

## DOCKETED

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# **Nonresidential Outdoor Lighting Controls**

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Building Standards Office  
Efficiency Division

Pre-Rulemaking Workshop  
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# Acknowledgments

California Utilities Statewide Codes and  
Standards Team

and

CASE Authors

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(Energy Solutions)



## Background

- Section 130.2(c) is applicable to:
  - All installed outdoor lighting
  - Luminaires mounted 24 feet or less above ground
  - Outdoor sales lighting
  - Building façade, ornamental hardscape, and outdoor dining lighting
- Outdoor luminaires:
  - Pole mounted luminaires for area and parking lot lighting, hardscape lighting luminaires, and building mounted luminaires





# Background



Image credit: PNNL

- Outdoor lighting control in 130.2(c):
  - Turns off the light when daylight is available
  - Turns off the light for a portion of the night
  - Reduces lighting power when there is reduced activity
- Outdoor Lighting Controls
  - Phototcontrol, astronomical time-switch control, motion sensor, automatic scheduling control



# Background

- Information received by CASE Team:
  - “Often many new parking lot lighting systems are left on throughout the night, well after normal business hours.” (draft CASE report)



# CASE Team Proposal

- Scheduled dimming for outdoor lighting during normally unoccupied hours
  - If the space is known to be unoccupied during some hours of the night, the operator can define the normally unoccupied schedule.
  - If the space is known to be occupied all night long, then normally occupied period would be from sunset to sunrise, with no unoccupied hours.
  - If the schedule is not known, it will be assumed that the normally occupied period is 6 am to midnight and normally unoccupied period is midnight to 6 am.
- Maximum of 400W of lighting power to be controlled together for all periods (occupied and unoccupied hours).



# CASE Team Proposal

- Update definitions on motion sensors
  - Revise the motion sensor definition to include reference to “reduce lighting power” after an area is vacated and automatically “increase light output” when an area is occupied
- Add motion sensor time off to be set at 15 minutes
  - Align with the ASHRAE maximum vacancy period requirement of 15 minutes for exterior lighting motion controls
  - (Remarks: ASHRAE requirement for parking garages is 20 minutes)
  - Also consistent with indoor control requirements



# CASE Team Proposal

- Align with ASHRAE 90.1 on Lighting Wattage Reduction to 50 percent
  - Legacy lighting technologies cannot be dimmed down more than 40 percent
  - Recent LED light source development allow outdoor LED luminaires to be dimmed down by more than 50 percent
- Revise exceptions 2 to 130.2(c) on outdoor luminaires to be rated at 30 watts or less.
  - (Previously 75W for pole-mounted luminaires and 30W for non-pole mounted luminaires.)
  - Align with LED light sources as the baseline for lighting power allowance.



# CEC Staff Recommendations

- Differences from CASE Team Proposal
  - Revise outdoor lighting control definitions
    - Delete lighting control terms that have redundant meanings relative to other terms
      - For example, “Automatic Scheduling Control” has the same meaning as “Automatic Time-Switch Control”. We would consider deleting “Automatic Time-Switch Control” and using “Automatic Scheduling Control” throughout the text.



# CEC Staff Recommendations

- (continue)
  - Revise outdoor lighting control definitions
    - Revise so that they are more consistent with one another
      - “Astronomical Time-Switch Control”
      - “Automatic Scheduling Control”
      - “Motion Sensor”
      - “Part-Night Outdoor Lighting Control”



## Revised outdoor lighting control definitions:

**Astronomical Time-Switch Control** is an Automatic Scheduling Control ~~Automatic Time-Switch Control~~ that controls lighting based on the time of day and astronomical events such as sunset and sunrise, accounting for geographical location and calendar date.

~~Automatic Time-Switch Control~~ controls lighting based on the time of the day.

**Automatic Scheduling Control** is a time-based lighting control ~~device or system~~ that is capable of being programmed or adjusted for its settings to turn off the outdoor luminaire for a portion of the night and the day.

**Motion Sensor** is used outdoors, automatically turns off the outdoor luminaire lights OFF after an area is vacated of occupants, and automatically turns on the outdoor luminaire lights ON when the area is occupied.

**Part-Night Outdoor Lighting Control** is an Automatic Scheduling Control ~~a light sensing and time-based lighting control device or system that is programmed to reduce or~~ that automatically turn off the lighting power to the ~~an~~ outdoor luminaire for a portion of the night.



# CEC Staff Recommendations

## Differences from CASE Team Proposal:

- similar control requirements (automatic scheduling control and motion sensors)
  - for luminaires at 24 feet or less above the ground
  - for building façade, ornamental hardscape, outdoor dining, and outdoor sales frontage lighting.
- Luminaires at 24 feet or less above the ground.
  - Motion sensor control of lighting load not exceeding 800W (rather than 400W)



## Automatic scheduling control and motion sensors:

	When no activity
Normally occupied hours (business hours)	Dim down the luminaires 50% to 90%
Normally unoccupied hours (after hours)	Setting 1: Dim down the luminaires 50% to 90%  Setting 2: Turn off the luminaires  Setting 3: at least half of the luminaires to be dimmed 50% to 90% or turned off; rest of the luminaires with motion sensor controls



# Proposed Language

## Section 130.2 Outdoor Controls and Equipment

(c) **Controls for Outdoor Lighting.** Outdoor lighting controls shall be installed that meet the following requirements as applicable:

EXCEPTION 1: Outdoor lighting not permitted by a health or life safety statute, ordinance, or regulation to be turned OFF or dimmed down.

