DOCKETED

Docket Number:	17-BSTD-01
Project Title:	2019 Building Energy Efficiency Standards PreRulemaking
TN #:	220512
Document Title:	Philips Lighting Comments on draft CASE Report NR Outdoor Light Sources
Description:	N/A
Filer:	System
Organization:	Philips
Submitter Role:	Public
Submission Date:	8/2/2017 12:20:43 PM
Docketed Date:	8/2/2017

Comment Received From: Kelly Seeger
Submitted On: 8/2/2017
Docket Number: 17-BSTD-01

Philips Lighting Comments on draft CASE Report NR Outdoor Light Sources

Additional submitted attachment is included below.

PHILIPS

August 2, 2017

Submitted via website: https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=17-BSTD-01

Mr. Andrew McAllister
Commissioner
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

Docket No.: 17-BSTD-01

Philips Lighting Comments on the Draft CASE Report (June 2017) NR Outdoor Light Sources for the 2019 California Building Energy Efficiency Standards, California Code of Regulations, Title 24, Part 6

Dear Commissioner McAllister,

Philips Lighting appreciates the opportunity to provide the attached comments on the Draft CASE Reports of June 2017 for the Nonresidential Lighting provisions of the 2019 California Building Energy Efficiency Standards California Code of Regulations, Title 24, Part 6. We also send our thanks to the California Energy Commission and recognize the CEC's efforts as well as that of the CA IOUs and consultants to involve industry in the development of the CASE Reports.

Philips Lighting is a global leader in lighting products, systems and services. Our understanding of how lighting positively affects people coupled with our deep technological know-how enable us to deliver digital lighting innovations that unlock new business value, deliver rich user experiences and help to improve lives. Serving professional and consumer markets, we sell more energy efficient LED lighting than any other company. We lead the industry in connected lighting systems and services, leveraging the Internet of Things to take light beyond illumination and transform homes, buildings and urban spaces.

Please contact me if you have any questions about these comments.

Sincerely,

Kelly M. Seeger, LC, IES, LEED AP
Technical Policy Manager, Building Codes & Standards
Standards and Regulations - Americas
Philips Lighting
Tel: +1 (781) 825-3312
email: kelly.seeger@philips.com

PHILIPS

Philips Lighting Comments on the Draft CASE Report (June 2017) NR Outdoor Light Sources for the 2019 California Building Energy Efficiency Standards, California Code of Regulations, Title 24, Part 6

Proposed changes to Section 130.2(b) – OUTDOOR LIGHTING CONTROLS AND EQUIPMENT

We support the use of an LED baseline for the development of the outdoor lighting power allowances and applaud the incorporation of information and material from RP-20 into the proposed LPAs, which are both favorable developments for the 2019 Building Energy Efficiency Standards.

Luminaire cut-off requirements

In the 2016 Building Energy Efficiency Standards, luminaires with wattages less than 150 watts are exempt from uplight and glare requirements[1]. Due to increased availability and usage of lower wattage LED luminaires, the Statewide CASE Team is proposing to apply these requirements to all luminaires above 30W, which amounts to an 80% change. We are concerned that the proposed reduction of this exemption may exclude some efficient decorative and specialty luminaires that cannot meet the backlight and uplight requirements in Title 24 and would limit the choices of designers and owners to specify and install these types of outdoor lighting. We encourage further evaluation by the Statewide CASE Team and the CEC of LED luminaires that may be affected by the proposed change to the exemption and the potential impacts on the design and installation of outdoor lighting.

Correlated color temperature of light sources used for outdoor lighting

We appreciate the work that the Statewide CASE Team has done to evaluate that the LPAs proposed for the 2019 Standards can be met with warm correlated color temperature (CCT) outdoor luminaires with CCTs of 3000K to 4000K. However, we respectfully disagree with the creation of lighting power allowances that can only be met with certain CCTs.

The research on blue light impact and the potential for circadian disruption of people and animals is ongoing. Within a recent Board position, the Illuminating Engineering Society of North America also takes exception to the use of CCT to characterize the effects of outdoor lighting and notes that it is "inadequate for the purpose of evaluating possible health outcomes. [2]"

A recent Lighting Research Center (LRC) webinar presented by Dr. Mark Rea and Dr. Mariana Figueiro[3] addressed issues raised in the American Medical Association (AMA) report[4]. It also provided direction on accurately measuring and specifying lighting, and guidance on the problems of misapplying simple metrics to the topic of the health and environmental impacts of light and lighting without consideration of all factors.

