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Comments on proposed Title 24-2022 Part 6 (lighting)

Please see attached comments.

Additional submitted attachment is included below.


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June 18, 2022

California Energy Commission
Commissioner Andrew McAllister
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Docket No. 21-BSTD-01 – 2022 Title 24 Part 6 45 Day Language

I'm a San Francisco-based lighting designer, having practiced in the field for 41 years. I was the resident lighting expert at the Pacific Energy Center from 2008-2011, and I have held many positions of responsibility in the industry. I also teach classes about energy codes and many other aspects of lighting to a wide variety of people.

Just this past Tuesday, I had the opportunity to sit in on a webinar given by Charles Knuffke about the proposed changes to Title 24 Part 6. In the interest of time, I'm going to basically submit his comments but adding my strong support for all of what he mentioned in his letter of March 17th. Unfortunately, I don't have the time to put this in my own wording. Plus, after sitting through his two-hour webinar review of this, I absolutely agree with all of the comments he had after explaining it all to the attendees. Thank you for your consideration.

From Charles Knuffke, on March 17th:

"Unlike the limited comments provided in our Pre-Rulemaking Express Terms review, this letter provides feedback on all changes we find either significant or concerning in the lighting sections of the code. Where applicable, we've provided suggestions on any language that we believe should be changed before the code language becomes final.

§100.1 – Definitions

We have concerns about the new additional code sections for multifamily projects but will cover that later in this letter. In Definitions however, we note three key phrases used in that part of the code have been added to the definitions:


Common Living Area Common Service Areas Common Use Areas

We believe Common Use Area is the aggregate of all Common Living Areas and Common Service Areas – if this is the case, the definition should state this outright.

Additionally, while the definition for Common Service Areas provides clear examples of the spaces it is referring to, this is not the case for Common Living Areas. To ensure no confusion, we suggest example spaces be listed for this term. We also note that *Table 170.2-M Area Category Method* calls out Lighting


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Power Density Values for Common Use Areas – can this be considered an exhaustive list of all Common Use Areas?

§110.12 – Demand Response

We view the move of all Demand Management requirements to *Section 110.12* of the code in 2019 to have been phenomenally successful, especially since the change promotes a holistic approach to the topic for new projects. Regarding the 2022 changes proposed for this code section, we offer the following comments...

§110.12(a)2 – Demand Responsive Controls

All demand responsive controls shall be capable of communicating to the VEN using a wired or wireless bi-directional communication pathway.

We're extremely pleased that this paragraph has been edited and the phrase "hard-wiring" has been removed from the code. Some installers have taken this phrase to mean a simple initiation contact closure to demand responsive lighting controls, while others have suggested it was intended to mean a Powerline Carrier method. Since there was no definition of the term in *Section 100.1* it was difficult to know which, if either, was correct. The updated language makes clear the true intent on how demand responsive controls must communicate to the VEN. We also believe opening the communication to any bi-directional protocol is a smart move for the Commission. The only change we might suggest is that rather than the term "pathway", protocol would be more descriptive as to the intent.

Currently the older code language is still called out in Reference Appendices NA7.6.3.1, but we trust this will be updated in the final language.

§110.12(c) – Demand Responsive Lighting Controls

*Nonresidential lighting systems subject to the requirements of Section 130.1(b) with a **general lighting power of 4,000 watts or greater**, shall have controls that are capable of automatically reducing lighting power in response to a Demand Response Signal. General lighting shall be reduced in a manner consistent with the uniform level of illumination requirements in TABLE 130.1-A.*

*1. For compliance testing, the lighting controls shall demonstrate a lighting power reduction in controlled spaces of a minimum of **15 percent below the total installed lighting power** as described in NA7.6.3. The controls may provide additional demand responsive functions or abilities.*

Repeated conversations with individuals associated with the CEC have verified our understanding of the language in this section – should the current 2019 code's 10,000ft² threshold be met, this section mandates the capability of reducing a percentage of all lighting power in the spaces left after the current 2019 code's Exception 1 was applied, and not just general lighting. For this reason, we're greatly concerned that the language has now been changed to a wattage based solely on general lighting.

We understand there are benefits to using a threshold based on wattage rather than a project's overall square footage. However, we're concerned that people might misunderstand that while the new wattage limit is based on General Lighting, the compliance testing requirement is based on total installed lighting

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power. People may be further confused because the current 2019 code *EXCEPTION 1 to Section 110.12(c)* clearly calls out:

EXCEPTION 1 to 110.12(c): Spaces with a lighting power density of 0.5 watts per square foot or less are not required to install demand responsive controls and do not count toward the 10,000 square foot threshold.

