CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

Notes from 2019 Title 24 Part 6 Code Development Cycle Utility-Sponsored Stakeholder Meeting for Nonresidential Lighting Topics (2 of 2)

Posted July 12, 2017

Meeting Information

Meeting Date: March 30, 2017

Meeting Time: 9:00am – 12:00pm

Meeting Host: California Statewide Utility Codes and Standards Team

Attendees

First Name	Last Name	Contact	Organization
Statewide Utility Codes and Standards Team			
Utility Staff			
John	Barbour	JBarbour@semprautilities.com	San Diego Gas & Electric
Kelly	Cunningham	KACV@pge.com	Pacific Gas & Electric
Randall	Higa	Randall.Higa@sce.com	Southern California Edison
Jim	Kemper	James.Kemper@ladwp.com	Los Angeles Department of Water & Power
Chris	Kuch	christopher.kuch@sce.com	Southern California Edison
Al	Mendoza	Alvaro.Mendoza@sce.com	Southern California Edison
Dave	Roland	David.Roland@smud.org	Sacramento Municipal Utility District
Will	Vincent	William.Vicent@sce.com	Southern California Edison
Codes and Standards Enhancement (CASE) Team Members			
Heidi	Hauenstein	hhauenstein@energy-solution.com	Energy Solutions
Michael	McGaraghan	mmcgaraghan@energy-solution.com	Energy Solutions
Jon	McHugh	jon@mchughenergy.com	McHugh Energy
Axel	Pearson	apearson@energy-solution.com	Energy Solutions
Chris	Uraine	curaine@energy-solution.com	Energy Solutions
Nancy	Clanton	nancy@clantonassociates.com	Clanton Associates
Annie	Kuczkowski	annie@clantonassociates.com	Clanton Associates
Mudit	Saxena	msaxena@vistar-energy.com	Vistar Energy
Eric	Shadd	eric@determinant-ll.com	Determinant
California Energy Commission Participants			
Simon	Lee	Simon.Lee@energy.ca.gov	California Energy Commission
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Joe	Loyer	joe.loyer@energy.ca.gov	California Energy Commission
Javier	Perez	jperez@energy.ca.gov	California Energy Commission
Other Participants			
Cheryl	English		Acuity Brands

Tom	Culp		Birch Point Consulting
Cori	Jackson		CLTC, UC Davis
Kyle	Landis		Disneyland Resort
Greg	Copley		Ecology Action
Juvenal	Martinez		EnerCal Solutions
George	Nesbitt		Environmental Design / Build
Gary	Flamm		G.R.Flamm, Consultant
Harold	Jepsen		Legrand / Wattstopper
Glenn	Savage		LG
Michael	Jouaneh		Lutron
Jim	Edelson		NBI
Alex	Boesenberg		NEMA
Michael	Scalzo		NLCAA -CETI
John	Arent		NORESCO
Kyra	Weinkle		NORESCO
ichard	Haring		Philips Lighting
Kelly	Seeger		Philips Lighting
Rick	Miller		RNM Engineering, Inc.
Howard	Holko		Solatube International
Maria	Morrison		Solatube International
Neall	Digert		Solatube International, Inc.
Mark	Stackle		Solatube International, Inc.
Hanna	Scott		Sun West Distributors, Inc.
Laura	Carpenter		TERRALUX
Michael	Mutmansky		TRC Energy Services
Greg	Bennorth		Universal Lighting Technologies
Paul	Schaller		Universal Lighting Technologies

Meeting Agenda

Time	Topic	Presenter
9:00 – 9:15	Introduction	Chris Kuch (SCE)
9:15 – 10:10	Advanced Daylighting Design	Eric Shadd (Determinant LLC) Mudit Saxena (Vistar Energy)
10:10 – 11:05	Outdoor Lighting Controls	Axel Pearson (Energy Solutions)
11:05 – 11:55	Outdoor Lighting Sources	Nancy Clanton, Clanton & Associates Annie Kuczkowski, Clanton & Associates Mike McGaraghan, Energy Solutions Chris Uraine, Energy Solutions
11:55 – 12:00	Review and wrap-up, next steps	Chris Kuch (SCE)

