Comparison of 2013 and Proposed 2016 Lighting System Alteration Requirements: Proposed Section 141.0, subdivision (b)2.I

The 2016 Code lighting retrofit 15 day language proposal exempts lighting system alterations that result in at least 30% lower power consumption compared to the original luminaires from existing area control requirements, multi-level and one-step control requirements, daylighting control requirements, demand response control requirements and lighting power allowance requirements.

2013 Lighting System Alteration Requirements:

I. Lighting System Alterations that Change the Area of Enclosed Space, Change the Occupancy Type, or Increase Lighting Power.

Lighting System Alterations (of any size) that change the area of the enclosed space, change the occupancy type, or increase the lighting power must comply with the following requirements:

(1) Install §130.1(a) Area Controls;

(2) Install §130.1(b) Multi-Level Controls;

(3) Install §130.1(c) Shut-Off Controls;

(4) Install §130.1(d) Automatic Daylight Controls;

(5) Install §130.1(e) Demand Response Controls (limited to alterations of buildings greater than 10,000 sq. feet and to spaces with a lighting power density of 0.5 watts per square feet or greater);

(6) Comply with the requirements of §130.0(d) (which requires controls to comply with §110.9 standards); and

(7) Comply with the lighting power allowance requirements of §140.6.

(See 2013 Code, Table 141.0-E.)

II. Other Lighting System Alterations that Alter More than 10% of Existing Luminaires.

Lighting System Alterations that do not change the area of the enclosed space or the occupancy type or increase the lighting power, but that alter more than 10% of the existing luminaires have to comply with one of the following:

A. If lighting power is between 85% and 100% of the lighting power allowance, the alterations must comply with the lighting power allowance requirements of §140.6 and install the following controls: (1) §130.1(a) Area Controls; (2) §130.1(b) Multi-Level Controls; (3) §130.1(c) Shut-Off Controls; and (d) §130.1(d) Automatic Daylight Controls. (See 2013 Code, Table 141.0-E.)

B. If lighting power is less than or equal to 85% of the lighting power allowance, the alterations must comply with the lighting power allowance requirements of §140.6 and install the following controls: (1) §130.1(a) **Area Controls**; (2) §130.1(c) **Shut-Off Controls**; and **"Two Level Lighting Controls.**" (See 2013 Code, Table 141.0-E.)

III. Acceptance Test Requirements.

Lighting system alterations that include controls must comply with lighting control acceptance testing requirements. (See 2013 Code, §130.4.)

2016 Proposed Changes to 2013 Lighting System Alteration Requirements:

I. New Alternative 30% Power Reduction Compliance Pathway for Alterations.

The 2016 Code Proposal creates a new alternative compliance pathway that exempts applicable lighting alterations from otherwise applicable control and power allowance requirements. The new pathway applies to any lighting system alterations where (1) existing luminaires are replaced with new luminaires; (2) the work does not include adding, removing or replacing walls or ceilings along with redesign of the lighting system; and (3) the replacement luminaires collectively have at least 30% lower rated power than the existing luminaires being replaced.

A. **Power Allowance Exemption.** Alterations taking the new 30% power reduction pathway are exempt from the requirement to meet the lighting power allowance in Section 140.6. In contrast, the 2013 Code

requires alterations to meet the lighting power allowance even if compliance requires more than a 30% reduction in rated power from the existing lighting. The 2016 Code now caps the required reduction at 30% even if the lighting power allowances are not met.

QUESTIONS FOR CEC STAFF:

(1) On its face this reduces 2016 energy efficiency requirements compared to 2013 Code. What is the rationale for exempting these alterations from the lighting power allowance?

(2) Has the potential energy loss from this proposed change been calculated?

(3) Does the Commission know what percentage of existing systems would require a greater than 30% reduction in overall rated power in order to meet the lighting power allowance?

B. **Advanced Controls Exemption.** Alterations taking the new 30% power reduction pathway are exempt from the 2013 requirements to install (1) §130.1(a) Area Controls; (2) §130.1(b) Multi-Level Controls; and (d) §130.1(d) Automatic Daylight Controls.