Note that this exception applied to all lighting power, and not just general lighting power, so the proposed change in the 2022 code that only general lighting would be considered will certainly reduce the number of spaces being considered to see if together they meet the 4,000W threshold. We believe the current code language is much clearer than the new text “*subject to the requirements of Section 130.1(b)*” which would exempt spaces with general lighting less than .5W/ft² and in spaces less than 100 ft² regardless of what the total lighting power is in that space.

To avoid the reduction of spaces that would be counted toward the Demand Response requirement, we would suggest that:

- 1) The current 2019 code’s *Exception 1 to 110.12(c)* should be left in place (since it only exempts spaces where the total lighting was less than .5W/ft²), and
- 2) The initial sentence be revised to read (changed text underlined or stricken through):

Nonresidential lighting systems subject to the requirements of Section 130.1(b) with a general lighting power of 4,000 watts or greater, shall have controls that are capable of automatically reducing a minimum of 15% of all lighting power in response to a Demand Response Signal.

We believe these changes make clear that all lighting not exempted in the 2019 Exception 1 sentence will be considered toward the 4,000W threshold, and that all remaining lighting should be used to demonstrate compliance.


If the above suggestions are seen as problematic, we strongly suggest that the 2019 Section 110.12(c) code language remain as is and unaltered for the 2022 code cycle since it will result in a significant rollback in stringency from the current 2019 code language. The proposed language would eliminate the Demand Response requirement from any facility that has considerable non-general lighting loads, including large retail establishments. At a time when many California Utilities have advertising campaigns asking consumers to reduce power usage from 4:00 – 9:00pm because of stress on the electrical grid between those times, it does not make sense to change the Demand Responsive Lighting selection criteria from the current all lighting in spaces to just general lighting. We believe the code was clear before that all lighting should be considered, and that the only mention of general lighting was included to indicate a uniform reduction be performed within individual spaces.

§110.12(e) – Demand Responsive Controlled Receptacles


Wanted to take the opportunity to thank all involved for the work done to include this new section in the code. With the significant reduction in available lighting design power seen over the last code cycles, plug loads have become larger components of building’s overall energy use. Adding this section (which we


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note will only apply when both Demand Responsive Lighting Controls and Controlled Receptacles are already required on a project) ensures that building owners will be given the option to readily include some portion of their receptacle loads in their Demand Management Sequence of Operation reduction strategy, should they wish to do so.

§120.1(d)5 – Occupant Sensor Ventilation Control Device

The current language in this section is confusing about the timing between a space becoming unoccupied and when the HVAC hardware had to go into occupied-standby mode. In fact, during a call to the CEC's Hotline just before the 2019 Energy Code took effect, we were provided an incorrect interpretation by the person we spoke with that day. We want to thank the CEC and their advisors for the edits made in this section of the Energy Code, as well as in 130.1(f), which now clearly indicates that when occupancy sensors are used to control space ventilation, a 5-minute grace time is allowed from when the occupancy sensors provide an unoccupied signal to when the HVAC system must react.

§130.1(a)1 - EXCEPTION to §130.1(a)1 – Manual Area Controls Readily Accessible

We greatly appreciate the addition of “*and areas of the building intended for access or use by the public*” to this paragraph. The revised language allows (not requires) designers to protect access to manual area controls in any public spaces when they believe it beneficial based on their project's needs.

§130.1(a)2 - EXCEPTION 1 to §130.1(a)2 – Manual Area Controls in Enclosed Spaces

Based on the commonsense approach taken in the above edit to *Exception to Section 130.1(a)1*, we would ask the CEC to consider a similar update to this exception (which over time has grown unwieldy with the addition of so many different spaces to the list). We strongly believe that designers should be able to use remote mounted or visually annunciated manual area controls wherever the design of the project would benefit from their use. If agreeable to this change, we believe *Exception 1* and *Exception 2* could be eliminated, and *Section 130.1(a)2* could simply state:

Be located in the same enclosed area with the lighting it controls, be located so that a person using the control can see the lights or area controlled by that control, or provide a visual signal or display showing the current state of the controlled lighting, and

§130.1(a) - EXCEPTION to §130.1(a) – Manual Area Controls in Egress Areas


Appreciate that the CEC plans on reducing the current 2019 code's .2W exception to .1W, since this aligns with the .1W called out in *EXCEPTION 3 to Section 130.1(c)1* for Shut Off control in Egress Areas. Many individuals (us included) have wondered why these two sections have included different wattage exceptions in their language.

