

**DOCKETED**

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*Comment Received From: Jim R Stewart, PhD  
Submitted On: 12/6/2023  
Docket Number: 22-BSTD-01*

**Re 2025 Energy Code Pre-Rulemaking “ Express Terms Fix  
Lighting Allowances**

*Additional submitted attachment is included below.*

California Energy Commission  
Re: Docket No. 22-BSTD-01  
715 P Street  
Sacramento, CA 95814  
docket@energy.ca.gov

**Re: 2025 Energy Code Pre-Rulemaking – Express Terms: Fix Lighting Allowances**

Dear Commissioners

These comments are in response to the pre-rulemaking draft of the Express Terms for the 2025 update to the California Energy Code. Environmental activists are encouraged by the CEC efforts to decarbonize the building stock of the State of California. Key to reducing the carbon footprint of buildings is to reduce the loads on building, then consider the lowest carbon source for meeting these loads including on-site renewables.

We are generally supportive of simplifying the energy code and eliminating the tailored lighting calculation method as part of that simplification. However, we are concerned that moving the higher lighting power density allowances from the tailored method into the area category method will result in more designers using these higher allowances, thus using more lighting power than needed.

Please see the attached detailed analysis of the potential lighting load increases that would result from the change proposed in the Express Terms. The analysis indicates the statewide energy consumption would be estimated to increase by around 13 GWh/yr. equivalent to 3,000 tons CO<sub>2e</sub>/yr, and adding a similar amount of new load every following year as compared to the status quo GHG emissions.

So far we are not aware of any compelling reason to increase the area category allowances for those applications where the tailored method was rarely used. We request that the Commission not include these additional allowances for Convention, Conference, Multipurpose and Meeting Areas, Main Entry Lobbies or Grocery Sales areas.

Thus the Commission should reject the proposed additional allowances for these space types.

Thanks,

Jim Stewart, PhD

**Analysis of the Impact of Moving Higher Lighting Power Density Allowances  
from the Tailored Method into the Area Category Method**

December 1, 2023

As identified by the proponent (California Lighting Technology Center- CLTC), only 2% of completed lighting projects used the tailored method. [CLTC, University of California Comments - 2025 Title 24 Lighting Language Cleanup Initiative - Initiative Overview & Findings, TN #250676, <https://efiling.energy.ca.gov/GetDocument.aspx?tn=250676&DocumentContentId=85462> ]

As shown in the table below from the CLTC’s presentation, only Retail Sales, Museum Exhibit Areas, Dining Areas, Religious Worship and Auditorium Areas had more than 1% of these spaces using tailored lighting method.

Space Function	Tailored	Area Category	Complete Building
Retail Merchandise Sales	409 (19%)	1517 (72%)	180 (9%)
Dining Area	62 (6%)	850 (80%)	152 (14%)
Multipurpose Area	18 (0.5%)	3025 (99.5%)	-
Exhibit Museum Area	12 (21%)	45 (79%)	-
Main Entry Lobby	7 (0.2%)	2798 (99.8%)	-
Conference Area	4	See Multipurpose	-
Showroom Area	3	-	-
Religious Worship Area	2	58	4
Grocery Store Area	2	272	6
Meeting Center Area	1	See Multipurpose	-
Auditorium Area	1	34	-

Space types with less than 1% usage of the tailored lighting method are:

1. Convention, Conference, Multipurpose and Meeting Area – 0.5%
2. Main Entry Lobby 0.2%
3. Grocery Sales 2/272 = 0.7%

Given that the current market makes use of the tailored method less than 1% of the time for these space types, this leads us to conclude:

1. These space types do not need the additional lighting power; they can use more effective design principles, more efficacious light sources, make use of the Power Adjustment Factors, or trade-off with other spaces, as have been done by 99% of these space types currently.
2. If this proposal to eliminate the tailored method is adopted, more than 1% of these space types will make use of the additional lighting power allowances. This is effectively reducing the stringency of the standard. If just 10% of projects made use of these credits normalized by adding them to the Area Category Method, this would increase statewide lighting consumption by 12.8 GWh/yr and increase GHG emissions by 3,000 tons/yr. This is a negative environmental impact.
3. We recommend that added lighting power allowances not be added for these space types. From the draft express terms, we have extracted proposed changes to these space types

that were added to TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>). The newly added power allowances are underlined and are in red font to highlight these changes.

