Proposal Summary

Indoor Lighting Power Density

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Prepared by: Jon McHugh (McHugh Energy), Bernie Bauer (Integrated Lighting Concepts) and Yao-Jung Wen (Energy Solutions)

Measure Description

This code change proposal aims to update the mandatory methodology for allocating wattage to installed lighting wattage and update the prescriptive requirements on lighting power density (LPD) for nonresidential indoor spaces. The LPD requirements dictate the maximum lighting power allowed in each building type or space type within a building. Consideration of the following three factors is the basis for updating the LPD values:

1) The increase in light source luminous efficacy due to advancements in LED technologies since the last update in the 2022 code cycle.
2) Area categories where the national standards (2025 ASHRAE 90.1) and other model codes (2024 IECC) have more stringent LPD requirements than 2025 Title 24, Part 6.
3) Alignment with current industry practice in the lamp lumen depreciation (LLD) assumptions used in deriving the LPD requirements.

This proposal also includes the creation of a new data center-related building type or a new area category for the complete building method or the area category method, respectively, along with the development of corresponding LPD values.

The current LPD values of all building types and area categories will be reviewed and updated as necessary. The update would apply to new construction, additions, and alterations of nonresidential buildings as well as non-dwelling spaces within multifamily buildings.

Table 1 summarizes the scope of the proposed code change.

Table 1: Scope of Proposed Code Change

An “X” indicates the proposed code change is relevant.

Building Type(s)		single family	**Construction Type(s)**	X	new construction
	X	multifamily		X	additions
	X	nonresidential		X	alterations
Type of Change	X	mandatory	**Updates to Compliance Software**		no updates
	X	prescriptive		X	update existing feature
		performance			add new feature
Third Party Verification	X	no changes to third party verification			
		update existing verification requirements			
		add new verification requirements			

Justification for Proposed Change

Indoor LPD requirements underwent a significant update in the 2019 code cycle and were slightly updated for a limited set of area and building categories in the 2022 code cycle. The Statewide CASE Team reviewed the current LED light source efficacy and requirements in national standards and other model codes. The LPD values for certain spaces in these standards and model codes are already lower than the LPD values in the 2025 Title 24. ASHRAE 90.1 (Energy Standard for Buildings Except Low-Rise Residential Buildings) has already published lower LPD values for some spaces in Addendum S to ASHRAE 90.1-2022 and the same general lighting LPD values have been proposed for the 2027 version of IECC (International Energy Conservation Code). The Statewide CASE Team also recognized that the light loss factors, specifically, the lamp lumen depreciation (LLD) values used to derive the LPD values for past code cycles, have been based on factors for traditional light sources, despite the underlying technology for the LPD values already being LED. This appears to be inconsistent with current industry practices and should be updated accordingly.

Current code requirements have not explicitly addressed LPDs for data centers and the related spaces. Given the rapid growth in data center construction to support cloud computing and artificial intelligence, it is critical to ensure illumination services are provided with high energy efficiency in data centers. Therefore, the Statewide CASE Team recommends including data centers and related spaces as part of the effort in updating the LPD requirements.

Updating the LPD requirements presents a significant opportunity for savings, highlighting that lighting remains one of the most impactful building end-uses for reducing energy demand and the carbon footprint of nonresidential buildings.

Data Needs / Information Requests

The Statewide CASE Team is seeking the following information to inform the code change proposal. Data may be provided anonymously. To participate or provide information, please email Jon McHugh, info@mchughenergy.com directly and copy info@title24stakeholders.com.

- Lamp lumen depreciation (LLD) and other light loss factors (LLF) assumptions used in the current lighting design practice.
- Latest cost data on high-efficacy LED lamps and luminaires.
- The LPDs achieved in lighting designers' project portfolios.
- Any trade-offs lighting designers may have made in lighting quality or performance to achieve the LPDs in their portfolio.
- Methods of preventing changes to luminaire wattage after wattage selectable luminaires are installed (disabling output selection mechanism, passwords etc.)
- Lighting specifiers to volunteer for an advisory committee and provide guidance to the Statewide CASE Team on specifications, including—but not limited to—energy modeling assumptions and methodologies.

Draft Code Language

1.1 Guide to Marked Up Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2025 documents are marked with blue underlining (new language) and ~~strikethroughs~~ (deletions).

1.2 Title 24, Part 1

There are no proposed changes to Title 24, Part 1.

1.3 Title 24, Part 6

Indoor lighting power compliance is achieved by showing that Adjusted Indoor Lighting Power as calculated according to Section 140.6(a) is less than the Allowed Indoor

Lighting Power as calculated according to Section 140.6(b) and Section 140.6(c) including the use of the LPD (lighting power density) values in Table 140.6-B Complete Building Method or Table 140.6-C Area Category Method.