QUESTIONS FOR CEC STAFF:

(1) Aren't more efficient systems already provided an exemption from Multi-Level and Daylight Control requirements through the 2013 pathway for alterations whose lighting power is lower or equal to 85% of the section 140.6 power allowance? What is the rationale for creating an additional, potentially easier pathway for avoiding these controls?

(2) At the Commission business meeting, staff stated that eliminating advanced lighting control requirements for these alterations would not result in a reduction in energy savings because the 30% energy reduction prerequisite would result in about 10% greater energy reduction than would be otherwise be required for systems that were 15 years old or less to meet code. Our understanding from the presentation is that this assumption is based on calculations showing lighting power allowances are

currently about 20% stricter than lighting power allowances that applied to new lighting built to minimum code standards 15 years ago. Is that correct?

(3) Did this calculation take into account the percentage of alterations that would involve systems that are either (a) older than 15 years old, or (b) 15 years old or less but that were not required to meet new construction code standards at the time they were installed due (e.g., alterations of less than 50% of existing luminaires) or that were retrofitted without a permit or otherwise not code-compliant?

(4) Even if the new 30% reduction pathway is assumed to result in an additional 10% savings over what is otherwise require, won't that potentially provide less savings than the 2013 pathway for alterations whose lighting power is lower or equal to 85% of the section 140.6 power allowance?

(5) Has the Commission calculated lost savings from alterations that choose the 30% reduction pathway instead of the 85% power allowance pathway? Isn't the less-efficient 30% pathway the more attractive pathway since it exempts more requirements than the 85% pathway?

C. **Demand Response Control Exemption.** Alterations taking the new 30% power reduction pathway are exempt from the existing requirement that alterations that change the occupancy type or that change the area of the enclosed space (without redesign of the lighting system) must install §130.1(e) Demand Response Controls.

QUESTIONS FOR CEC STAFF:

(1) The administration has stated that increased use of renewable solar and wind power sources in the state depends heavily on the availability of automated demand response to ensure grid reliability. On its face this reduces the number of alterations that will be required to install demand response controls. What is the rationale for reducing the number of lighting system alterations that will be required to include demand response controls?

(2) Has the Commission calculated the reduction in demand control installation that may result from this change?

II. New Exemption for Alterations that Change the Area of the Enclosed Space or Change the Occupancy Type or Increase the Lighting Power in the Enclosed Space.

A. Change in Demand Response Threshold. For all alterations that change the area of the enclosed space or change the occupancy type or increase the lighting power in the enclosed space, the 2016 Code: (1) changes threshold for application of Demand Responsive Controls from current requirement that *building* be greater than 10,000 sq. ft. to requirement that *alterations* be greater than 10,000 sq. ft. within a single building; and (2) deletes the current requirement to comply with §130.0(d)/§110.9 multi-level and daylighting control provisions.

B. **New 10% Exemption.** The 2016 Code exempts alterations that change the area of the enclosed space or change the occupancy type or increase the lighting power in the enclosed space from all Title 24 compliance requirements if the alterations involve less than 10% of existing luminaires. Under 2013 Code, alterations of less than 10% of existing luminaires were still subject to control requirements if the alteration changed the area of the enclosed space, changed the occupancy type or increased the lighting power. Now luminaire alterations may increase lighting power and still avoid controls as long as the alterations involve less than 10% of the existing luminaires.

C. New 85% Power Allowance Reduction. In addition to the above exemption, the 2016 Code proposal provides that alterations that change the area of the enclosed space or change the occupancy type or increase the lighting power in the enclosed space are exempt from the 2013 requirements to install multi-level controls, automatic daylight controls and demand response controls if the lighting power is less than or equal to 85% of the power allowance. Under the 2013 Code, the 85% power allowance pathway did not apply to these types of alterations.

QUESTIONS FOR CEC STAFF:

(1) None of the above exemptions currently apply to alterations that change the area of the enclosed space or change the occupancy type or increase the lighting power in the enclosed space. What is the rationale for now creating exemptions to these types of alterations?

(2) What are the energy impacts of this change? How was this calculated?

(3) None of these new exemptions require a 30% reduction in energy use. Is the Commission assuming any additional energy savings from these changes? From where?