§130.1(b) – EXCEPTION 1 to §130.1(b) – Multilevel Lighting Controls


An area enclosed by ceiling height partitions that has only one luminaire with no more than two lamps or has only one inseparable SSL luminaire.


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With the ubiquity of dimmable fixtures, we wonder why this specific exception isn't deleted entirely since the multilevel requirement only applies when the general lighting in a space $\geq 100\text{ft}^2$ is $> .5\text{W}/\text{ft}^2$. This may have been a concern previously but does not seem as important now.

§130.1(c)1D – Shut Off Controls for Different Lighting Types

Separate controls for general, display, ornamental, and display case lighting;

We understand that this language has been in place for many code cycles but thought now would be a good time to suggest that this specific requirement be edited.

Since this requirement is in the Shut Off control section, one might assume that “controls” would be the named shut off devices – i.e., a timeclock or motion detector. However, it would make little sense to install multiple occupancy sensors or multiple timeclocks in a single retail zone. What the code should be stating is the need for separate controllability for general, display, ornamental, and display case lighting and separate override devices for general, display, ornamental, and display case lighting. Separate controllability is assured when these lighting types are controlled using separate load control devices – relays, contactors, or other.

The requirement for the separate override devices is already called for in *Section 130.1(a)3*. Since multiple manual area controls (which serve as override devices) are required when there are different types of lighting, there's no reason to restate this in the shut off control section.

We wonder if this line could be deleted, but for now suggest this section be altered to read (note the change to decorative was included to meet the updated definition of ornamental):

Separate controllability controls of general, display, decorative ornamental, and display case lighting;

§130.1(c) – Exception 6 to §130.1(c)1 – Shut Off Controls for Egress Stairwells

Lighting in stairways provided that the stairway is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1.

We are surprised to see that stairwells have been exempted from the shutoff control requirements in *Section 130.1(c)1*, since this would be a major rollback in efficiency. During normal working hours, stairs often have light levels well above the egress requirement of one footcandle average, so controls should at least cut lighting back at least 50% and to no more than 1FC to maintain life safety requirements. We note that multiple firms have brought out lighting products for this specific application based on research that originated in California.

This is not an exception to the entire *Section 130.1(c)*, so we may be reading it incorrectly. Unfortunately, many will have a hard time understanding how to meet the stairwell requirements called out in *Section 130.1(c)6 and Section 130.1(c)7* with this exception in place, especially since these spaces are typically egress areas, and the new egress requirement called out in *Exception 2 to Section 130.1(c)* seems to override all others.


§130.1(c)1E – Manual On Overrides for Time Clocks


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There is little concern about deletion of the line that time clocks may use manual on switching - intelligent timeclocks have been using manual on switches for over 30 years, and since the word “may” was used in this section, it wasn’t truly a requirement. However, we note in the Initial Statement of Reasons 2022 Energy Code Proposed Changes that the reason given for this change is that Manual On switches are required in *Section 130.1(a)*. This is incorrect – that Section references Manual Switches, not Manual On Switches, so we wonder why this was the reason provided for the elimination of this requirement.

§130.1(c)2 – Countdown Timer Switches

We’ve been asking the CEC to reconsider their decision to eliminate Countdown Timer Switches from all but the two remaining spaces allowed in Title 24 since this change was first introduced. We will again point out that a properly set timer switch will save energy in many applications, especially storage facilities. We also believe the original change was done without a CASE study – something that should have been required for the removal of a commonly used device from the California marketplace. Our request would be to set a maximum time setting for Countdown Timers of 20 minutes and allow designers to use them for any lighting not specifically called out in *Sections 130.1(c)5-8*.

§130.1(c)5 – Required locations for Occupancy Sensors

There are several new changes that have been added between the release of the Express Terms Draft and the 45 language that showed up seemingly without reason or justification. These edits change the language significantly from the current 2019 code language.

Currently the 2019 code requires that when general lighting in a space has to follow *Table 130.0 – A* (space greater than 100ft² with general lighting greater than .5W/ft²), then that space is required to be controlled by occupancy sensors that are either Manual On or Partial On. Several years back, this section was going to be eliminated without reason, and during a public meeting at CEC Headquarters we pointed out that these requirements were included for specific energy efficiency reasons and should be left in the code. The language was not deleted at that time, which ensured that in rooms with dimmable lighting, energy usage would be maximized by reducing the initial light level used when the space became occupied.

