| **DOCKETED** |
|------------------|-----------------|
| **Docket Number:** | 19-BSTD-03 |
| **Project Title:** | 2022 Energy Code Pre-Rulemaking |
| **TN #:** | 234874 |
| **Document Title:** | September 22 Presentation - 2022 Pre-Rulemaking for Building Energy Efficiency Standards |
| **Description:** | September 22 - 2022 Pre-Rulemaking for Building Energy Efficiency Standards workshop presentation for Nonresidential Daylighting and Nonresidential Outdoor Sources proposals |
| **Filer:** | Haile Bucaneg |
| **Organization:** | California Energy Commission |
| **Submitter Role:** | Commission Staff |
| **Submission Date:** | 9/23/2020 11:16:28 AM |
| **Docketed Date:** | 9/23/2020 |
What We Will Cover Today

• Some Basic, Background
• How Title 24, Part 6 is Developed
• Simon Lee, P.E.
  o Nonresidential Daylighting controls
  o Nonresidential Outdoor Lighting
    ➢ Reclassification of Lighting Zones
    ➢ Adjustments to Outdoor Lighting Power Allowances
    ➢ New section for Multifamily Outdoor Lighting
Authority & Process

- **Public Resources Code (PRC 25402):** Reduction of wasteful, uneconomic, inefficient, or unnecessary consumption of energy
  
  ➢ (a)(1) Prescribe, by regulation, lighting, insulation, climate control system, and other building design and construction standards that increase the efficiency in the use of energy and water…

  ➢ Warren Alquist Act Signed into law in 1974 by Governor Ronald Reagan and launched by Governor Jerry Brown in 1975 which mandates updates Building Efficiency Standards and requires the building departments to enforce them through the permit process.
Goals of the California Energy Code

1. Increase building energy efficiency cost-effectively
2. Contribute to the state's GHG reduction goals
3. Enable pathways for all-electric buildings
4. Reduce residential building impacts on the electricity grid
5. Promote demand flexibility and self-utilization of PV generation
6. Provide tools for local government reach codes
Process Used to Updated Energy Codes

CEC staff, with input from utility partners and industry stakeholders, develop the triennial standards update

Opportunities for participation
- Utility-Sponsored Stakeholder Meetings
- CEC-Sponsored Workshops

Standards must be cost-effective
- Life-Cycle Costing Methodology
- Time Dependent Valuation (TDV)
## 2022 Standards Process

<table>
<thead>
<tr>
<th>DATE</th>
<th>MILESTONES</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2018 - November 2019</td>
<td>Updated Weather Files</td>
</tr>
<tr>
<td>November 2018-December 2019</td>
<td>Metric Development</td>
</tr>
<tr>
<td>November 2018-July 2019</td>
<td>Measures Identified and approval</td>
</tr>
<tr>
<td>August 2019 to October 2020</td>
<td>Stakeholder meeting/workshop &amp; final staff workshop</td>
</tr>
<tr>
<td>August 2020-October 2020</td>
<td>CASE Reports submitted to the CEC</td>
</tr>
<tr>
<td>February 2021</td>
<td>45-day Language Hearings</td>
</tr>
<tr>
<td>July 2021</td>
<td>Adoption of 2022 Standards at a Business Meeting</td>
</tr>
<tr>
<td>July 2021 to November 2021</td>
<td>Staff work on Software, Compliance Manuals, Electronic Documents Available to Industry</td>
</tr>
<tr>
<td>December of 2021</td>
<td>Approval of the Manuals</td>
</tr>
<tr>
<td>January 2022</td>
<td>Software, Compliance Manuals, Electronic Documents Available to Industry</td>
</tr>
<tr>
<td>January 1, 2023</td>
<td>Effective Date</td>
</tr>
</tbody>
</table>
Tentative Pre-Rulemaking Schedule