The Adjusted Indoor Lighting Power is calculated from the total installed wattage of luminaires as defined in Section 130.0(c) *"Luminaire classification and power,"* and as modified by various wattage exclusions and wattage modifications in Section 140.6(a). This proposal does not include any changes to Section 140.6(a) but does propose the following changes to Section 130.0(c) designed to better align with recent changes on how to define installed wattage in ASHRAE 90.1-2022 (see 90.1-2022 Addendum CK https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20addenda/90_1_2022_ck_20250731.pdf)

SECTION 130.0 – LIGHTING SYSTEMS AND EQUIPMENT, AND ELECTRICAL POWER DISTRIBUTION SYSTEMS —GENERAL

…

(c) Luminaire classification and power. Luminaires shall be classified, and their wattage shall be determined as follows:

~~1. Luminaire wattage shall be labeled as follows:~~

~~A. The maximum rated wattage or relamping rated wattage of a luminaire shall be listed on a permanent, preprinted, factory installed label, as specified by UL 1574, 1598, 2108 or 8750, as applicable; and~~

~~B. The factory-installed maximum rated wattage or relamping rated wattage label shall not consist of peel-off or peel-down layers or other methods that allow the rated wattage to be changed after the luminaire has been shipped from the manufacturer.~~

~~**Exception to Section 130.0(c)1B:** Peel-down labels may be used only for the following luminaires, when they can accommodate a range of lamp wattages without changing the luminaire housing, ballast, transformer or wiring. Qualifying luminaires shall have a single lamp, and shall have integrated ballasts or transformers. Peel- down labels must be layered such that the rated wattage reduces as successive layers are removed.~~

~~i. High-intensity discharge luminaires, having an integral electronic ballast, with a maximum relamping rated wattage of 150 watts.~~

~~ii. Low-voltage luminaires (except low voltage track systems), £ 24 volts, with a maximum relamping rated wattage of 50 watts.~~

~~iii. Compact fluorescent luminaires, having an integral electronic ballast, with a maximum relamping rated wattage of 42 watts.~~

~~2.~~ 1. For luminaires with line voltage lamp holders not served by drivers, ballasts, or transformers; the wattage of such luminaires shall be ~~determined as the maximum relamping rated wattage as labeled in accordance with Section 130.0(c)1~~. the labeled maximum wattage of the specified and installed lamps or solid state lighting (SSL) light engines.

2. For inseparable SSL luminaires and SSL luminaires with remotely mounted drivers, the wattage of such luminaires shall be as follows:

A. For luminaires where the lumen output and wattage settings are factory-set and not field-adjustable, the wattage shall be the labeled wattage of the luminaire listed on a permanent, preprinted, factory installed label, as specified by UL 1574, 1598, 2108 or 8750, as applicable, or

B. For luminaires with field-adjustable lumen output settings, the wattage shall be the maximum field-adjustable wattage of the luminaire once initially installed. The maximum field-adjustable wattage shall be the maximum wattage that is possible to be selected without removing the luminaire. The labeled wattage of the luminaire at its different output settings listed on a permanent, preprinted, factory installed label, as specified by UL 1574, 1598, 2108 or 8750, as applicable and shall be marked with the power setting selected.

3. For high intensity discharge (HID) or fluorescent luminaires with permanently installed or remotely installed ballasts, the wattage of such luminaires shall be the operating input wattage of the rated lamp/ballast combination published in the ballast manufacturer's catalogs based on independent testing lab reports as specified by UL 1598. Solid state lighting (SSL) shall not be used in conjunction with HID or fluorescent ballasts.

~~4. For inseparable SSL luminaires and SSL luminaires with remotely mounted drivers, the maximum rated wattage shall be the maximum rated input wattage of the SSL luminaire as specified in Section 130.0(c)1 when tested in accordance with UL 1598, 2108 or 8750, or IES LM-79.~~

4. ~~5~~. For LED tape lighting and LED linear lighting with LED tape lighting components, the maximum rated wattage shall be the sum of the installed length of the tape lighting times its rated linear power density in watts per linear feet, or the maximum rated input wattage of the driver or power supply providing power to the lighting system, with tape lighting tested in accordance with UL 2108 or 8750, or IES LM-79.

5. ~~6~~. For modular lighting systems that allow the addition or relocation of luminaires without altering the wiring of the system, shall be determined as follows:

A. The wattage shall be the greater of:

i. 30 watts per linear foot of track or plug-in busway; or

ii. the rated wattage of all of the luminaires included in the system, where the luminaire wattage is determined as specified in Section 130.0(c)1.

