added as stakeholders. Also enforcement staff.
    d. Jim Benya (Benya Burnett Consultancy): Distributors, and electrical distributors especially. The DIY crowd is an important group – in NR the majority of projects are small projects. And the inspecting authorities – they all say they cannot follow the forms because they are too hard to follow. So they really need to be a bigger part of the process.
    e. Kelly Cunningham (PG&E): So we need to distinguish between things that the advocacy team can address, and things that are more geared toward training opportunities that

we need to identify and plan on to implement with stakeholders before the effective date of the standards.

Measure 3: Indoor Light Sources

1. Bernie Bauer (Integrated Lighting Concepts, Statewide CASE Team), Michael McGaraghan and Chris Uraine (Energy Solutions, Statewide CASE Team) presented Indoor Lighting Sources
2. Presentation available here.

Comments and Feedback

1. Discussion on feasibility
    a. Most stakeholders seemed to agree that LEDs are ready for use in most nonresidential space types.
    b. Jim Benya (Benya Burnett Consultancy): There are a few areas that are not cost-effective for solid state lighting such as fade to black for theaters, performance, etc. These should be identified so exceptions can be made for them.
    c. Utility CASE Team: Please reach out so we can discuss and identify these areas.
2. Jim Benya (Benya Burnett Consultancy): DOE's projections on LED efficacy increases are not always the most accurate. LEDs also have more glare and potentially decrease light quality with increased lumen output.
3. Doug Avery (Avery Energy): New construction will want to use dedicated LEDs, but retrofits will use medium screw base LEDs. Current limiter/LPD allowance for screw base needs to be solved.
4. Jim Benya (Benya Burnett Consultancy): CEC should suggest to the Department of Labor that they change their basis for OSHA requirements (illuminance metrics – footcandles). The illuminance level between darkness and biological lighting is over 100 footcandles. By 2019 there might be protocols to balance building systems against the biological benefits of health-based lighting. The intersection between light, health, and wellness can change everything.
5. Michael Mutmansky (TRC): Direct/indirect LEDs still have issues where other products may perform better. Be sure to examine all technologies.
    a. Utility CASE Team: Our analysis will be data driven and will show us what is cost-effective.
6. Discussion on standby power
    a. Alex Boesenburg (NEMA): Choosing one product with the lowest standby power draw and making it the standard all other products must meet, can result in a sacrifice of functionality, utility, etc. I will take this as an action item to start this discussion to better understand the features and associated with power draw.
    b. Gabe Taylor (CEC): This is a serious, long-term issue in California. Are we going to have power draw from all these fixtures in 2019?
    c. Stakeholder: Low standby power limits (such as 0.2W) can potentially eliminate sensors/other functions and only allow "on/off."
    d. Jim Benya (Benya Burnett Consultancy): Controls are imbedded in fixtures now – this needs to be accounted for when solving standby power draw issues.

e. Gabe Taylor (CEC): A PAF type approach might be a way to solve standby power draw issue without introducing additional burden on consumers and manufacturers. But we are targeting improvements in efficiency, not in limiting utility. If there are products that can do all the same things with less standby power, that is what we want to identify.

7. Discussion on stakeholder groups to consult to improve compliance
    a. Chris Bradt (BKi): Recommend reaching out to code officials, distributors, stakeholders in the sales channel, stakeholders in the design channel, and stakeholders in the code channel, third-party plan check firms may be good to interview.
    b. Jim Benya (Benya Burnett Consultancy): For every handful of large projects that adhere to the code, there are dozens of small projects that may not comply. It is essential to focus on the small projects by making the code easy to understand.

Measure 4: Indoor Lighting Controls

1. Stefaniya Becking (Energy Solutions, Utility CASE Team) presented Indoor Lighting Controls
2. Presentation available here.

