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Comments on the Nonresidential Lighting updates in the 45-Day Express Terms

Additional submitted attachment is included below.

Comments on the Nonresidential Lighting updates in the 45-Day Express Terms

CALIFORNIA STATEWIDE UTILITY CODES AND STANDARDS TEAM

June 14, 2021

The California Statewide Utility Codes and Standards Enhancement Team (Statewide CASE Team) appreciates the opportunity to participate in the review of the May 6, 2021 Express Terms 2022 Energy Code, Title 24, Parts 1 and 6 (45-Day Express Terms)¹.

The Statewide CASE Team actively supports code-setting bodies in developing and revising building energy codes and standards. The program's objective is to achieve significant energy savings and assist in meeting other energy-related state policy goals through the development of reasonable, responsible, and cost-effective code changes. Three California Investor Owned Utilities — Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison — and two Publicly Owned Utilities — Los Angeles Department of Water and Power and Sacramento Municipal Utility District (herein referred to as the Statewide CASE Team when including the CASE Author) — supported this effort. The Statewide CASE Team is actively supporting the California Energy Commission (Energy Commission) in updating the California Energy Code (Title 24, Part 6) for the 2022 code update cycle. Through CASE Reports, the Statewide CASE Team has provided the Energy Commission with the technical and cost-effectiveness information required to make informed judgments on proposed standards for promising energy efficiency design practices and technologies.

The Statewide CASE Team encourages the Energy Commission to consider the recommendations presented in this document.

1. Summary of Recommended Revisions

Section 130.1(c)5 of Title 24, Part 6 has been updated for simplification but also results in a reduction in stringency as non-general lighting in the specified areas are no longer

¹CEC Docket #21-BSTD-01, Document #237717

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=237717&DocumentContentId=70942>

required to install occupancy sensors. Additional simplification, without reducing stringency, can be achieved by requiring the control of “all lighting” in small offices, multipurpose rooms, classrooms, conference rooms, and restrooms instead of general lighting, and by the use of exceptions to clarify when a simple on/off occupancy sensor can be used.

Section 130.1(d) of Title 24, Part 6 has been updated to include automatic daylighting controls for the secondary sidelit daylight zones, which were previously prescriptively required in Section 140.6(d). The exceptions to sidelit daylight controls² were also moved to Section 130.1(d) but as written can be interpreted as overly inclusive. Specifically, Exceptions 4 and 5 can be interpreted to mean all daylighting controls in all daylight zones are exempted, but these exceptions are intended to apply only to the secondary sidelit daylight zones.

The prescriptive lighting power densities (LPDs) found in Table 140.6-C have been updated but formatting has made some LPDs ambiguous in terms of which area they apply to. The additional allowance LPD for Lobby and Main Entry area was also not updated to the value proposed by the Statewide CASE Team in the Nonresidential Indoor Lighting CASE Report.³ Finally, after additional review, the Statewide CASE Team is recommending increasing the LPD slightly for the Barber, Beauty Salon, Spa Area to support a greater range of applications.

2. Preventing Stringency Reduction for Occupant Sensing Control Requirements

In the May 2021 45-Day Express Terms, the Energy Commission updated Section 130.1(c)5 by clarifying and simplifying the language. However, in doing so, the Energy Commission reduced the stringency of occupant sensing control requirements for non-general lighting in small offices, multipurpose rooms, classrooms, conference rooms, and restrooms covered by this section. While simplification is essential, it should not come at the cost of a roll-back, which increases energy consumption. The Statewide CASE Team recommends the Energy Commission update this section to include specific requirements for manual ON, partial-ON, and manual shut-OFF. The proposed code language makes use of exceptions to state the occupancy sensing requirements more clearly. The intent of the requirement is that all lighting in the list of occupancies are required to have partial-ON occupancy controls or manual-ON occupancy controls,

² Exceptions 4 and 5 to Section 130.1(d)

³ The Final CASE Report can be found online: https://title24stakeholders.com/wp-content/uploads/2020/09/2022-T24-Indoor-Lighting_Final-CASE-Report_Statewid-CASE-Team.pdf

except for restrooms and lighting systems not required by Section 130.1(b) to be multi-level.

Newly proposed exception 1 to 130.1(c)5 allows restrooms to be a an on/off occupancy sensing control for two reasons:

1. There may be only one light in a small restroom, and
2. If the light goes out while someone is in a stall, it is desirable that the occupant can turn the lights back on without moving to a switch.

The Statewide CASE Team is also recommending removing 130.1(c)1D to clarify this point. As written, 130.1(c)1D could be interpreted as needing a separate occupancy sensor and a separate timeclock channel for each of these categories of lighting.