Key Takeaways and Action Items

1. **Advanced Daylighting Design**
    a. Key takeaway: Power adjustment factors (PAFs) need to be simplified.
    b. Key takeaway: Consider adding PAFs for automated shades and/or dynamic glazing.
    c. Key takeaway: Add a definition for "clerestory" to proposed language.
    d. Key takeaway: Consider annualized metrics for all fenestration products.
2. **Outdoor Lighting Controls**
    a. Key takeaway: Consider removing maximum dimming threshold.
    b. Key takeaway: Astronomical timeclocks are more reliable than photocells.
    c. Key takeaway: Clarify vacancy in lots.
    d. Action item: Send questions out about share of sales after this event, so stakeholders can respond appropriately.
3. **Outdoor Lighting Sources**
    a. Key takeaway: 3000 Kelvin (K) is a good base, but consider lower correlated color temperature (CCT) or possible exceptions for certain areas (such as observatories).
    b. Key takeaway: Reconsider lighting schedules used for calculations.

Meeting Notes

Introduction

- Chris Kuch (Southern California Edison) presented.

Comments and Feedback

1. No comments or questions.

Advanced Daylighting Design

- Eric Shadd (Determinant LLC) and Mudit Saxena (Vistar Energy) presented.
- Presentation available here.

Comments and Feedback

1. Discussion on Energy Savings Methodology
    a. Jon McHugh (McHugh Energy, Utility CASE Team): Does energy savings includes HVAC interaction effects?
        i. Eric Shadd (Determinant LLC, Utility CASE Team): HVAC is not included.
        ii. Michael Mutmansky (TRC Energy Services): Should this be done on whole building results? I am concerned that HVAC interactive effects will confound these energy savings calculations.
2. Discussion on PAF Proposals
    a. Michael Jouaneh (Lutron): Please consider adding PAFs for automated shades and/or dynamic glazing to the proposal. The use of these two technologies should be incentivized more than the proposed PAFs, because they are used less often, save energy, and help maximum effectiveness of the automatic daylight controls. For example,

occupants tend to close manual blinds and leave all them shut even when glare is gone, thereby negating daylight control savings.

b. Gary Flamm (G.R.Flamm): Please clarify tertiary zones.
    i. Eric Shadd (Determinant LLC, Utility CASE Team): The primary zone is one head height from vertical fenestration, the secondary is two head heights, and tertiary zone is three head heights.
c. Michael Jouaneh (Lutron): Will there be a PAF for tertiary daylight zone lighting controls?
    i. Eric Shadd (Determinant LLC, Utility CASE Team): Yes.
    ii. Gary Flamm (G.R.Flamm): What about interaction with skylight zone?
    iii. Eric Shadd (Determinant LLC, Utility CASE Team): The current requirement that skylit daylit zones supersede any sidelit daylit zones will remain.
d. Jon McHugh (McHugh Energy, Utility CASE Team): Does each control go to OFF?
    i. Eric Shadd (Determinant LLC, Utility CASE Team): No, they dim down to minimum 20 percent. We will look at OFF in the future.
        1. Jon McHugh (McHugh Energy, Utility CASE Team): Consider bi-level to OFF.
e. Michael Mutmansky (TRC Energy Services): There is a possible problem with misapplication of technologies. The zones and conditions that can result in a loss of energy savings should be considered for a PAF very cautiously. You should consider a PAF for only those conditions where the measures calculate certain savings, like the clerestories seem to show.
    i. Jon McHugh (McHugh Energy, Utility CASE Team): Often PAFs are less than the actual savings, since the added flexibility of PAF shares the savings between the state and the building owner. In addition, PAFs are conservative to account for controls failing before the expected life of the lighting systems.
f. Michael Jouaneh (Lutron): My initial impression is that these PAF seem too complicated, so that they will not likely get used. Please simplify them like other PAFs.
    i. Michael Mutmansky (TRC Energy Services): Agreed, the table is very complex.
    ii. Kelly Seeger (Philips Lighting): Agreed, but I am also wondering about actual usage as well.

3. Discussion on Skylit Daylit Zone
    a. Michael Mutmansky (TRC Energy Services): Does this exception eliminate the requirement for the skylight, or just the controls?
        i. Mudit Saxena (Vistar Energy, Utility CASE Team): We inserted the exception under skylit daylit zone under shading that says you won't have any daylight, so it is eliminating controls. However, it can also be thought of as eliminating requirements for skylight under prescriptive requirements in Section 140.3 (c).
4. Discussion on Clerestory Definition
    a. Javier Perez (CEC): Please add a definition for "clerestory" to the proposed language.
    b. Gary Flamm (G.R.Flamm): Will the new definition prohibit using any clerestory windows for complying with the mandatory daylight in Section 140.3(c)?
    c. Mudit Saxena (Vistar Energy, Utility CASE Team): No, clerestories can be used to create a primary zone under Section 140.3(c).
5. Discussion on 1,500-Hour Exception