We strongly advocate that Title 24 not move backwards by adopting the proposed changes in this section. We should not allow the occupancy sensor’s sequence of operation to bring lighting full on when the general lighting requirements of *Section 130.1(b)* are met for the listed space types. We are once again stating that we’ve seen no documented reason why small offices, multipurpose rooms, classrooms, conference rooms that are required to follow *Table 130 – A* should be allowed to go full on at initial occupancy instead of following the current 2019 code’s Manual On or Partial On to 50-70 percent requirement.

For these reasons, we respectfully request that except for the addition of the below paragraph (which previously was in *Table 130-A*), all edits to this section be removed and the current 2019 code language be left as is.


“The general lighting in the following areas are required to be controlled by partial-on occupant sensing controls capable of automatically activating between 50-70 percent of controlled lighting power: Classrooms with a connected lighting load of 0.6 watts per square feet or less.”


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§§130.1(c)6 and 7 – Sections only apply to General Lighting

Placing this comment here since it applies to both *Section 130.1(c)6* and *Section 130.1(c)7*. Previously the language in these sections applied to all lighting in the specified areas, but we've noted that a change was made in the initial paragraphs to state that these sections now only apply to General Lighting. We find this an interesting change, which may eliminate an issue we've seen in hotel corridors where both overhead lighting and small lights to illuminate the room numbers are present. We hope this proves to be a positive update in the code language.

§130.1(c)6 – Off or Partial Off Spaces

We apologize that we did not call out our concerns about the changes in this section previously but will do so now... We do not understand why spaces in this section must now go "Partial OFF" instead of the current 2019 code "full or partial OFF" requirement. We have not seen any CASE report or read reasons on why the changes in the first paragraph of the section were made. The Initial Statement of Reasons 2022 Energy Code Proposed Changes states that this change was made to remove redundancy but based on the definition of "Partial Off" in *Section 100.1* this is incorrect - Partial Off does not include full off, so we believe a mistake has been made with this proposed change. While partial off is an excellent control sequence of operation for these spaces, we believe that some designers might want simple off control in these spaces on their projects. Leaving the option of Full Off for these spaces may allow a less expensive approach to be used, providing a more cost effective design. We believe the designer should be able to decide which approach works best for the application – Off or Partial Off. We would ask that the language be returned to "Full or partial OFF" in the first sentence.

Additionally, a new metric been added referring to "*offices greater than 300 square feet*". We are surprised by the 300ft² reference since we've not seen offices of this size called out by the code. Since *Section 130.1(c)5* calls out offices of 250 square feet or smaller, shouldn't this be "*offices greater than 250 square feet*" so there is no gap between office areas called out in *Section 130.1(c)5* and *Section 130.1(c)6*?

If the thinking is that a partial on requirement called out in *Section 130.1(f)7* will take care of this issue, please see our note on that section below.

§130.1(c)6A – Aisle Ways and Open Areas

We have reviewed the text in the first paragraph, and while a significant part of the text is underlined, we cannot discern any actual change from current 2019 code text. Was the text here supposed to be updated?

§130.1(c)6D – Occupancy Sensors in Large Office Spaces

While a new Title 24 Code requirement, the language in this section is similar to that in the 2018 IECC Energy Code. We appreciate the work done by Energy Solutions and the CEC to bring this requirement into the 2022 Title 24 Energy Code. We were initially concerned that some of the proposed language for this section might make implementation difficult for the design community and responded so to the initial draft CASE Study. We're thankful for the open collaboration shown by the Energy Solutions CASE Team, and that the final language included in this section addressed our concerns.

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We would suggest only a small edit – in Section 130.1(c)6Div, instead of stating:

“...lighting shall be allowed to automatically turn on to full power upon occupancy...”

it should read:

“...lighting shall be allowed to automatically turn on to any level up to full power upon occupancy...”

Wattstopper believes this is a significant new requirement, one that will spur new design approaches to open offices while providing more granular control capability, while making it even easier for contractors and designers to meet the Lighting Alterations section of the code. We also hope this helps increase the number of energy saving lighting retrofits in California.

§130.1(c)8 – Hotel Room Controls

We have heard some suggest the elimination of hotel key cards as an allowed means of control in this code section. Having traveled to locations where these are in regular use, we still believe captive key cards are a simple way to provide lighting control in hotel rooms and should remain an allowed method of meeting shut off control for this application.

§130.1(d) – Daylighting

We believe it makes great sense to bring the secondary Sidelit Daylit Zone requirements out of *Section 140.6(d)* and move them into this section. This change should make it easier for those tasked with designing to meet the code (and those teaching the code) since this modification unites all daylighting rules in one section.