Recommended revisions to the May 2021 45-Day Express Terms are included below in red. The Statewide CASE Team's recommended language insertions are underlined and recommended language deletions are ~~struck~~.

SECTION 130.1 – MANDATORY INDOOR LIGHTING CONTROLS

...

(c) Shut-OFF Controls. All installed indoor lighting shall be equipped with controls able to automatically reduce lighting power when the space is typically unoccupied.

EXCEPTION 1 to Section 130.1(c): Healthcare facilities.

EXCEPTION 2 to Section 130.1(c): Lighting providing means of egress illumination, as the term is used in the California Building Code, shall be configured to provide no less than the amount of light required by California Building Code Section 1008 while in the partial-off mode.

1. In addition to lighting controls installed to comply with Sections 130.1(a) and (b), all installed indoor lighting shall be equipped with controls that meet the following requirements:

- A. Shall be controlled with an occupant sensing control, automatic time-switch control, or other control capable of automatically shutting OFF all of the lighting when the space is typically unoccupied; and
- B. Separate controls for the lighting on each floor, other than lighting in stairwells; and
- C. Separate controls for a space enclosed by ceiling height partitions not exceeding 5,000 square feet; and

EXCEPTION to Section 130.1(c)1C: ~~In the following function areas~~ The area controlled may not exceed 20,000 square feet in the following function areas :

Malls, auditoriums, single tenant retail, industrial, convention centers, and arenas;

~~D. Separate controls for general, display, ornamental, and display case lighting;~~
~~and.~~

~~E. For automatic time switch controls, may include a manual on mode.~~

...

5. Areas where Occupant Sensing Controls are required to shut OFF All Lighting for specified offices, multipurpose rooms, classrooms, conference rooms and restrooms. In offices 250 square feet or smaller, multipurpose rooms of less than 1,000 square feet, classrooms of any size, conference rooms of any size, and restrooms of any size, lighting shall be controlled with occupant sensing controls to automatically shut OFF all of the lighting ~~when the room is unoccupied~~ within 20 minutes of the control zone being unoccupied. The controls shall meet the following requirements:

A. General lighting subject to section 130.1(b) to use occupant controls that shall function as either a Vacancy sensing or as a Partial-ON occupant control. All other lighting to be controlled with either Occupant sensing, Vacancy sensing, or Partial-On occupant control. Partial-on occupant sensing controls shall automatically activate between 50-70 percent of controlled lighting power when the control zone is occupied.

B. Controls shall be configured to allow the lights to be manually shut-OFF in accordance with Section 130.1(a) regardless of the sensor status.

EXCEPTION to Section 130.1(c)5A: Lighting in restrooms controlled by an occupant sensor.

3. Moving Secondary Sidelit Daylit Zone from Prescriptive to Mandatory

Automatic daylighting control requirements for secondary sidelit daylit zones have been moved from the prescriptive section (Section 140.6) to the mandatory section (Section 130.1). Part of this migration includes updating language to clarify wattage thresholds for when automatic daylighting controls are required for the primary and secondary sidelit daylit zones.

The May 2021 45-Day Express Terms included two new exceptions to explain this relationship, but may be interpreted as affecting the required controls in all daylit zones instead of applying the exception only to controlled general lighting in the secondary sidelit daylight zone. Specifically, Exception 4 to Section 130.1(d) can be interpreted as meaning automatic daylighting controls are not required in either the primary or

secondary sidelit daylit zones when the total installed general lighting power in the secondary sidelit daylight zones is less than 120 watts. However, the intent of this exception is that no automatic daylighting controls are required in the secondary sidelit daylight zone when there is less than 120 watts installed in the secondary sidelit daylight zone. Likewise, Exception 5 to Section 130.1(d) can be interpreted as no automatic daylighting controls are required in either the primary or secondary sidelit daylit zones when less than 240 watts are installed in the combined daylit zones. Again, the intent of exception is that automatic daylighting controls are only exempt in the secondary sidelit daylit zones in this scenario.

The Statewide CASE Team recommends the Energy Commission update the exceptions to clarify that automatic daylighting controls are only exempted from the secondary sidelit daylit zones in both scenarios.

Recommended revisions to the May 2021 45-Day Express Terms are included below in red. The Statewide CASE Team's recommended language insertions are underlined and recommended language deletions are ~~struck~~.

SECTION 130.1 – MANDATORY INDOOR LIGHTING CONTROLS

(d) **Automatic Daylighting Controls.** The general lighting in skylit daylit zones, ~~and~~ primary sidelit daylit zones, and secondary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall be provided with controls that automatically adjust the power of the installed lighting up and down to keep the total light level stable as the amount of incoming daylight changes. For skylights located in an atrium, the skylit daylit zone definition shall apply to the floor area directly under the atrium and the top floor area directly adjacent to the atrium.