(4) What are the impacts of this change on automated demand response goals? What is the meaning of the change in the demand response control threshold requirement from buildings greater than 10,000 square feet to alterations greater than 10,000 square feet? Does this mean a high rise office building could redo its lighting in one less than 10,000 square foot office at a time without ever installing demand response controls?

III. Deletion of Section 130.1(a)(4) Area Control Requirements.

The 2013 Code requires that alterations subject to area control requirements shall comply with all requirements of Section 130.1(a). The 2016 Code exempts all alterations from compliance with Section 130.1(a)(4), which requires that, in addition to the requirements in Section 130.1(a)1, 2, and 3: (A) General lighting shall be separately controlled from all other lighting systems in an area; (B) Floor and wall display, window display, case display, ornamental, and special effects lighting shall each be separately controlled on circuits that are 20 amps or less; and (C) When track lighting is used, general, display, ornamental, and special effects lighting shall each be separately controlled.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for completely eliminating these retail displays, special effects and ornamental lighting control requirements?

(2) What are the energy impacts of this change? How was this calculated?

(3) These Area Control exemptions do not require a 30% reduction in energy use. Is the Commission assuming any additional energy savings from these changes? From where?

V. Acceptance Test Exemption. Exempts lighting system alterations from existing acceptance test requirements where lighting controls are added to control 20 or fewer luminaires.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for this exemption?

(2) What are the energy impacts of this change? How was this calculated?

Comparison of 2013 and Proposed 2016 Luminaire Modification Exemptions: Proposed Section 141.0, subdivision (b)2.J and Proposed Deletion of Existing Table 141.0-F

The 2016 Code lighting retrofit 15 day language proposal deletes the control requirements set forth in existing Table 141.0-F and replaces these requirements with the language in proposed Section 141.0, subdivision (b)2.J. These changes exempt all luminaire modifications from existing multi-level, one-step and daylighting control requirements, and exempt modified luminaires that have at least 30% lower power consumption compared to the original luminaires from current lighting power allowance requirements. In addition, these changes increase the threshold for triggering Title 24 compliance requirements for luminaire modifications from modification of 40 luminaires to modification of 70 luminaires.

2013 Lighting Component Modification Requirements:

I. Forty (40) Luminaire Threshold for Title 24 Compliance. Lighting component modifications are not subject to Title 24 requirements if they total less than 40 luminaire modifications-in-place per building space per year.

II. Modification Control Requirements. Modifications of 40 or more luminaire modifications-in-place must comply with the lighting power allowance requirements of §140.6 and follow one of the following two control requirement paths:

A. If lighting power is between 85% and 100% of the lighting power allowance, the modifications must install the following controls: (1) §130.1(a) Area Controls; (2) §130.1(b) Multi-Level Controls; (3) §130.1(c) Shut-Off Controls; (4) §130.1(d) Automatic Daylight Controls. In addition, the controls must comply with the requirements of §130.0(d) (which requires controls to comply with §110.9 standards). (See Table 141.0-E.)

B. If lighting power is less than or equal to 85% of the lighting power allowance, the modifications must install the following controls: (1) §130.1(a) Area Controls; (2) §130.1(c) Shut-Off Controls; and (3) "Two Level Lighting Controls" (or multi-level controls). (See Table 141.0-E.)

III. Acceptance Testing Requirement. Acceptance testing is required for all lighting controls installed as part of the modification requirements. (See 2013 Code, §130.4.)

2016 Proposed Changes to 2013 Luminaire Modification Requirements:

I. Title 24 Compliance Threshold Increased from 40 to 70 Luminaires. Under the 2016 proposal, the threshold for applying Title 24 to lighting modifications is raised from *40 to 70* luminaire modifications-in-place *and eliminates the per year requirement*, meaning that a building owner could modify 69 luminaires every month without triggering any energy efficiency requirements.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for almost doubling the number of luminaire modifications that are completely exempt from any Title 24 requirements?

(2) What are the energy impacts of this change? How was this calculated? Does this take into account that these exempt luminaire modifications not only do not have to save any energy, they could increase energy use?

(3) This exemption does not require a 30% reduction in energy use. Is the Commission assuming any additional energy savings from these changes? From where?