a. Jon McHugh (McHugh Energy, Utility CASE Team): The 1,500-hour exception should perhaps apply to Section 140.3(c), which requires skylights in large open areas under a roof with 15-foot ceiling heights. The 1,500-hour exception already exists in Section 140.3(c). This proposal harmonizes with a similar exception in this as well as the ASHRAE 90.1 standard.
    i. Michael Mutmansky (TRC Energy Services): Good. Has any analysis been done to verify that a lighting control system in this 1500-hour exception proves to be not cost-effective or was this just an alignment measure without analysis?
    ii. Jon McHugh (McHugh Energy, Utility CASE Team): 1,500 hours is over 50 percent of the hours between 8 am to 4 pm.

6. Discussion on Elevation Requirement
    a. Michael Scalzo (NLCAA-CETI): Is there an elevation requirement for the shading?
    b. Mudit Saxena (Vistar Energy, Utility CASE Team): The CASE Team will be looking into overhang requirements the impact of the distance between the window head height and the overhang in elevation view.
7. Discussion on VT Annual Rating
    a. Neall Digert (Solatube International): The NFRC-203 VTannual Product Performance Rating is a valuable innovation for the fenestration, design, building modeling, and Energy/Design Code communities. The technical analysis comparing the PIER-documented VT performance of Traditional Skylights and the application of the NFRC-203 VTannual Ratings of tubular daylighting devices (TDDs) makes perfect sense. Thank you for providing a thoughtful and effective application of the VTannual Product Performance Rating to Title 24, Part 6.
        i. Hanna Scott (Sun West Distributors): The NFRC-203 VTannual Rating for TDDs seems like a great solution. Annualized metrics should be considered for all fenestration products.

Outdoor Lighting Controls

- Axel Pearson (Energy Solutions, Utility CASE Team) presented.
- Presentation available here.

Comments and Feedback

1. Discussion of Simplification
    a. Cori Jackson (CLTC): For simplification, consider removing maximum dimming threshold; perhaps leave it to the designers. This would also eliminate the need for the acceptance tester to verify the 90 percent threshold.
2. Discussion on General/Definitions
    a. Michael Jouaneh (Lutron): What is considered vacant - no people or cars?
        i. Axel Pearson (Energy Solutions, Utility CASE Team): Anything that can trip an occupancy sensor. That could be people or cars.
        ii. Michael McGaraghan (Energy Solutions, Utility CASE Team): Please note: "motion sensors or other lighting control system that controls lighting in response to space being vacant."
        iii. Michael Jouaneh (Lutron): If cars are parked in a lot with no people, the lighting controls should consider that occupied? Many technologies that work indoors

effectively don't work well outdoors. Seems easy to bypass this requirement by simply putting in higher lighting (poles higher than 24 feet).

iv. Jon McHugh (McHugh Energy, Utility CASE Team): This is motion controlled for all lighting 24 feet or less, so parked cars wouldn't be considered occupied. Taller poles (taller than 24 feet) would be more expensive and have different zoning requirements.

v. Michael Jouaneh (Lutron): Please clarify what "vacated of occupants" means. Are cars considered occupants? Occupants are usually just people in the standard today.

vi. Jon McHugh (McHugh Energy, Utility CASE Team): If you have some specific language for a sensor that detects the presence of people and moving cars, please let us know.

vii. Michael Jouaneh (Lutron): Can there be an alternative compliance to outdoor sensors, such as verified acceptance testing tri-level astronomical timeclock for when areas are typically occupied and for after-hours? Please define "the area" to be controlled or occupied. It's not clear on what the area is.

viii. Michael McGaraghan (Energy Solutions, Utility CASE Team): Good points. We can do some more thinking and would like to discuss further with you.

b. Harold Jepsen (LeGrand/Wattstopper): The draft language sent, included an update to 130.1(c). Will that be addressed or is this now removed?