...

~~EXCEPTION 4 to Section 130.1(d): Rooms in which the total installed general lighting power in the Secondary Sidelit Daylit Zone is less than 120 watts do not require automatic daylighting controls in the daylit zones.~~

~~EXCEPTION 5 to Section 130.1(d): Rooms in which the total installed wattage of the general lighting in the primary and the secondary sidelit daylit zones is less than 240 watts do not require automatic daylighting controls in the sidelit daylit zones.~~

EXCEPTION 4 to Section 130.1(d): Enclosed spaces where the total installed general lighting power in the Secondary Sidelit Daylit Zone is less than 120 watts or where the total installed general lighting power for the Primary and Secondary Sidelit Daylit Zones are less than 240 watts, automatic daylighting controls are not required for lighting in the Secondary Sidelit Daylit Zones.

4. Clarifying the Area Category Method

Table 140.6-C outlines the prescriptive lighting power density (LPD) values in units of Watts per square feet, for the Area Category Method for indoor lighting spaces, but a few of the values would benefit from clarification. The additional allowance for the Cafeteria/Fast Food area (part of Dining Area) is ambiguously formatted and could be interpreted as 0.35 watts per square foot (W/ft²), which is the Bar/Lounge and Fine Dining additional allowance, or it could be interpreted as not having an additional allowance. The Statewide CASE Team recommended the additional allowance for Cafeteria/Fast Food area be 0.25 W/ft², which is the same for Family and Leisure area.

The Concourse and Atria area appear to be combined with the Convention, Conference, Multipurpose and Meeting Area. This also appears to be a formatting issue, but the Statewide CASE Team wants to ensure the formatting is updated.

The additional allowance for the Lobby, Main Entry area is listed as 0.35 W/ft² in the May 2021 45-Day Express Terms, but the Statewide CASE Team proposed the additional allowance be updated to 0.25 W/ft² in the Nonresidential Indoor Lighting CASE Report. The Statewide CASE Team recommends the additional allowance be updated to the 0.25 W/ft² value.

After evaluating a broader range of design intents for Barber, Beauty Salon, Spa Area, and recognizing that these occupancies are not covered under the Tailored Method, the Statewide CASE Team recommends a moderate increase in the LPD in the May 2021 45-Day Express Terms but less than the LPDs in the 2019 Energy Code. As compared to the May 2021 45 Day Express Terms, general lighting LPD would be increased from 0.65 W/ft² to 0.70 W/ft² and the detailed task allowance from 0.20 W/ft² to 0.30 W/ft². Ornamental lighting would stay the same at 0.25 W/ft².

Recommended revisions to the May 2021 45-Day Express Terms are included below in **red**. The Statewide CASE Team's recommended language insertions are underlined and recommended language deletions are ~~struck~~.

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

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TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES
(WATTS/FT²)

Primary Function Area	Allowed Lighting Power Density for General Lighting (W/ft ²)	Additional Lighting Power ¹	
		Qualified Lighting Systems	Additional Allowance (W/ft ² , unless noted otherwise)
<u>Barber, Beauty Salon, Spa Area</u>	0.65 <u>0.70</u>	Detailed Task Work ⁷	0.20 <u>0.30</u>
		Display/Decorative	<u>0.25</u>

...

Concourse and Atria Area		<u>0.60</u>	<u>Decorative/Display</u>	<u>0.25</u>
Convention, Conference, Multipurpose and Meeting Area	Shipping and Handling	0.75 <u>0.60</u>	<u>Decorative/Display</u>	<u>0.25</u>

...

Dining Area	Bar/Lounge and Fine Dining	0.55 <u>0.45</u>	<u>Decorative/Display</u> Ornamental	0.30 <u>0.35</u>
	Cafeteria/Fast Food	0.40 <u>0.45</u>	<u>Decorative/Display</u>	<u>0.25</u>
	Family and Leisure	<u>0.50</u>		
	<u>Family and Leisure</u>	<u>0.40</u>	<u>Decorative/Display</u>	<u>0.25</u>

...

Lobby, Main Entry		<u>0.70</u>	<u>Decorative/Display</u>	0.35 <u>0.25</u>
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5. Proposed Code Language

Recommended revisions to the May 2021 45-Day Express Terms are included in this document in **red**. The Statewide CASE Team's recommended language insertions are **underlined** and recommended language deletions are **struck**. This section compiles all of the recommended revisions in each section above.

SECTION 130.1 – MANDATORY INDOOR LIGHTING CONTROLS

...

(c) Shut-OFF Controls. All installed indoor lighting shall be equipped with controls able to automatically reduce lighting power when the space is typically unoccupied.