EXCEPTION 2: Lighting in tunnels required to be illuminated 24 hours per day and 365 days per year.

1. All installed outdoor lighting shall be controlled by an automatic scheduling control and one of the following: a photocontrol, outdoor astronomical time switch control, part-night outdoor lighting control, or other control capable of automatically shutting OFF the outdoor lighting when daylight is available.



2. All installed outdoor lighting, where the bottom of the luminaire is mounted 24 feet or less above the ground, shall be controlled by automatic scheduling controls and motion sensors, or other automatic controls responding to both schedule and area activity. The controls shall control only outdoor lighting loads and shall meet all of the following:
  - A. During **normally occupied scheduled periods**, when no activity has been detected in the area illuminated by the controlled luminaires for a time no longer than 15 minutes, lighting power of each luminaire shall be reduced by at least 50 percent but not exceeding 90 percent.



## Automatic scheduling control and motion sensors:

	When no activity
Normally occupied hours (business hours)	Dim down the luminaires 50% to 90%
Normally unoccupied hours (after hours)	Setting 1: Dim down the luminaires 50% to 90%  Setting 2: Turn off the luminaires  Setting 3: at least half of the luminaires to be dimmed 50% to 90% or turned off; rest of the luminaires with motion sensor controls



- B. During normally unoccupied scheduled periods, controls shall meet one of the following requirements:
- i. When no activity has been detected in the area illuminated by the controlled luminaires for a time no longer than 15 minutes, the lighting power of each luminaires shall be reduced by at least 50 percent but not exceeding 90 percent.
  - ii. When no activity has been detected in the area illuminated by the controlled luminaires for a time no longer than 15 minutes, the luminaires shall be turned off.
  - iii. At least half of the controlled luminaires with the lighting power reduced by 90 percent or be turned off, and the remainder of the controlled luminaires be controlled by motion sensors as specified in Section 130.2(c)2Bi.



## Automatic scheduling control and motion sensors:

	When no activity
Normally occupied hours (business hours)	Dim down the luminaires 50% to 90%
Normally unoccupied hours (after hours)	Setting 1: Dim down the luminaires 50% to 90%  Setting 2: Turn off the luminaires  Setting 3: at least half of the luminaires to be dimmed 50% to 90% or turned off; rest of the luminaires with motion sensor controls



C. No more than 800 watts of lighting power shall be controlled together by a motion sensing control or other controls responding to activity in the area.

EXCEPTION 1 to 130.2(c)2: Outdoor lighting complying with Section 130.2(c)3.

EXCEPTION 2 to 130.2(c)2: Outdoor luminaires where rated at 30 watts or less as determined in accordance with Section 130.0( c).

EXCEPTION 3 to 130.2(c)2: Application listed as Exceptions to Section 140.7(a) ~~shall not be required to meet the requirements of Section 130.2(c)3~~.



3. All installed building façade lighting, ornamental hardscape lighting, outdoor dining lighting, and outdoor sales frontage lighting, except lighting complying with the requirements of Section 130.2(c)2, , shall be controlled by automatic scheduling controls and motion sensors, or other automatic controls responding to both schedule and area activity. The controls shall control only outdoor lighting loads and shall meet all of the following:
  - A. During normally occupied scheduled periods, when no activity has been detected in the area illuminated by the controlled luminaires for a time no longer than 15 minutes, lighting power of each luminaire shall be reduced by at least 50 percent but not exceeding 90 percent.
  - B. During normally unoccupied scheduled periods, controls shall meet one of the following requirements:
    - i. When no activity has been detected in the area illuminated by the controlled luminaires for a time no longer than 15 minutes, the lighting power of each luminaires shall be reduced by at least 50 percent but not exceeding 90 percent.
    - ii. When no activity has been detected in the area illuminated by the controlled luminaires for a time no longer than 15 minutes, the luminaires shall be turned off.
    - iii. At least half of the controlled luminaires with the lighting power reduced by 90 percent or be turned off, and the remainder of the controlled luminaires be controlled by motion sensors as specified in Section 130.2(c)2Bi.



# Inputs/Comments

Notes to stakeholders and consultants:

- Do you have concerns that the proposed motion sensor control requirement of an additional sensor for each 800W may limit design flexibility?



# Comments/Questions

- Submit written comments by July 14, 2017
  - E-file:  
<https://efiling.energy.ca.gov/EComment/EComment.aspx> - Docket # 17-BSTD-01
  - E-mail: [docket@energy.ca.gov](mailto:docket@energy.ca.gov) – include the docket number in the subject line
- I can be contacted directly  
[simon.lee@energy.ca.gov](mailto:simon.lee@energy.ca.gov) or 916-651-3005