- We recommend that the added additional allowances shown in underline be rejected for these space functions and that the area category method be required to use the current space category Lighting Power Densities (LPDs) without the added allowances transferred over from the Tailored lighting method.

TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)

Primary Function Area	Allowed Lighting Power Density for General Lighting (W/ft <sup>2</sup> )	Additional Lighting Power	
		Qualified Lighting Systems	Additional Allowance <sup>3</sup> (W/ft <sup>2</sup> , unless noted otherwise)
...			
Convention, Conference, Multipurpose and Meeting Area	0.75	Decorative/Display	0.25
<u>Convention, Conference, Multipurpose and Meeting Area</u>		<u>Wall Display MH &lt;= 10'6"</u>	<u>2 W/ft</u>
<u>Convention, Conference, Multipurpose and Meeting Area</u>		<u>Wall Display MH 10'7"-14'</u>	<u>2.35 W/ft</u>
<u>Convention, Conference, Multipurpose and Meeting Area</u>		<u>Wall Display MH &gt; 14'</u>	<u>2.66 W/ft</u>
<u>Convention, Conference, Multipurpose and Meeting Area</u>		<u>Floor Display &amp; Task MH &lt;= 10'6"</u>	<u>0.30</u>
<u>Convention, Conference, Multipurpose and Meeting Area</u>		<u>Floor Display &amp; Task MH 10'7"-14'</u>	<u>0.35</u>
<u>Convention, Conference, Multipurpose and Meeting Area</u>		<u>Floor Display &amp; Task MH &gt; 14'</u>	<u>0.40</u>
...			
Lobby, Main Entry	0.70	Decorative/Display	0.25
<u>Lobby, Main Entry</u>		<u>Wall Display MH &lt;= 10'6"</u>	<u>3 W/ft</u>
<u>Lobby, Main Entry</u>		<u>Wall Display MH 10'7"-14'</u>	<u>3.5 W/ft</u>
<u>Lobby, Main Entry</u>		<u>Wall Display MH &gt; 14'</u>	<u>4 W/ft</u>
...			
Grocery Sales	1.00	Decorative/Display	0.35
<u>Grocery Sales</u>		<u>Wall Display MH &lt;= 10'6"</u>	<u>6.6 W/ft</u>
<u>Grocery Sales</u>		<u>Wall Display MH 10'7"-14'</u>	<u>7.76 W/ft</u>
<u>Grocery Sales</u>		<u>Wall Display MH &gt; 14'</u>	<u>8.8 W/ft</u>
<u>Grocery Sales</u>		<u>Floor Display &amp; Task MH &lt;= 10'6"</u>	<u>0.60</u>
<u>Grocery Sales</u>		<u>Floor Display &amp; Task MH 10'7"-14'</u>	<u>0.70</u>
<u>Grocery Sales</u>		<u>Floor Display &amp; Task MH &gt; 14'</u>	<u>0.80</u>

Primary Function Area	Allowed Lighting Power Density for General Lighting (W/ft <sup>2</sup> )	Additional Lighting Power	
		Qualified Lighting Systems	Additional Allowance <sup>3</sup> (W/ft <sup>2</sup> , unless noted otherwise)
<u>Grocery Sales</u>		<u>General Lighting in the enclosed space of ceiling height &gt; 10'</u>	<u>0.10</u>

These estimates were developed by taking the publicly available data published in the “Nonresidential Indoor Lighting,” code change proposal for the 2022 California building energy code.