EXCEPTION 1 to Section 130.1(c): Healthcare facilities.

EXCEPTION 2 to Section 130.1(c): Lighting providing means of egress illumination, as the term is used in the California Building Code, shall be configured to provide no less than the amount of light required by California Building Code Section 1008 while in the partial-off mode.

1. In addition to lighting controls installed to comply with Sections 130.1(a) and (b), all installed indoor lighting shall be equipped with controls that meet the following requirements:

A. Shall be controlled with an occupant sensing control, automatic time-switch control, or other control capable of automatically shutting OFF all of the lighting when the space is typically unoccupied; and

B. Separate controls for the lighting on each floor, other than lighting in stairwells; and

C. Separate controls for a space enclosed by ceiling height partitions not exceeding 5,000 square feet; and

EXCEPTION to Section 130.1(c)1C: ~~In the following function areas~~ The area controlled may not exceed 20,000 square feet in the following function areas: Malls, auditoriums, single tenant retail, industrial, convention centers, and arenas;

~~D. Separate controls for general, display, ornamental, and display case lighting; and.~~

~~E. For automatic time switch controls, may include a manual on mode.~~

...

5. Areas where Occupant Sensing Controls are required to shut OFF All Lighting for specified offices, multipurpose rooms, classrooms, conference rooms and restrooms. In offices 250 square feet or smaller, multipurpose rooms of less than 1,000 square feet, classrooms of any size, conference rooms of any size, and restrooms of any size, lighting shall be controlled with occupant sensing controls to automatically shut OFF all of the lighting ~~when the room is unoccupied~~ within 20 minutes of the control zone being unoccupied. The controls shall meet the following requirements:

A. General lighting subject to section 130.1(b) to use occupant controls that shall function as either a Vacancy sensing or as a Partial-ON occupant control. All other lighting to be controlled with either Occupant sensing, Vacancy sensing, or Partial-On occupant control. Partial-on occupant sensing controls shall automatically activate between 50-70 percent of controlled lighting power when the control zone is occupied.

B. Controls shall be configured to allow the lights to be manually shut-OFF in accordance with Section 130.1(a) regardless of the sensor status.

EXCEPTION to Section 130.1(c)5A: Lighting not subject to the multi-level lighting requirements of section 130.1(b) controlled by an occupant sensor.

...

(d) Automatic Daylighting Controls. The general lighting in skylit daylit zones, ~~and~~ primary sidelit daylit zones, and secondary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall be provided with controls that automatically adjust the power of the installed lighting up and down to keep the total light level stable as the amount of incoming daylight changes. For skylights located in an atrium, the skylit daylit zone definition shall apply to the floor area directly under the atrium and the top floor area directly adjacent to the atrium.

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~~EXCEPTION 4 to Section 130.1(d): Rooms in which the total installed general lighting power in the Secondary Sidelit Daylit Zone is less than 120 watts do not require automatic daylighting controls in the daylit zones.~~

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EXCEPTION 4 to Section 130.1(d): Enclosed spaces where the total installed general lighting power in the Secondary Sidelit Daylit Zone is less than 120 watts or where the total installed general lighting power for the Primary and Secondary Sidelit Daylit Zones are less than 240 watts, automatic daylighting controls are not required for lighting in the Secondary Sidelit Daylit Zones.

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

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*TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES
(WATTS/FT²)*

Primary Function Area	Allowed Lighting Power Density for General Lighting (W/ft ²)	Additional Lighting Power ¹	
		Qualified Lighting Systems	Additional Allowance (W/ft ² , unless noted otherwise)
<u>Barber, Beauty Salon, Spa Area</u>	0.65 <u>0.70</u>	Detailed Task Work ⁷	0.20 <u>0.30</u>
		Display/Decorative	<u>0.25</u>

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Concourse and Atria Area		<u>0.60</u>	<u>Decorative/Display</u>	<u>0.25</u>
Convention, Conference, Multipurpose and Meeting Area	Shipping and Handling	0.75 <u>0.60</u>	<u>Decorative/Display</u>	<u>0.25</u>

...

Dining Area	Bar/Lounge and Fine Dining	0.55 <u>0.45</u>	<u>Decorative/Display</u> Ornamental	0.30 <u>0.35</u>
	Cafeteria/Fast Food	0.40 <u>0.45</u>	<u>Decorative/Display</u>	<u>0.25</u>
	Family and Leisure	<u>0.50</u>		
	<u>Family and Leisure</u>	<u>0.40</u>	<u>Decorative/Display</u>	<u>0.25</u>

...

Lobby, Main Entry		<u>0.70</u>	<u>Decorative/Display</u>	0.35 <u>0.25</u>
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