

Proposal Summary



2022 California Energy Code (Title 24, Part 6)

Multifamily Outdoor Lighting Allowance

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Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on September 5, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by September 19, 2019

Measure Description

This CASE study will investigate energy savings and cost-effectiveness of reducing the Outdoor Lighting Power Allowance (LPA) for multifamily-specific applications. The study will additionally explore elimination of perimeter allowance from the calculation of the General Hardscape allowance to simplify the process of determining the Lighting Power Allowance. This may include a two-option approach, with one using average allowance values and a second that retains the detail and complexity of current calculation methodologies.

Most outdoor space that is assigned a lighting allowance falls under general hardscape. The total allowance for general hardscape is calculated by combining a site allowance, a perimeter allowance, and an area allowance. Additionally, there are a variety of outdoor LPAs that are permitted to be “layered” on top of the general hardscape allowance if certain conditions exist. This combined calculation approach was developed in the 2005 version of the Title 24, Part 6 subsequently expanded to accommodate the need for more LPA for properties with complex geometries.

The CASE Team has identified an additional goal to reduce negative impacts on human health and the outdoor environment while completing this simplification approach. The CASE Team will review requirements on luminaire shielding, site light levels and lighting controls to minimize negative impact of intrusive lighting on human health per the guidance from the American Medical Association (AMA) Council on Science and Public Health¹.

¹ The AMA document is available through the AMA website. A link to a press release is provided, but the actual document requires registration for access. <https://www.ama-assn.org/press-center/press-releases/ama-adopts-guidance-reduce-harm-high-intensity-street-lights>



The CASE Team proposes the following steps, subject to research and consultation with experts on light and health:

- Simplify the “Site + Perimeter + Area” approach in Table 140.7-A into a “Site + Area” method and alternatively a “Per Unit” or “Per Space” approach to account for very small multifamily properties.
- Evaluate the requirements for the BUG system to determine if adjustments are needed to substantially reduce the light trespass into residence windows.
- Create different lighting controls requirements from those in Section 130.2 to specifically address the concerns for lighting surrounding residences. This will target more aggressive light level cutbacks during non-activity periods.
- Consider language that will require either late night color temperature reduction or considerable site light level setbacks to eliminate most of the blue wavelength light that is considered the most harmful for human health.

Draft Code Language

The Energy Commission plans to create a multifamily chapter for inclusion in 2022 Title 24, Part 6. The multifamily chapter will draw from the appropriate sections of the 2019 residential and nonresidential Standards. The Statewide CASE Team uses the language and section numbering from residential and nonresidential Standards and Reference Appendices to show the proposed changes below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions). These changes are specific to multifamily buildings and not indicative of changes that apply to residential or nonresidential buildings.

SECTION 130.2 – OUTDOOR LIGHTING CONTROLS AND EQUIPMENT

~~Nonresidential, high-rise residential~~ Multifamily and hotel/motel buildings shall comply with the applicable requirements of Sections 130.2(a) through 130.2(c).

(a) **RESERVED**

(b) **Luminaire Cutoff Requirements.** All outdoor luminaires of 6,200 initial luminaire lumens or greater, shall comply with Backlight, Uplight, and Glare (collectively referred to as "BUG" in accordance with IES TM-15-11, Addendum A) requirements as follows:

1. Maximum zonal lumens for Backlight, Uplight, and Glare shall be in accordance with Title 24, Part 11, Section 5.106.8.

And

1. Maximum zonal lumens for Glare shall be in accordance with TABLE 130.2-A.

EXCEPTION 1 to Section 130.2(b): Signs.

EXCEPTION 2 to Section 130.2(b): Lighting for building facades, public monuments, statues, and vertical surfaces of bridges.

EXCEPTION 3 to Section 130.2(b): Lighting not permitted by a health or life safety statute, ordinance, or regulation to be a cutoff luminaire.

EXCEPTION 4 to Section 130.2(b): Temporary outdoor lighting.