[https://title24stakeholders.com/wp-content/uploads/2020/09/2022-T24-Indoor-Lighting\\_Final-CASE-Report\\_Statewid-CASE-Team.pdf](https://title24stakeholders.com/wp-content/uploads/2020/09/2022-T24-Indoor-Lighting_Final-CASE-Report_Statewid-CASE-Team.pdf)

Data sources are listed as follows:

1. Prototype areas: Table 53
2. Statewide annual construction rates by Primary Function Area: Table 109
3. Annual full load operating hours: Table 50
4. Conversion of MWH/yr to Tons of GHGs/yr emitted: Divided GHGs in Table 3 by GWHs in Table 2 (240 tons CO<sub>2e</sub> per GWH)

The following table takes the prototype spaces and calculates the wall areas based on a 1.6 Length to width ratio. As an average between no wall display and all walls being used for display, we used 50% of wall length being counted as having display lighting. The proposed values increase based on ceiling height, we used a moderate 12 foot ceiling to provide the estimate in the middle of the range: some spaces are shorter and others are taller. This allows for all the allowances to be considered in terms of a Watt per square foot metric for estimating what it the total statewide and environmental impact of this proposed change to the area category approach for the space types that used the tailored method approach less than 1% of the time.

Primary Function Area	Prototype Area	Length (ft)	Width (ft)	Display Wall Fraction	Display Wall Length (ft)	Wall Display @12 ft (W/lin ft)	Wall display power (Watts)	Wall display LPD (W/ft <sup>2</sup> )	Floor Display @ 12 ft ht (W/ft <sup>2</sup> )	General Lighting > 10 ft height (W/ft <sup>2</sup> )	Total Additional LPD (W/ft <sup>2</sup> )
Convention, Conference, Multipurpose and Meeting Area	900	38	24	50%	62	2.35	145	0.16	0.35		0.51
Main Entry Lobby	1,800	54	34	50%	87	3.50	305	0.17			0.17
Retail Sales Area: Grocery Sales	4,800	88	55	50%	142	7.76	1105	0.23	0.70	0.10	1.03

The added wattage ranges between 0.17 W/sf for lobbies to 1.03 W/sf for grocery stores. For the multipurpose rooms the 0.51 W/sf is a 50% increase over the current area category method allowances of 0.75 W/ft<sup>2</sup> general lighting and an additional 0.25 W/ft<sup>2</sup> for decorative/display lighting. Similarly the 1.03 W/ft<sup>2</sup> additional lighting power allowance for grocery stores is a 75% increase over the current area category method allowances of 1.0 W/ft<sup>2</sup> general lighting and an additional 0.35 W/ft<sup>2</sup> for decorative/display lighting. The State of California should not be promoting a “new normal” of grocery store lighting greater than 2 W/ft<sup>2</sup>.

Primary Function Area	Increase in Allowed LPD (W/ft <sup>2</sup> )	Combined NC + Alterations Area (Million ft <sup>2</sup> /yr)	Annual Full Load Operating Hours	Conservative Increase in Use Tailored Values (%)	Increase in Electricity Consumption (MWh/yr)	Increase in GHG Emissions (Tons CO <sub>2</sub> e)
Convention, Conference, Multipurpose and Meeting Area	0.51	28.5	3,367	10%	4,904	1,179
Main Entry Lobby	0.17	31.1	3,367	10%	1,776	427
Retail Sales Area: Grocery Sales	1.03	16.9	3,515	10%	6,120	1,471
<b>Totals</b>		<b>76.5</b>			<b>12,799</b>	<b>3,077</b>

Finally with only a 10% increase in the use of these allowances the statewide energy consumption would be estimated to increase by around 12,799 MW/yr (12.8 GWh/yr) and adding a similar amount of new load every following year as compared to the status quo. This would have the effect of adding 3,000 metric tons per year of avoidable GHG emissions. This additional lighting power is not needed to see where you are walking or to read the ingredients on a can of soup, this additional power allowance allows one to make one’s store or convention center “brighter than the neighbors.” The LPDs help create a truce in escalating “light wars.” Reasonable limits on energy consumption are essential to achieve our energy and environmental goals.