§130.1(d)3C – Daylighting Controls

We understand the desire to increase the required maximum of the electric light level reductions from 65%, we only wish that instead of the draft code calling out a 90% reduction, the reduction requirement was limited to 80%. It's been our unfortunate experience that some inexpensive LED drivers at 10% can have issues with flicker when at that level. We have rarely seen issues with fixtures at 20%, which is why we suggest a max 80% reduction.

§130.1(d) – EXCEPTIONS 3-5 to §130.1(d)1


We have found it difficult for designers to understand this code language, mainly because it's not clear if the word “and” is being used to indicate a list of areas in the code or is being used as “added to” in the mathematical sense. As an example, *Exception 3* states:

Rooms in which the total installed general lighting power in the Skylit Daylit Zone and Primary Sidelit Daylit Zone is less than 120 watts do not require automatic daylighting controls in the daylit zones.


This could be interpreted as:


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Rooms in which the installed general lighting power in the Skylit Daylit Zone added to the general lighting power in the Primary Sidelit Daylit Zone is less than 120 watts do not require automatic daylighting controls in the daylit zones.

Or it could be interpreted as:

Rooms in which the total installed general lighting power in the Skylit Daylit Zone is less than 120 watts do not require automatic daylighting controls in that daylit zone, and

Rooms in which the total installed general lighting power in the Primary Sidelit Daylit Zone is less than 120 watts do not require automatic daylighting controls in that daylit zone.

Would additionally add that *Exception 5 to Section 130.1(d)1* makes little sense since it can cancel out control requirements in a primary zone greater than 120W (or in a secondary zone that's greater than 120W) when the other zone is less than 120W. For instance, a Primary Zone of 130W would normally require daylighting controls, but if the load in the Secondary Zone is 109W, now no controls at all would be required.

We believe it would be easier to understand if the language in the code was re-written for clarity to something like:

Whenever any of the three potential daylit zones in a room (Primary, Secondary, or Skylit) have greater than 120 watts of general lighting, daylighting controls are required for those daylit zones.

§130.1(f)7 – Control Interactions

For lighting controlled by multilevel lighting controls and by occupant sensing controls that provide an automatic-on function, the controls shall provide a partial-on function that is capable of automatically activating between 50-70 percent of controlled lighting power.

While this language hasn't been changed from the current 2019 code, it's now problematic since it contradicts what is in the new **Section 130.1(c)6D**, which allows the occupancy sensors in offices greater than 250ft² to bring the lights to full on when their individual zones are occupied.


We believe that the intent of the Control Interactions section is to clarify how the different sections work together, and therefore this is not the best place to add new lighting requirements. Our recommendation is that the requirement concerning partial on levels should be left in place in *Section 130.1(c)5* (where it then won't contradict the allowed full on option for offices greater than 250 ft² in *Section 130.1(c)6D*) and delete it from here.

§130.2(c)3 – EXCEPTION 1 to §130.2(c)3 – Motion Sensing Controls for Outdoor Lighting

We believe a mistake was made when this exception's language in the previous 2016 code was changed in 2019 to provide a single wattage of 40W for all exterior lighting types versus separate wattages for pole lights, non-pole lights, and a W/ft for linear lighting. While we still recommend the current 40W for pole and non-pole lighting, we strongly advocate that linear lighting should be returned to the previous 2016 code's max based on W/ft rather than a total wattage per luminaire.


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The single wattage incentivizes designers to install multiple separate linear strips (to stay under the 40W max requirement) rather than one of the required length.

§130.2(c)3 – EXCEPTION 4 to §130.2(c)3 – Motion Sensing Controls for Outdoor Lighting

We were surprised to see in the 45 Day Language that the exception wattage for lighting in parking lots was being increased from 40W to 78W. We've believed that this was being done solely to align with ASHRAE, but this makes little sense. ASHRAE's cost effectiveness is based on a single average cost of electricity that is less than what CA uses in its ROI calculations. For that reason alone, T24 should not seek to constantly align with 90.1 in all threshold metrics, since California will leave significant energy efficiency savings on the table by seeking to do so.

We believe it's beneficial that Title 24 sometimes leads ASHRAE, and when we lag behind ASHRAE we consider the requirements and thresholds in that code. However, there's simply no reason to move backwards from a number that's been enforced for the last three years just for the sake of alignment.

§140.6(a)2K – Demand Response PAF

This PAF should apply to all lighting, not just General Lighting (as was stated in our earlier comments on *Section 110.12(c) – Demand Responsive Lighting Controls*). This PAF language should also be edited in *Table 140.6-A*.