II. Modifications Allowed to Exceed Lighting Power Allowance. Under the 2016 proposal, modifications may exceed the lighting power allowance in Section 140.6 as long as the modified luminaires collectively have at least 30% lower rated power compared to the original luminaires prior to modification. In contrast, the 2013 Code requires modification to meet the lighting power allowance even if compliance requires more than a 30% reduction in rated power from the existing lighting. The 2016 Code caps the required reduction at 30% even if the lighting power allowances are not met.

QUESTIONS FOR CEC STAFF:

(1) On its face this reduces 2016 energy efficiency requirements compared to 2013 Code. What is the rationale for capping the required lighting power reduction at 30% even if the lighting power allowance is not met?

(2) Has the potential energy loss from this proposed change been calculated?

(3) Does the Commission know what percentage of existing modifications would require a greater than 30% reduction in overall rated power in order to meet the lighting power allowance?

III. Elimination of Daylight and Multi-level Control Requirements for All Modifications. The 2016 Code only requires luminaire modifications to install Area Controls and Shut-Off Controls.

A. The 2016 Code eliminates the requirement to install Daylight Controls and Multi-Level Controls (and comply with the additional Section 130.0(d) control requirements) that currently applies under the 2013 Code if lighting power is greater than 85% of the lighting power allowance.

B. The 2016 Code eliminates the 2013 Code requirement to install **"Two Level Lighting Controls**" (or multi-level controls) where lighting power is less than or equal to 85% of the lighting power allowance.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for completely eliminating current daylighting, multi-level and two level control requirements for modifications?

(2) What are the energy impacts of this change? How was this calculated?

(3) These exemptions do not require a 30% reduction in energy use. Is the Commission assuming any additional energy savings from these changes? From where?

IV. Elimination of Certain Area Control and Automatic Shut-Off Control Requirements for All Modifications.

A. **Deleted Area Control Requirements.** The 2013 Code requires that luminaire modifications subject to area control requirements shall comply with all requirements of Section 130.1(a). The 2016 Code exempts all modifications from compliance with Section 130.1(a)(4), which requires that: (A) General lighting shall be separately controlled from all other lighting systems in an area; (B) Floor and wall display, window display, case display, ornamental, and special effects lighting shall each be separately controlled on circuits that are 20 amps or less;

and (C) When track lighting is used, general, display, ornamental, and special effects lighting shall each be separately controlled.

B. **Deleted Automatic Shut-Off Control Requirements.** The 2013 Code requires that luminaire modifications subject to automatic shut-off control requirements shall comply with all requirements of Section 130.1(c). The 2016 Code exempts all modifications from compliance with numerous provisions of Section 130.1(c), including 130.1, subdivisions (c)(1)(d) [separate controls form general, display, ornamental, and display case lighting], (c)(6)(B) [Library book stack aisle occupancy sensors], (c)(6)(C) [corridor and stairwell occupancy sensors], (c)(7)(A) [hotel motel corridor and stairwell occupancy sensors], and (c)(8) [hotel/motel guest room occupancy sensors].

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for completely eliminating these use-specific area control and automatic shutoff control requirements?

(2) What are the energy impacts of this change? How was this calculated?

(3) These area control and automatic shutoff control exemptions do not require a 30% reduction in energy use. Is the Commission assuming any additional energy savings from these changes? From where?

V. Acceptance Test Exemption. Exempts luminaire modifications from existing acceptance test requirements where lighting controls are added to control 20 or fewer luminaires.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for this exemption?

(2) What are the energy impacts of this change? How was this calculated?

Lighting Wiring Alteration Exemptions: Proposed Section 141.0, subdivision (b)2.K

The 2016 Code lighting retrofit 15 day language proposal exempts lighting wiring alterations from existing control requirements, demand response requirements and acceptance test requirements.