EXCEPTION 5 to Section 130.2(b): Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:

- A. Where the existing luminaire does not meet the luminaire BUG requirements in Section 130.2(b); and
- B. Spacing between existing poles is greater than six times the mounting height of the existing luminaires; and

- C. Where no additional poles are being added to the site; and
- D. Where new wiring to the luminaires is not being installed; and
- E. Provided that the connected lighting power wattage is not increased.

EXCEPTION 6 to Section 130.2(b): Luminaires that illuminate the public right of way ~~on publicly maintained~~ (roadways, sidewalks, and bikeways that are owned or maintained by the public municipality or utility).

~~**EXCEPTION 7 to Section 130.2(b):** Outdoor lighting attached to a high-rise residential or hotel/motel building and separately controlled from the inside of a dwelling unit or guest room.~~

- (c) **Controls for Outdoor Lighting.** Outdoor lighting shall be independently controlled from other electrical loads, and the controls for outdoor lighting shall meet the following functional requirements:

EXCEPTION 1 to Section 130.2(c): Outdoor lighting not permitted by a health or life safety statute, ordinance, or regulation to be turned OFF or reduced.

EXCEPTION 2 to Section 130.2(c): Lighting in tunnels required to be illuminated 24 hours per day and 365 days per year.

1. **Daylight Availability.** All installed outdoor lighting shall be controlled by a photo control, astronomical time-switch control, or other control capable of automatically shutting OFF the outdoor lighting when daylight is available.
2. **Automatic Scheduling Controls.**
 - A. Automatic scheduling controls shall be capable of reducing the outdoor lighting power by at least ~~50~~ [insert revised number per new calculations] percent and no more than 90 percent, and separately capable of turning the lighting OFF, during scheduled unoccupied periods.
 - B. Automatic scheduling controls shall allow scheduling of a minimum of two nighttime periods with independent lighting levels, and may include an override function that turns lighting ON during its scheduled dim or OFF state for no more than two hours when an override is initiated.
 - C. Acceptance tests of outdoor lighting controls shall verify the scheduled occupied and unoccupied periods, as specified in Section 130.4(a)6.
 - D. Automatic scheduling controls shall be installed for all outdoor lighting, and may be installed in combination with motion sensing controls or other outdoor lighting controls.
3. **Motion Sensing Controls.**
 - A. Motion sensing controls shall be capable of reducing the outdoor lighting power of each controlled luminaire by at least ~~50~~ [insert revised number per new calculations] percent and no more than 90 percent, and separately capable of turning the luminaire OFF, during unoccupied periods.
 - B. Motion sensing controls shall be capable of reducing the lighting to its dim or OFF state no longer than 15 minutes after the area has been vacated, and of returning the lighting to its ON state when the area becomes occupied.
 - C. No more than 1,500 watts of lighting power shall be controlled by a single sensor.
 - D. Motion sensing controls shall be installed for the following luminaires, and may be installed for other outdoor lighting and in combination with other outdoor lighting controls:
 - i. Outdoor luminaires other than Building Façade, Ornamental Hardscape, or Outdoor Dining, ~~or Outdoor Sales Frontage lighting~~, where the bottom of luminaire is mounted 24 feet or less above grade; and,
 - ii. Outdoor wall mounted luminaires installed for Building Façade, Ornamental Hardscape or Outdoor Dining lighting that have a bilaterally symmetric distribution as described in the IES Handbook (typically referred to as “wall packs”) mounted 24 feet above grade or lower.

EXCEPTION 1 to Section 130.2(c)3: Luminaires with a maximum rated wattage of ~~40~~ [insert revised number per new calculations] watts each are not required to have motion sensing controls.

EXCEPTION 2 to Section 130.2(c)3: Applications listed as Exceptions to Section 140.7(a) are not required to have motion sensing controls.

EXCEPTION 3 to Section 130.2(c)3: Lighting subject to a health or life safety statute, ordinance, or regulation may have a minimum time-out period longer than 15 minutes or a minimum dimming level above 50 percent when necessary to comply with the applicable law.

NOTE: Authority: Sections 25213, 25218, 25218.5, 25402 and 25402.1, Public Resources Code. Reference: Sections 25007, 25008, 25218.5, 25310, 25402, 25402.1, 25402.4, 25402.5, 25402.8, and 25943, Public Resources Code.