§150.0(k)2F – Residential Automatic Off Controls

The current 2019 code language in this section states: "Luminaires connected to a circuit with controlled lighting power of less than 50 watts are not required to have dimming controls."

We appreciate that the CEC decided to reduce the wattage threshold from 50 watts in the Express Terms draft to 20 watts. We believe that this better represents a proper balance between the cost of running individual circuits and the cost of additional dimming controls.

§150.0(k)3A – Residential Outdoor Lighting

The current 2019 code language requires that if a standard Timeclock is used in this section, it must be integrated with a photocell to ensure that the controlled exterior lighting will be off during the day. The proposed language would allow a standalone timeclock to be used without having photocell control of the exterior lighting, which means that there's every possibility that the lights will be on during the day – especially during the early evening hours when the electrical grid is particularly taxed. We believe eliminating the photocell requirement is a mistake and would suggest the language be returned to what is there for the current 2019 code.


This appears to be a simple change in the code, but it removes the very item that ensured outdoor lights would be off during daytime hours. This is not a requirement for astronomical timeclocks since they calculate sunrise and sunset daily, but there's no way a standard timeclock controlling outdoor lighting – which is usually set and forgotten about – wouldn't be on during daylight hours for a good part of the year.


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We wish there were opportunities to interface with the CEC early in the code cycle during open “exploratory” meetings so that supposedly “non-substantive” code language like this could be vetted before being proposed in 45 day documentation.

Table 150.0-A – Classification of High Luminous Efficacy Light Sources

We’re unsure whether sentence 2 in the table should be read as:

(Inseparable Solid State Lighting (SSL) luminaires) and (colored light sources that are installed to provide decorative, accent, display, utility, undercabinet or special effect lighting),

Or

We believe the second interpretation is correct, but since we’ve already heard differing opinions from some during discussions on the draft language in the code, we would appreciate if it were edited to provide greater clarity.

§§150.0(t)1 and 2 – new Heat Pump Space Heater Ready Section

§§150.0(u)1 and 2 – new Electric Cooktop Ready Section.

§§150.0(v)1 and 2 – new Electric Clothes Dryer Ready Section.

We’re confused by the way these three sections are written, as it appears that they each require both subsections 1 and 2 be met – i.e., a wired circuit and receptacle be mounted near the estimated location of each device AND that a space for a breaker be provided in the electrical panel. What’s confusing is the use of the word “circuit” which implies that the receptacle should be connected to a circuit breaker, when perhaps the word “wires” should be used instead.

If the receptacle is to have a circuit connected to it, why is there language in the second subsection calling for a space – is the CEC suggesting that the receptacle wires be left unterminated inside the circuit breaker panel?

We suggest these sections be reworded to provide clear requirements for electrical work that should be performed to meet these sections.


§§160.0 Onward – General Comment on Multifamily Buildings Requirements

Having participated in several industry meetings since 2019 about simplifying and clarifying the language in the Energy Code, we hoped to see at least some of those efforts come to fruition in the language of the Pre-Rulemaking Express Terms Document. Unfortunately, we did not see where the many suggestions raised at these meetings were incorporated – in fact, it appears the code has moved significantly in the direction of complexity and confusion with the decision to include entirely new sections for multifamily Buildings.


Not once in all the training presentations on Title 24 we’ve led has anyone suggest that what the code needed was over a hundred pages of additional text for multifamily buildings, text which for the most part restates earlier nonresidential and residential sections of the code. Our main area of interest is the lighting and power sections of the code, and for those areas most of the voluminous new language came about because of no more than a few paragraphs for outdoor lighting in residential projects that were in


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Section 150.0(k)3 and which we believe were easily understood. We question whether these small areas of code concern justify the massive addition of the new multifamily Sections.

While most of the language is a repetition of the earlier code language, there are enough slight differences to cause real concern. We can't help but think as the multifamily code language further diverges future code cycles that designers will have an exceedingly difficult time remembering the differences in the code for Common Service Area office in a multifamily Building

(Inseparable Solid State Lighting (SSL) luminaires and colored light sources) that are (installed to provide decorative, accent, display, utility, undercabinet or special effect lighting) verses similar spaces that are open to the public in the same facility, or when dealing with exterior lighting application in a nonresidential dwelling verses a multifamily one.