---

[1] Illuminating Engineering Society of North America. 2011. IES TM-15-11, Addendum A

[2] Illuminating Engineering Society of North America. 2017. IES Board Position on AMA CSAPH Report 2-A-16, Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting, PS-09-17

[3] LRC Webinar: Response to the American Medical Association Report "Human and Environmental Effects of Light Emitting Diode Community Lighting", March 2017, https://www.ies.org/lda/lrc-video-response-to-ama-report-available/

[4] American Medical Association. 2016. Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting. Report of the Council on Science and Public Health CSAPH Report 2-A-16

The webinar showed that neither CCT nor melanopic-lux is the right metric to use to characterize circadian light (CLa), the measure of the *melanopic* content of a light source. Considering only melanopic content overestimates the effect of circadian light of some sources because all five photoreceptors—not just the intrinsically photosensitive retinal ganglion cells (ipRGCs)—contribute to the circadian response to light. CCT is a measure of the color appearance of light, and as such is imperfect, and is not predictive of the human circadian response. In fact, a large range of Circadian Stimulus values (CS, a measure of human melatonin suppression in response to light spectra)[5] can occur at a given CCT[6]; this is because the circadian response to light depends on time of day of exposure, exposure duration, and the intensity and spectrum of the light. CCT is not an adequate metric to determine health impacts of light.[7, 8]

This means that a source with a CCT of 4000 K can elicit a smaller circadian response to light than a 3000 K source. The LRC presented such a comparison in their webinar, and the 4000 K source was much less effective in terms of circadian disruption and had much less impact than the 3000 K source because of the factors previously mentioned.

Further to the topic of blue light hazard, the data in Figure 1 shows that a person would have to stare at a high-powered blue LED for six minutes for possible damage to occur. Note the exposure time is less for royal blue LEDs, which are not used in architectural lighting, but are used in other applications such as dental curing.

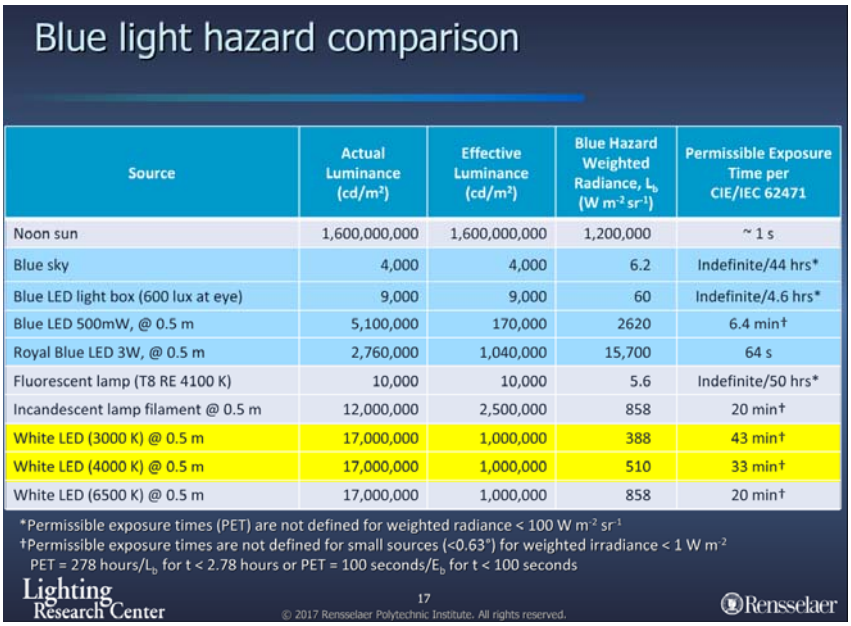

Figure 1: LRC Webinar: Response to the American Medical Association Report "Human and Environmental Effects of Light Emitting Diode Community Lighting" March 2017, slide 17

[5] Rea MS, Figueiro MG, Bierman A, Bullough JD. 2010. Circadian Light. Journal of Circadian Rhythms. 8:2.
[6] Esposito T, Houser KW. 2016. Realization and performance of an integrated therapeutic and architectural lighting solution. Illuminating Engineering Society Light + Color Research Symposium. Gaithersburg, MD. April 3 – 5, 2016.
[7] https://www.ies.org/policy/position-statements/ies-board-position-on-ama-csaph-report-2-a-16-human-and-environmental-effects-of-light-emitting-diode-led-community-lighting/
[8] Kevin Houser (2017) The AMA's Misguided Report on Human and Environmental Effects of LED Lighting, LEUKOS, 13:1, 1-2, DOI: 10.1080/15502724.2016.1247566

The highlighted lines are representative of what is in the American Medical Association study. The data shows that a person would have to stare at the 3000 K source for 43 minutes and the 4000 K source for 33 minutes respectively to incur damage to the eyes. Also important is that the Permissible Exposure Times indicated by the AMA study and shown in Figure 1 above are for an LED source that is 0.5 meters (1.6 feet) from the face. This is an unlikely scenario for an outdoor lighting application.