3. Discussion on Occupancy Sensor Safety Concerns
   a. Glenn Savage (LG): If the occupancy sensor is not tuned to sense people, there may be a security issue in vacant parts of the parking area.
   b. Daniel Wong (CEC): Are there any considerations for lighting levels for after-hours operation and safety/security?
4. Discussion on Occupancy Sensors - General
   a. Michael Scalzo (NLCAA-CETI): Are there lighting controls capable of controlling the lighting for Option #2?
      i. Axel Pearson (Energy Solutions, Utility CASE Team): Yes. We've identified a couple capable controls and would like to hear about more.
   b. Michael Mutmansky (TRC Energy Services): Can a $50 sensor cover the additional pre-post curfew adequately?
      i. Michael McGaraghan (Energy Solutions, Utility CASE Team): The calculated incremental cost is just for adding motion control to pole mounted fixtures.
   c. Michael Mutmansky (TRC Energy Services): 40 percent minimum dimming level was set to accommodate HID sources. Is that no longer needed?
      i. Michael McGaraghan (Energy Solutions, Utility CASE Team): The outdoor LPA presentation will explain the move to an all LED baseline.
      ii. Michael Mutmansky (TRC Energy Services): Switching to LED baseline does not mean making a technology non-viable, which I think 50 percent minimum dimming value does.
      iii. Michael McGaraghan (Energy Solutions, Utility CASE Team): If you believe the code needs to continue to accommodate HID, we'd be interested to hear rationale.
5. Discussion on Occupancy Sensors - Reliability

a. Jon McHugh (McHugh Energy, Utility CASE Team): One of the reasons we are removing astronomical time clock isn't simplification, but it's about reliability of savings. People who maintain these systems report that they have to reset the timeclocks often so they work as intended. A question for stakeholders: Is this still an ongoing issue? Are photo sensors more reliable than timeclocks.
    i. Glenn Savage (LG): Photocells can also be damaged or become dirty.
    ii. Michael Jouaneh (Lutron): I'm not supportive of removing astronomical time switch in exchange for photo sensor; we should try to not limit compliant technologies. I have not seen astronomical timeclocks as an issue.
    iii. Michael Mutmansky (TRC Energy Services): I think this may be a mistake. I suspect (but do not know explicitly) that an astronomical timeclock will be much more reliable than a photocell. Photocells have life to them, but they fail ON.
    iv. Michael Scalzo (NLCAA-CETI): Photocells default to on; lights remain on until the photocell is replaced, which at times takes a month with the lighting remaining on until the repair.
    v. Harold Jepsen (LeGrand/Wattstopper): Photocells are usually less reliable than astronomical clocks as they have a limited life due to decline from sun exposure, but they both have their weaknesses. Clocks cannot be set correctly.
    vi. Greg Copley (Ecology Action): Astronomic time clocks work well, and can be more cost effective than photocells in some cases. Customer's and contractors need this flexibility.

b. Gary Flamm (G.R.Flamm): If allowing only photo control and motion sensor, how does one differentiate between normally scheduled hours and after hours?
    i. Michael Michael Mutmansky (TRC Energy Services): How about requiring an auto-calibration astronomical timeclock?
    ii. Glenn Savage (LG): Auto-calibration astronomical timeclocks can be updated live using NNTP, this would resolve time sync issues.
    iii. Michael Jouaneh (Lutron): What about 24/7 operating areas? There is no after-hours. Are they exempt? Hospital parking or hotel parking lots come to mind.
    iv. Axel Pearson (Energy Solutions, Utility CASE Team): We are asking for feedback on how to address this.

c. Michael Jouaneh (Lutron): How many manufacturers are making reliable tri-level sensing for outdoors? Seems like a very unique solution.
    i. Michael McGaraghan (Energy Solutions, Utility CASE Team): We are looking for more info on tri-level controls since we've only found a few.

6. Discussion on Scope
    a. Jon McHugh (McHugh Energy, Utility CASE Team): If you have some specification language for a sensor that detects the presence of people and moving cars we'd like to hear about it.
    b. Michael Jouaneh (Lutron): Can there also be an alternative compliance to outdoor sensors, such as verified via acceptance testing tri-level astronomical timeclock for when areas are typically occupied, and for after-hours?
7. Discussion on Calculations Methodology
    a. Rick Miller (RNM Engineering): The analysis assumes the sensors have a 15-year life. This is probably not reasonable due to the outdoor environment.

i. Jon McHugh (McHugh Energy, Utility CASE Team): What is your experience with longevity of outdoor motion sensors?
ii. Michael McGaraghan (Energy Solutions, Utility CASE Team): If you have data or input on our assumptions, please reach out to us.

b. Cheryl English (Acuity): It would be helpful if you could send questions about share of sales after this event so that we can respond appropriately.
i. Michael McGaraghan (Energy Solutions, Utility CASE Team): We can do that.