Additionally, since all the verbiage in the multifamily sections is shown as "new" text in the draft 2022 Code document, it's extremely difficult to pick out the differences between the language in the earlier sections of the code, and in the new sections. The inability to discern differences in the language means that we don't believe we're able to provide the educated feedback the CEC is looking for to ensure mistakes and errors are corrected while still in a draft state.

We did not have time to examine the new multifamily sections in detail, but after a cursory review with another individual well versed in the lighting and power requirements of Title 24, we found several differences between the language in the nonresidential sections and the new multifamily sections – enough to make us worry about what wasn't caught. Below are five examples of difference in the multifamily language and that in previous sections that illustrates our concerns.

Example 1 General Hardscape Power Allowance

Table 140.7-A is comprised of three types of Power Allowances:

1. Area Wattage Allowance (AWA)
2. Linear Wattage Allowance (LWA)
3. Initial Wattage Allowance (IWA)

However, Table 170.2-R is comprised of only two types of Power Allowances:

1. Area Wattage Allowance (AWA)
2. Initial Wattage Allowance (IWA)

TABLE 140.7-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 0 ¹	Lighting Zone 1 ¹	Lighting Zone 2 ¹		Lighting Zone 3 ¹		Lighting Zone 4 ¹
	Asphalt/Concrete	Asphalt/Concrete	Asphalt	Concrete ²	Asphalt	Concrete ²	Asphalt/Concrete
Area Wattage Allowance (AWA)	No allowance ¹	0.0180_0.016 W/ft ²	0.0250_0.019 W/ft ²	0.025 W/ft ²	0.0250_0.021 W/ft ²	0.02 W/ft ²	0.030_0.024 W/ft ²
Linear Wattage Allowance (LWA)		0.150_0.13 W/lf	0.170_0.15 W/lf	0.4 W/lf	0.250_0.20 W/lf	0.4 W/lf	0.350_0.29 W/lf
Initial Wattage Allowance (IWA)		180-150 W	250-200 W	250 W	250-250 W	250 W	400-320 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. RESERVED.

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 170.2-R GENERAL HARDSCAPE MULTIFAMILY LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 0 ¹	Lighting Zone 1 ¹	Lighting Zone 2 ¹	Lighting Zone 3 ¹	Lighting Zone 4 ¹
Area Wattage Allowance (AWA)	No allowance ¹	0.026 W/ft ²	0.030 W/ft ²	0.038 W/ft ²	0.055 W/ft ²
Initial Wattage Allowance (IWA)		300 W	350 W	400 W	450 W

¹ Continuous 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 160.5(c)1.

² Narrow 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.

Additionally, it should be noted that the wattages are different in the two tables for the same Type of Power Allowance (and there are issues where cells are improperly split). Designers will have to deal with two separate tables and W/ft² values when doing outdoor lighting depending on whether it's a standard commercial project or outdoor lighting for a multifamily project.

Example 2 – Why does multifamily require a 50-90% reduction, but the earlier section has a 60- 90% reduction?

§130.2(c)2B states:

Automatic scheduling controls shall be capable of reducing the outdoor lighting power by at least 50 percent and no more than 90 percent, and separately capable of turning the lighting OFF, during scheduled unoccupied periods.

However, §160.5(c)2Bii states:

Automatic scheduling controls shall be capable of reducing the outdoor lighting power by at least 60 percent and no more than 90 percent, and separately capable of turning the lighting OFF, during scheduled unoccupied periods.

Example 3 – Error updating multifamily language when a change is made in previous section.

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Table 141.0-F – Control Requirements for Indoor Lighting System Alterations – 3rd column header states:

Projects complying with Sections 141.0(b)2lii or 141.0(b)2liii

However, Table 180.2-D – Control Requirements for Indoor Lighting System Alterations for Common Services Areas – 3rd column header states:

Projects complying with Sections 180.2(b)4Bivb and 180.2(b)4Bivc

Example 4 – Significant change in multifamily language, while previous is left alone.

In this comparison there are several differences, but the most worrisome is that in the top residential language, line ii requires a photocell and a motion sensor, but in the bottom multifamily example, line ii just requires a photocell. This represents a significant difference in the required hardware, one that must have been deleted deliberately from the multifamily requirements. We do not understand why the multifamily text allows significantly less efficient hardware than the residential text requires.

§150.0(k)3A – Residential Outdoor Lighting states:

For single-family residential buildings, outdoor lighting permanently mounted to a residential building or to other buildings on the same lot shall meet the requirement in item i and the requirements in either item ii or item iii:

- i. Controlled by a manual ON and OFF control switch that permits the automatic actions of items ii or iii below; and*
- ii. Controlled by a photocell **and a motion sensor**; or*
- iii. Controlled by an astronomical time clock control or an automatic time*

switch control. Timeswitch or time clock controls that override to ON shall not be allowed unless the override automatically returns the automatic control to its normal operation within 6 hours.