TABLE 130.2-A BUG GLARE RATING MAXIMUM REQUIREMENTS PER LIGHTING ZONE

	Lighting Zone				
	<u>LZ0</u>	<u>LZ1</u>	<u>LZ2</u>	<u>LZ3</u>	<u>LZ4</u>
<u>Maximum Allowable G Rating</u>	<u>N/A</u>	<u>G0</u>	<u>G1</u>	<u>G1</u>	<u>G2</u>

SECTION 140.7 – PRESCRIPTIVE REQUIREMENTS FOR OUTDOOR LIGHTING

- (a) An outdoor lighting installation complies with this section if it meets the requirements in Subsections (b) and (c), and the actual outdoor lighting power installed is no greater than the allowed outdoor lighting power calculated under Subsection (d). The allowed outdoor lighting shall be calculated according to Outdoor Lighting Zone in Title 24, Part 1, Section 10-114.

EXCEPTIONS to Section 140.7(a): When more than 50 percent of the light from a luminaire falls within one or more of the following applications, the lighting power for that luminaire shall be exempt from Section 140.7:

1. Temporary outdoor lighting.
 2. Lighting required and regulated by the Federal Aviation Administration, and the Coast Guard.
 3. Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way owned or maintained by the local municipality or utility.
 4. Lighting for sports and athletic fields, and children's playgrounds.
 5. ~~Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants, and aviation facilities.~~
 6. Lighting of public monuments.
 7. Lighting of signs complying with the requirements of Sections 130.3 and 140.8.
 8. Lighting of stairs, wheelchair elevator lifts for American with Disabilities Act (ADA) compliance, and ramps that are other than parking garage ramps.
 9. Landscape lighting.
 10. ~~In theme parks: outdoor lighting only for themes and special effects.~~
 11. Lighting for outdoor theatrical and other outdoor live performances, provided that these lighting systems are additions to area lighting systems and are controlled by a multiscene or theatrical cross-fade control station accessible only to authorized operators.
 12. Outdoor lighting systems for qualified historic buildings, as defined in the California Historic Building Code (Title 24, Part 8), if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems for qualified historic buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other outdoor lighting systems for qualified historic buildings shall comply with Section 140.7.
- (b) **Outdoor Lighting Power Trade-offs.** Outdoor lighting power trade-offs shall be determined as follows:
1. Allowed lighting power determined according to Section 140.7(d)1 for general hardscape lighting allowance may be traded to specific applications in Section 140.7(d)2, provided the hardscape area from which the lighting power is traded continues to be illuminated in accordance with Section 140.7(d)1A.
 2. Allowed lighting power determined according to Section 140.7(d)2 for additional lighting power allowances for specific applications shall not be traded between specific applications, or to hardscape lighting in Section 140.7(d)1.
 3. Trading off lighting power allowances between outdoor and indoor areas shall not be permitted.
- (c) **Calculation of Actual Lighting Power.** The wattage of outdoor luminaires shall be determined in accordance with Section 130.0(c).
- (d) **Calculation of Allowed Lighting Power.** The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with Section 140.7(d)1, and the sum of the additional lighting power allowance for specific applications determined in accordance with Section 140.7(d)2.