Comments and Feedback:

1. Discussion on mandatory automatic daylight dimming plus OFF control
    a. Konstantinos Papamichael (CLTC): Noted that some customers do not like automatic daylighting dimming to OFF and that lowering the minimum level rather than requiring the OFF step should be considered.
    b. Utility CASE Team: We will consider the downside of flicker at lower lighting levels (e.g., 5%).
    c. Jon McHugh (McHugh Energy): These measures have been required in ASHRAE 90.1 since 2013. New lighting controls often cause confusion initially, and then people get used to them.
    d. CEC: Discussed the need to have an option for building owners to modify the OFF step after commissioning of the lighting control system. CEC and CASE Team agreed that as long as the requirement was commissioned at inspection, it would be acceptable if building owners modify this control strategy later.
    e. Mudit Saxena (Vistar Energy): Highlighted that ASHRAE 90.1 removed 150% design illuminance trigger for automatic daylighting when the requirement for OFF step was introduced to provide flexibility to end users.
    f. Mudit Saxena (Vistar Energy): Noted that LBNL study “A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings” findings on energy savings are very conservative. Further, noted that savings from OFF step in automatic daylighting are very significant, per analysis conducted by PNNL for ASHRAE 90.1.
    g. Konstantinos Papamichael (CLTC): Stressed the need to simplify the code language for automatic daylighting requirements (outside of the proposed measures). The Utility CASE Team will follow-up with CLTC on this issue.

   h. Utility CASE Team: Noted the need to reach out to building owners to get their perspective on automatic daylight dimming plus OFF measure. The Utility CASE Team is planning to reach out to building owners.

2. Discussion on mandatory occupancy-based full OFF controls in nonresidential restrooms
   a. Multiple stakeholders (utility, energy consultant): Various stakeholders pointed to data sources that could be used to support this measure.
   b. Mudit Saxena (Vistar Energy): Noted that CLTC data will be more accurate than DEER database for restrooms.
   c. Utility CASE Team: Noted that University of California has implemented occupancy sensors in restrooms and have data that support greater than 24% in energy savings. Asked manufacturers of lighting controls to provide any available case studies relevant to the measure.
3. Discussion on smart lighting systems
   a. Doug Avery (Avery Energy): Noted that since smart lighting systems could help to implement multiple energy saving strategies, the efforts should focus on PAF measure for smart lighting systems. Discussed the need for setting minimum performance standards for smart lighting systems.
   b. Michael Mutmansky (TRC): On the topic of standby power for smart lighting systems, noted that any provisions on standby power will likely fit better in Title 20 rather than Title 24.
   c. Utility CASE Team: Noted a potential cross-over to Title 24, Section 130.5 Power Systems.
4. Discussion on occupancy-based full OFF controls in dressing rooms
   a. Bernie Bauer (Integrated Lighting Concepts): Noted that retailers do not like occupancy-based full OFF controls in dressing rooms. Emphasized that while ASHRAE 90.1 has this requirement, ASHRAE 90.1 Committee did not gather feedback from retail industry on the use of occupancy sensors in dressing rooms. Noted that if this measure moves forward, then C&S Team should collect feedback from retail industry.
5. Discussion on measures targeted for 2022 Title 24 code cycle
   a. Michael Jouaneh (Lutron): Asked why mandatory controls in dressing rooms and open plan offices were targeted for 2022 Title 24 code cycle rather than being considered for 2019 Title 24 code cycle. CASE Team noted that alternate CEC priorities and limited bandwidth are a factor.
6. Discussion on timer-based control and manual vs. auto ON
   a. Multiple stakeholders (manufacturer of lighting controls; energy consultant): Urged CASE Team to consider adding a measure requiring timer-based controls to be commissioned as manual ON (verses automatic ON) at least for certain space types (e.g., office space, warehouses). CASE Team will consider.

Measure 5: Lighting Alterations

1. Stefaniya Becking (Energy Solutions, Statewide CASE Team) presented Lighting Alterations
2. Presentation available here.

Comments and Feedback

1. Mudit Saxena (Vistar Energy): Suggested that the basis for triggering alteration code should be updated from being based on the number of replaced luminaires to replaced wattage (i.e., 70+ luminaire trigger for component modification code requirements; 10+ luminaire trigger for auto daylighting requirements for wiring alterations).
    a. CEC expressed general support to consider suggested update.
2. Stakeholder (manufacturer): Asked whether utilities able to provide incentives for lighting controls for retrofit projects opting for 50%/35% power reduction compliance pathway. Will lighting controls be considered "above code" requirements in this scenario for the purposes of incentives?
    a. Utility CASE Team noted that utilities are in the process of clarifying the policy on their ability to provide incentives for lighting controls when 50%/35% power reduction compliance pathway is used.
3. Chris Bradt (BKi): Asked what type of supporting information for the proposed measures is being requested from stakeholders.
    a. Utility CASE Team noted that both anecdotal information and "hard" data are important sources of information. Anecdotal information could indicate the need for a certain requirement, while "hard" data is needed for cost-effectiveness analysis.