However, §160.5(a)3A – Outdoor Lighting Controls states:

Outdoor lighting attached to a building and separately controlled from the inside of a dwelling unit, shall meet the requirement in item i and the requirements in either item ii or item iii:

- i. Controlled by a manual ON and OFF control switch that permits the automatic actions of items ii or iii below; and*
- ii. Controlled by a photocell; or*
- iii. Controlled by an astronomical time clock control or an automatic time*

switch control. Time switch or timeclock controls with manual override to ON shall not be allowed unless the override automatically returns the automatic control to its normal operation within 6 hours.

Example 5 – Example of earlier language not being properly updated

§160.5(b)4Cvi.b


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Despite the excessively long section number, we wanted to include this error. The requirement is in one of the new multifamily Code sections, yet the below exception refers to a section in the nonresidential portion of the code – 130.1(c)6D.

EXCEPTION to Section 130.1(c)6D: *Under-shelf or furniture-mounted task lighting controlled by a local switch and either a time switch or an occupancy sensor.*

We understand that a great amount of work has been done to add the multifamily language to the code, but we wonder whether the difficulty reconciling the multifamily code and previous code sections will prevent the proper application of the code to those designing multifamily, non-residential, and single family projects. We justify this statement with two specific points:

Point 1:

The new multifamily code section numbering scheme cannot be inferred by knowledge of the existing code section and subsection numbering. The new sections follow a completely different format, making it extremely difficult for anyone to find the information they're looking for in the multifamily portions of the code. Also, the inclusion of the Common Living Area Requirements before the Common Service Areas is confusing since this is in reverse order than the nonresidential and residential sections in the previous 160.5(a) 160.5(b)1 160.5(b)4.A 160.5(b)4.B 160.5(b)4.C 160.5(b)4.D 160.5(b)4.E 160.5(b)4.F 160.5(c)(1-3) 160.6(a-d) 170.0 170.2(e) 170.2(e)6 180.0 180.2(b)4.B.iv

- = 150.0(k) Residential
- = 130.0 Lighting Wattages
- = 130.1(a) Manual Area Controls
- = 130.1(b) Multilevel
- = 130.1(c) Shutoff
- = 130.1(d) Daylighting
- = 130.1(e) Demand Response
- = 130.1(f) Control Interactions
- = 130.2(a-c) Outdoor Lighting
- = 130.5(a-d) Power Requirements
- = 140.0 Performance and Prescriptive Energy Calculations = 140.6 Lighting Power Calculations
- = 140.7 Outdoor Lighting Power Calculations
- = 141.0 Lighting Additions and Alterations
- = 141.0(b)2.I Altered Lighting Requirements

If the new sections will be drawing from the previous sections, why weren't the new sections formatted so the numbering of their subsection requirements could be easily deduced based on the previous nonresidential and residential sections?

Point 2:

We readily admit that we're still finding our way through the multifamily sections of the code, and how they are applied. The lead paragraph of Section 160.0 states:

Multifamily buildings shall comply with the applicable requirements of Sections 160.1 through 160.8. Sections 160.1 through 160.8 apply to dwelling units and common use areas in multifamily buildings.


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Nonresidential occupancies in a mixed occupancy building shall comply with nonresidential requirements in Sections 120.0 through 141.1.

We believe this means the new 100+ pages of multifamily code apply to the dwelling units and Common Use Areas (ie Common Living Areas AND Common Service Areas). Any nonresidential facilities located in the building will still be using the previous code sections as they would have before. We're left wondering how designers will deal with exterior lighting since it may be difficult to determine whether outdoor spaces would be following the multifamily requirements (if the spaces are Common Use Area) or should following the non-multifamily sections of the code when the building included mixed use spaces.

Despite all the work done for the multifamily sections, our suggestion is to remove all the new multifamily language, or at the very least refer to the previous code sections instead of carrying all the previous code verbiage into the new sections so that differences in the code can be clearly called out as exceptions, instead of being hidden in the underlined text of the multifamily sections.

If there is any comment in this letter where the CEC finds our concerns or suggestions unclear, we hope that you'll consider contacting us directly for clarifications. We've certainly enjoyed previous opportunities to discuss the Energy Code language by phone, email, and in person. We hope to continue that positive relationship in the years to come."

Respectfully submitted,



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