B. For line-voltage lighting track and plug-in busway served by a track lighting integral current limiter or a dedicated track lighting supplementary overcurrent protection panel, the wattage shall be determined as follows:

i. The volt-ampere rating of the current limiter as specified by UL 1077; or

ii. The sum of the ampere (A) rating of all of the current protection devices times the branch circuit voltages for track lighting supplementary overcurrent protection panel.

C. For other modular lighting systems with power supplied by a driver, power supply or transformer, including but not limited to low-voltage lighting systems, the wattage of the system shall be the maximum rated input wattage of the driver, power supply or transformer published in the manufacturer's catalogs, as specified by UL 2108 or 8750.

Exception to Section 130.0(c)5C~~6~~: For power-over-Ethernet lighting systems, power provided to installed nonlighting devices may be subtracted from the total power rating of the power-over-Ethernet system.

6~~7~~. For all other lighting equipment not addressed by Sections 130.0(c)1~~2~~ through 5~~6~~, the wattage of the lighting equipment shall be the maximum rated wattage of the lighting equipment, or operating input wattage of the system, on a permanent, preprinted, factory installed label, as specified by UL 1574, 1598, 2108 or 8750, as applicable ~~labeled in accordance with Section 130.0(c)1,~~ or published in manufacturer's catalogs, based on independent testing lab reports as specified by UL 1574, 1598, 2108 or 8750, or IES LM-79.

SECTION 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING NONRESIDENTIAL, AND HOTEL/MOTEL BUILDINGS, TO EXISTING OUTDOOR LIGHTING, AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS

…

(b) Alterations. Alterations to components of existing nonresidential,…

2. Prescriptive approach. The altered components of the envelope, or space conditioning, lighting, electrical power distribution and water heating systems, and any newly installed equipment serving the alteration, shall meet the applicable requirements of Sections 110.0 through 110.9, Sections 120.0 through 120.6, and Sections 120.9 through 130.5….

I. Altered Indoor Lighting Systems. Alterations to indoor lighting systems that include 10% or more of the luminaires serving an enclosed space shall meet the requirements of i, ii, or iii below:

i. The alteration shall comply with the indoor lighting power requirements specified in Section 140.6 and the lighting control requirements specified in Table 141.0-F;

ii. The alteration shall not exceed 80% of the indoor lighting power requirements specified in Section 140.6, and shall comply with the lighting control requirements specified in Table 141.0-F; or

iii. The alteration shall be a one-for-one luminaire alteration within a building or tenant space of 5,000 square feet or less, the total wattage of the altered luminaires shall be at least 40% lower compared to their total pre-alteration wattage, and the alteration shall comply with the lighting control requirements specified in Table 141.0-F.

Alterations to indoor lighting systems shall not prevent the operation of existing, unaltered controls, and shall not alter controls to remove functions specified in Section 130.1.

Alterations to lighting wiring are considered alterations to the lighting system. Alterations to indoor lighting systems are not required to separate existing general, floor, wall, display, or decorative lighting on shared circuits or controls. New or completely replaced lighting circuits shall comply with the control separation requirements of Section 130.1(a)3.

Solid state lighting (SSL) shall not be used in conjunction with HID or fluorescent ballasts.

Exception 1 to Section 141.0(b)2I: Alteration of portable luminaires, luminaires affixed to moveable partitions, or lighting excluded as specified in Section 140.6(a)3.

Exception 2 to Section 141.0(b)2I: Any enclosed space with only one luminaire.

Exception 3 to Section 141.0(b)2I: Any alteration that would directly cause the disturbance of asbestos unless the alteration is made in conjunction with asbestos abatement.

Exception 4 to Section 141.0(b)2I: Acceptance testing requirements of Section 130.4 are not required for alterations where lighting controls are added to control 20 or fewer luminaires.

Exception 5 to Section 141.0(b)2I: Any alteration limited to adding lighting controls or replacing lamps, ballasts, or drivers, not including where a HID or fluorescent ballast is being used in conjunction with a solid state lighting (SSL) light source.

Exception 6 to Section 141.0(b)2I: One-for-one luminaire alteration of up to 50 luminaires either per complete floor of the building or per complete tenant space, per annum.

The primary proposed changes to Title 24, part 6, from this proposal will be the changes to the values in Table 140.6-B *Complete Building Method Lighting Power Density Values* and Table 140.6-C *Area Category Method - Lighting Power Density Values*. These updates to the LPDs will be posted later.

A copy of the 2025 version of Title 24, part 1 and part 6 can be downloaded from the California Energy Commission website at:
https://www.energy.ca.gov/sites/default/files/2025-07/CEC-400-2025-010-F_0.pdf

1.4 Reference Appendices

There are no proposed changes to the reference appendices.