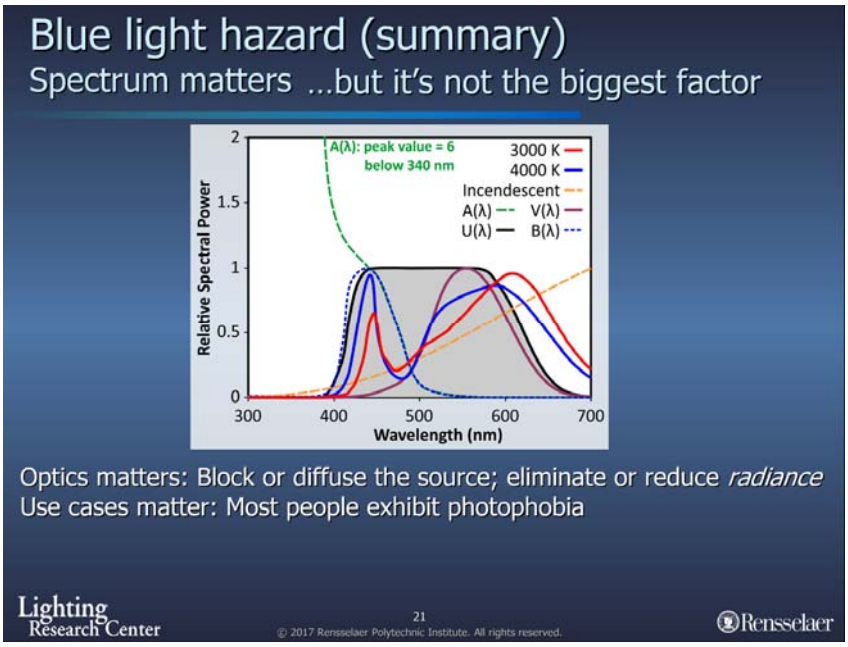

Figure 2: LRC Webinar: Response to the American Medical Association Report "Human and Environmental Effects of Light Emitting Diode Community Lighting" March 2017, slide 21

Because research is ongoing and the amount of light, duration and timing of exposure, and spectrum all matter, we believe it is premature to limit the scope of possibilities for outdoor lighting based solely on the correlated color temperature of the light source.

California building owners and those who design and install outdoor lighting should be allowed to select outdoor lighting of various CCTs provided the lighting is highly efficient, safe, limits the wasting of energy, and meets established luminaire cutoff requirements to prevent urban pollution, skyglow, and light trespass.

Proposed changes to Section 140.7 – REQUIREMENTS FOR OUTDOOR LIGHTING including Table 140.7-A. General Hardscape Lighting Power Allowances

The lighting power allowances (LPAs) proposed for general hardscape areas in Table 140.7-A are aggressive given the significant reduction that was completed for the 2016 Standards[9] for this exterior application area. General hardscape area LPAs for Lighting Zone 3 in the 2016 Building Energy Efficiency Standards are 32-56% lower than the 2013 Standards.

[9] 2016 Building Energy Efficiency Standards, pg. 215

PHILIPS

TABLE 140.7-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2[2]	Lighting Zone 3[2]	Lighting Zone 4
Area Wattage Allowance (AWA)	No Allowance [1]	0.020 W/ft^2	0.030 W/ft^2	0.040 W/ft^2	0.050 W/ft^2
Linear Wattage Allowance (LWA)		0.15 W/lf	0.25 W/lf	0.35 W/lf	0.45 W/lf
Initial Wattage Allowance (IWA)		340 W	450 W	520 W	640 W

[1] Continuous lighting is explicitly prohibited in Lighting Zone 0. A single luminaire of 15 Watts or less may be installed at an entrance to a parking area, trail head, fee payment kiosk, outhouse, or toilet facility, as required to provide safe navigation of the site infrastructure. Luminaires installed in Lighting Zone 0 shall meet the maximum zonal lumen limits for Uplight and Glare specified in Table 130.2-A and 130.2-B.

[2] For Lighting Zone 2 and 3, where greater than 50% of the paved surface of a parking lot is finished with concrete, the AWA for that area shall be 0.035 W/ft^2 for Lighting Zone 2 and 0.040 W/ft^2 for Lighting Zone 3, and the LWA for both lighting zones shall be 0.70 W/lf. This does not extend beyond the parking lot, and does not include any other General Hardscape areas.

Figure 2: Table 140.7-A (2016)

Given the previous significant reductions, we propose a modest reduction of 15% in the lighting power allowances for general hardscape in this code cycle as well as the following:

- Retainment of the LPAs for Lighting Zone 1 from the 2016 Standards
- Usage of the 2016 LPA values for Lighting Zone 2 and 3 as the concrete LPA values and make the asphalt value 15% less.
- Retainment of the LPAs for Lighting Zone 4 from the 2016 Standards

These proposed values keep pace with the increase in efficacy of LED sources and increase the energy savings in these exterior areas. The LPA for building entrance/exit also saw a large reduction (61%) in the 2016 Standards. Given this significant reduction, we propose a more reasonable reduction of 20% for the 2019 Standards.

Thank you for your consideration of Philips Lighting Comments on the Draft CASE Report (June 2017) NR Outdoor Light Sources for the 2019 California Building Energy Efficiency Standards, California Code of Regulations, Title 24, Part 6.