1. **General Hardscape Lighting Allowance.** Determine the general hardscape lighting power allowances as follows:
 - A. The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s), bridge(s), tunnel(s), and other improved area(s) that are illuminated. In plan view of the site, determine the illuminated hardscape area, which is defined as any hardscape area that is within a square pattern around each luminaire or pole that is ten times the luminaire mounting height with the luminaire in the middle of the pattern, less any areas that are within a building, beyond the hardscape area, beyond property lines, or obstructed by a structure. The illuminated hardscape area shall include portions of planters and landscaped areas that are within the lighting application and are less than or equal to 10 feet wide in the short dimensions and are enclosed by hardscape or other improvement on at least three sides. Multiply the illuminated hardscape area by the Area Wattage Allowance (AWA) from Table 140.7-A for the appropriate Lighting Zone.
 - ~~B. Determine the perimeter length of the general hardscape area. The total perimeter shall not include portions of hardscape that is not illuminated according to Section 140.7(d)1A. Multiply the hardscape perimeter by the Linear Wattage Allowance (LWA) for hardscape from Table 140.7-A for the appropriate lighting zone. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:
 - ~~i. Landscaped areas completely enclosed within the hardscape area, and which have a width or length less than 10 feet wide, shall not be added to the hardscape perimeter length.~~
 - ~~ii. Landscaped areas completely enclosed within the hardscape area, and which width or length is a minimum of 10 feet wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.~~
 - ~~iii. Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.~~~~
 - C. Determine the Initial Wattage Allowance (IWA) for general hardscape lighting from Table 140.7-A for the appropriate lighting zone. The hardscape area shall be permitted one IWA per site.
 - D. The general hardscape lighting allowance shall be the sum of the allowed watts determined from (A), ~~(B)~~ and (C) above.
2. **Additional Lighting Power Allowance for Specific Applications.** Additional lighting power for specific applications shall be the smaller of the additional lighting allowances for specific applications determined in accordance with TABLE 140.7-B for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

NOTE: Authority: Sections 25213, 25218, 25218.5, 25402 and 25402.1, Public Resources Code. Reference: Sections 25007, 25008, 25218.5, 25310, 25402, 25402.1, 25402.4, 25402.5, 25402.8, and 25943, Public Resources Code.

[Some cells in Tables 140.7 A and B will be removed. All numbers that remain will be revised based on the new calculations. The cells to be removed are illustrated below.]

TABLE 140.7-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

[REVISE ALL REMAINING VALUES BASED ON NEW CALCULATIONS]

Type of Power Allowance	Lighting Zone 0 ³	Lighting Zone 1 ³	Lighting Zone 2 ³		Lighting Zone 3 ³		Lighting Zone 4 ³
	Asphalt/Concrete	Asphalt/Concrete	Asphalt	Concrete ²	Asphalt	Concrete ²	Asphalt/Concrete
Area Wattage Allowance (AWA)	No allowance ¹	0.018 W/ft ²	0.023 W/ft ²	0.025 W/ft²	0.025 W/ft ²	0.03 W/ft²	0.03 W/ft ²
Linear Wattage Allowance (LWA)		0.15 W/ft	0.17 W/ft	0.4 W/ft	0.25 W/ft	0.4 W/ft	0.35 W/ft
Initial Wattage Allowance (IWA)		180 W	250 W	250 W	350 W	350 W	400 W

¹Continuous 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 shall meet the maximum zonal lumen limits as specified in Section 130.2(b).

~~²Where greater than 50% of the paved surface of a parking lot is finished with concrete. This does not extend beyond the parking lot, and does not include any other General Hardscape areas.~~

³Narrow band spectrum light sources with a dominant peak wavelength greater than 580 nm – as mandated by local, state, or federal agencies to minimize the impact on local, active professional astronomy or nocturnal habitat of specific local fauna – shall be allowed a 2.0 lighting power allowance multiplier.

TABLE 140.7-B ADDITIONAL LIGHTING POWER ALLOWANCE FOR SPECIFIC APPLICATIONS

All area and distance measurements in plan view unless otherwise noted.

Lighting Application	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.					
Building Entrances or Exits. Allowance per door. Luminaires qualifying for this allowance shall be within 20 feet of the door.	Not applicable	9 watts	15 watts	19 watts	21 watts
Primary Entrances to Senior Care Facilities, Police Stations, Healthcare Facilities, Fire Stations, and Emergency Vehicle Facilities. Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 feet of the primary entrance.	Not applicable	20 watts	40 watts	57 watts	60 watts
Drive Up Windows. Allowance per customer service location. Luminaires qualifying for this allowance shall be within 2 mounting heights of the sill of the window.	Not applicable	16 watts	30 watts	50 watts	75 watts
Vehicle Service Station Uncovered Fuel Dispenser. Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within 2 mounting heights of the dispenser.	Not applicable	55 watts	77 watts	81 watts	135 watts
ATM Machine Lighting. Allowance per ATM machine. Luminaires qualifying for this allowance shall be within 50 feet of the dispenser.	Not applicable	100 watts for first ATM machine, 35 watts for each additional ATM machine.			
WATTAGE ALLOWANCE PER UNIT LENGTH (w/linear ft). May be used for one or two frontage side(s) per site.					
Outdoor Sales Frontage. Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor sales area.	Not applicable	No Allowance	11 W/linear ft	19 W/linear ft	25 W/linear ft

	WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/ft²). May be used for any illuminated hardscape area on the site.				
Hardscape Ornamental Lighting. Allowance for the total site illuminated hardscape area. Luminaires qualifying for this allowance shall be rated for 100 watts or less as determined in accordance with Section 130.0(d), and shall be post-top luminaires, lanterns, pendant luminaires, or chandeliers.	Not applicable	No Allowance	0.007 W/ft ²	0.013 W/ft ²	0.019 W/ft ²
	WATTAGE ALLOWANCE PER SPECIFIC AREA (W/ft²). Use as appropriate provided that none of the following specific applications shall be used for the same area.				
Building Facades. Only areas of building façade that are illuminated shall qualify for this allowance. Luminaires qualifying for this allowance shall be aimed at the façade and shall be capable of illuminating it without obstruction or interference by permanent building features or other objects.	Not applicable	No Allowance	0.100 W/ft ²	0.170 W/ft ²	0.225 W/ft ²
Outdoor Sales Lots. Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other non sales areas shall be considered hardscape areas even if these areas are completely surrounded by sales lot on all sides. Luminaires qualifying for this allowance shall be within 5 mounting heights of the sales lot area.	Not applicable	0.060 W/ft²	0.210 W/ft²	0.280 W/ft²	0.485 W/ft²
Vehicle Service Station Hardscape. Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property, or obstructed by signs or structures. Luminaires qualifying for this allowance shall be illuminating the hardscape area and shall not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure.	Not applicable	0.006 W/ft²	0.068 W/ft²	0.138 W/ft²	0.200 W/ft²
Vehicle Service Station Canopies. Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	Not applicable	0.220 W/ft ²	0.430 W/ft ²	0.580 W/ft ²	1.010 W/ft ²
Sales Canopies. Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	Not applicable	No Allowance	0.470 W/ft ²	0.622 W/ft ²	0.740 W/ft ²
Non-sales Canopies and Tunnels. Allowance for the total area within the drip line of the canopy or inside the tunnel. Luminaires qualifying for this allowance shall be located under the canopy or tunnel.	Not applicable	0.057 W/ft ²	0.137 W/ft ²	0.270 W/ft ²	0.370 W/ft ²
Guard Stations. Allowance up to 1,000 square feet per vehicle lane. Guard stations provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants, including identification, documentation, vehicle license plates, and vehicle contents. Qualifying luminaires shall be within 2 mounting heights of a vehicle lane or the guardhouse.	Not applicable	0.081 W/ft²	0.176 W/ft²	0.325 W/ft²	0.425 W/ft²

CONTINUED: TABLE 140.7-B ADDITIONAL LIGHTING POWER ALLOWANCE FOR SPECIFIC APPLICATIONS

All area and distance measurements in plan view unless otherwise noted.

Lighting Application	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Student Pick-up/Drop-off zone. Allowance for the area of the student pick-up/drop-off zone, with or without canopy, for preschool through 12th grade school campuses. A student pick-up/drop off zone is a curbside, controlled traffic area on a school campus where students are picked-up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 feet, times the smaller of the actual length or 250 feet. Qualifying luminaires shall be within 2 mounting heights of the student pick-up/drop-off zone.	Not applicable	No Allowance	0.056 W/ft ²	0.200 W/ft ²	No Allowance
Outdoor Dining. Allowance for the total illuminated hardscape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.	Not applicable	0.004 W/ft ²	0.030 W/ft ²	0.050 W/ft ²	0.075 W/ft ²
Special Security Lighting for Retail Parking and Pedestrian Hardscape. This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	Not applicable	0.004 W/ft²	0.005 W/ft²	0.010 W/ft²	No Allowance