Outdoor Lighting Sources

- Nancy Clanton (Clanton & Associates, Utility CASE Team) presented.
- Presentation available here.

Comments and Feedback

1. General Discussion:
   a. Michael Jouaneh (Lutron): All LED baseline makes sense to me.
      i. Kelly Seeger (Philips Lighting): Agreed.
      ii. Michael Mutmansky (TRC Energy Services): Agreed.
      iii. Cheryl English (Acuity): Agreed.
      iv. Greg Bennorth (Universal Lighting Technologies): Agree with the 3000K baseline.
   b. Michael Mutmansky (TRC Energy Services): Dark sky zones, for areas such as observatories, need to be accommodated. Consider a 3500K option.
      i. Nancy Clanton (Clanton & Associates, Utility CASE Team): 3500K is not a common color temperature offering. It is usually 3000k or 4000k.
2. Discussion on LPA & Lower Correlated Color Temperature (CCT)
   a. Annie Kuczkowski (Clanton & Associates, Utility CASE Team): The proposal is about ensuring that warmer CCTs can meet the LPAs. We were conservative with our estimates. So, I'm confident that the 2020 LPAs allow 2700K luminaires.
      i. Michael Mutmansky (TRC Energy Services): I suggest you consider setting an LPA based on a 3000K minimum, and then provide an allowance multiplier for lower.
         1. Cheryl English (Acuity): I think this would be good to allow for unique applications that might need a lower CCT. The trick is to allow a LPA adjustment that doesn't allow people to use lower color temp to get a power allowance.
         2. Michael Mutmansky (TRC Energy Services): People aren't going to game the color temperature allowance, because the extra cost would not outweigh the perceived benefit they might achieve.
         3. Nancy Clanton (Clanton & Associates, Utility CASE Team): Agreed. The only exception is if somebody wanted to use something under 3000K for general lighting, but I don't think that happens often for outdoor lighting.
      ii. Michael McGaraghan (Energy Solutions, Utility CASE Team): One thing to clarify is that we believe warmer CCTs will be able to meet the proposed LPAs by 2020. We just used current (and not necessarily best in class) 3000K

luminaires in our models. We would also like clarification on white light vs. amber light – please provide us information on amber light applications. Are amber lights meeting IES requirements? Does amber light necessarily need more power?

1. Nancy Clanton (Clanton & Associates, Utility CASE Team): Amber might only be allowed in lower lighting zones like LZ0 or LZ1. So perhaps we only allow amber light in these zones?
2. Michael Mutmansky (TRC Energy Services): Observatory zones are quite large and can include LZ2 or even LZ3. Don't prevent people from using amber light based on their lighting zone. They should be permitted to use amber lighting if they want to use it for some ecological purpose.
3. Cheryl English (Acuity): Façade lighting might use lower than 3000K (or saturated colors). Also, areas in parks might require amber light for dark sky preserves.
4. Gary Flamm (G.R. Flamm): Wildlife may prefer warmer light; or may be harmed by cooler lamps.
5. Michael Mutmansky (TRC Energy Services): As far as I know, 2700K is the lowest of the "white" light ones that are commonly available, and then you get into the narrow band ones, etc. Those are a whole different issue. However, they may start making lower CCT in "white" as the technology advances. It's pretty rare to see anything below 3500K at the moment. I would guess 4000K is far and away the most common right now.
6. Cheryl English (Acuity): That is my understanding but we are seeing some shift to 3,000K due to AMA report.

3. Discussion on Calculations
    a. Annie Kuczkowski (Clanton & Associates, Utility CASE Team): We assume that the cleaning will not change based on light source for maintenance costs.
    b. George Nesbitt (Environmental Design/Build): The process for calculating outdoor allowable wattage seems overcomplicated and beyond some energy consultants. I think in many cases, the budget is just made up, and incentives add more fixtures. Would it be easier to use gross outdoor areas instead, with different budgets for different hard/softscapes? And let the designer decide where and what to light?
        i. Jon McHugh (McHugh Energy, Utility CASE Team): Is your issue with calculating of illuminated hardscape?
            1. George Nesbitt (Environmental Design/Build): Yes.
4. General Proposal Questions/Comments
    a. Jon McHugh (McHugh Energy, Utility CASE Team): The main issue with the second outdoor lighting proposal is an estimate of how frequently are people turning off lights according to a schedule, and whether lights be controlled for more hours if the lighting controls turned lights on during after-hours periods if managers want to limit liability at night.