2013 Lighting Wiring Alteration Requirements:

Lighting Wiring Alterations (1) that add a circuit feeding luminaires, (2) that replace, modify, or relocate wiring between a switch or panelboard and luminaires, or (3) that install or replace lighting control panels, panelboards, or branch circuit wiring must comply with all of the applicable requirements of Section 110.9, 130.1, and 130.4. Section 130.1 requires installation of the following controls: (1) §130.1(a) **Area Controls**; (2) §130.1(b) **Multi-Level Controls**; (3) §130.1(c) **Shut-Off Controls**; (3) §130.1(d) **Automatic Daylight Controls**; (4) §130.1(e) **Demand Response Controls** (limited to alterations of buildings greater than 10,000 sq. feet and to spaces with a lighting power density of 0.5 watts per square feet or greater.) Section 110.9 contains additional multi-level and daylighting control requirements. Section 130.4 requires acceptance testing of lighting controls. (§141.0, subd. (b)2.k.)

Proposed Changes in 2016 Lighting System Alteration Requirements:

I. Eliminates Demand Response Control Requirements. The 2016 Code Proposal deletes the existing requirement for lighting wiring alterations to install demand response controls.

QUESTIONS FOR CEC STAFF:

(1) The administration has stated that increased use of renewable solar and wind power sources in the state depends heavily on the availability of automated demand response to ensure grid reliability. On its face this reduces the number of alterations that will be required to install demand response controls. What is the rationale for reducing the number of lighting system alterations that will be required to include demand response controls?

(2) Has the Commission calculated the reduction in demand control installation that may result from this change?

II. Replaces Multi-Level Controls Requirement with Two-Level Lighting Control Requirement. The 2016 Code Proposal deletes the existing requirement for lighting wiring alterations to install multi-level controls and replaces it with a requirement to install less efficient two-level controls.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for this change?

(2) What are the energy impacts of this change? How was this calculated?

(3) The deletion of the existing multi-level control requirement applies to all lighting wiring alterations and does not require a 30% reduction in energy use. Is the Commission assuming any offsets from the lost energy savings of this change? From where?

III. Creates New Exemption From Daylight Control Requirements. The 2016 Code Proposal exempts lighting wiring alterations from existing daylight control requirements where less than 25 luminaires are located within the primary sidelit daylit zone and the skylit daylit zone.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for this change?

(2) What are the energy impacts of this change? How was this calculated?

(3) The exemption does not require a 30% reduction in energy use. Is the Commission assuming any offsets from the lost energy savings of this change? From where?

IV. Eliminates Certain Area Control and Automatic Shut-Off Control Requirements for All Lighting Wiring Alterations.

A. **Deleted Area Control Requirements.** The 2013 Code requires that lighting wiring alterations shall comply with all the area control requirements of Section 130.1(a). The 2016 Code exempts all lighting wiring alterations from compliance with Section 130.1(a)(4), which requires that, in addition to the requirements in Section 130.1(a)1, 2, and 3: (A) General lighting shall be separately controlled from all other

lighting systems in an area; (B) Floor and wall display, window display, case display, ornamental, and special effects lighting shall each be separately controlled on circuits that are 20 amps or less; and (C) When track lighting is used, general, display, ornamental, and special effects lighting shall each be separately controlled.

B. **Deleted Automatic Shut-Off Control Requirements.** The 2013 Code requires that lighting wiring alterations shall comply with all the automatic shut-off control requirements of Section 130.1(c). The 2016 Code exempts all modifications from compliance with numerous provisions of Section 130.1(c), including 130.1, subdivisions (c)(1)(d) [separate controls form general, display, ornamental, and display case lighting], (c)(2) [prohibition on countdown timer switches], (c)(5) [areas where occupant sensors must shut off all lighting], (c)(6) [additional occupancy sensor requirements for warehouses, libraries, corridors and stairwells]; (c)(7) [parking garages and hotel/motel stairwells and corridors], and (c)(8) hotel/motel guest room occupancy sensors].

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for completely eliminating these use-specific area control and automatic shutoff control requirements?

(2) What are the energy impacts of this change? How was this calculated?

(3) These area control and automatic shutoff control exemptions do not require a 30% reduction in energy use. Is the Commission assuming any additional energy savings from these changes? From where?

V. Acceptance Test Exemption. Exempts lighting wiring alterations from existing acceptance test requirements where lighting controls are added to control 20 or fewer luminaires.

QUESTIONS FOR CEC STAFF:

(1) What is the rationale for this exemption?

(2) What are the energy impacts of this change? How was this calculated?