- **September 1**
  - Energy Savings and Process Improvements for Alterations and Additions
    - Roof deck insulation for low-slope roofs
    - Prescriptive attic insulation for alterations
    - Prescriptive duct sealing
    - Electric resistance water heating
    - Electric resistance space heating
    - 40-ft trigger for prescriptive duct requirements
    - Cool roof for steep-slope roofs
    - Cool roof for low-slope roof

- **September 9**
  - Nonresidential Grid Integration
  - Controlled Receptacle, CEA Proposal

- **September 10**
  - Verification Testing

- **September 22**
  - Outdoor lighting
  - Daylighting

- **September 23**
  - Computer Room Efficiencies
  - Pipe Sizing and Leak Testing for Compressed Air Systems
  - Refrigeration System Operation
Tentative Pre-Rulemaking Schedule (Cont.)

- **September 30**
  - Indoor Air Quality Roundtable discussion with the outside world

- **October 6 and November 17**
  - Solar Photo Voltaic and Electrification
  - Multifamily All Electric

- **October 7**
  - Nonresidential Indoor Lighting
  - Air Distribution
  - Nonresidential HVAC Controls

- **October 13**
  - Multifamily Domestic Hot Water
  - Multifamily Restructuring

- **October 20**
  - Nonresidential High Performance Envelope

- **October 27**
  - Control Environmental Horticulture
  - New Construction Steam Trap

- **October 29** Place holder (May get pushed backed based on the Roundtable results from the September 30)
  - Indoor Air Quality Roundtable discussion with the outside world
Key Web-Link

2022 Title 24 Utility-Sponsored Stakeholder
http://title24stakeholders.com/

Building Energy Efficiency Program
http://www.energy.ca.gov/title24/

Comments to be submitted to:

NOTE: For this workshop comments To Be Submitted By October 6, 2020
Standards Contact Information – Energy Commission

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Comments For Today's Workshop

Due Date October 6, 2020 By 5:00 PM

Comments to be submitted to:
Questions?
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• Email: Simon.Lee@energy.ca.gov

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Larry Froess, P.E. CBECC Project Manager
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Thank You!
Daylighting Proposal for 2022

Staff Pre-Rulemaking Workshop

Presenters: Simon Lee, Electrical Engineer
Date: September 22, 2022
Proposal Summary

Nonresidential Daylighting Controls

Two sub-measures:
- Daylight Dimming to 10 percent
- Relocating secondary sidelit daylit zone requirements from prescriptive to mandatory

Supplementary changes associated with daylighting:
- PAF for daylighting continuous dimming controls
- New option for daylighting controls acceptance test
2022 Code Update Sections Affected

Building Energy Efficiency Standards for Residential and Nonresidential Buildings:

- Section 130.1(d)
- Section 140.6(a)2H
- Section 140.6(d)
- Section 100.1

Reference Appendix

- NA 7.6.1
Automatic Daylighting Controls
Automatic Daylighting Controls

Daylighting, Electric Lighting, Energy
Daylight Dimming to 10 percent

Require controlled luminaires to dim down to 10 percent of lighting power when there are abundance of daylight.

- to leverage LED luminaires, their capability in dimming range 10-100 percent that is already required for LED luminaires and light sources in Table 130.1-A.
Section 130.1

(d) **Automatic Daylighting Controls.**

3. The automatic daylighting controls shall:

   C. …, the general lighting power in that daylight zone shall be reduced by a minimum of 90% percent; and
Secondary Sidelit Daylit Zones

Move “Secondary Sidelit Daylit Zones” to Mandatory Automatic Daylighting Controls of Section 130.1(d).

- mandatory to install automatic daylighting controls in all applicable secondary sidelit daylit zones.
- does not affect parking lots.
- does not affect retail merchandise and wholesale showroom rooms.
Section 130.1(d)

Automatic Daylighting Controls. The general lighting in skylit daylit zones, primary sidelit daylit zones and secondary sidelit daylit zones, ... , shall provide controls that automatically adjust the power of the installed up and down to keep the total light level stable ... 

All daylit zones and the combined primary and secondary sidelit daylit zones in parking garages shall be shown on the plans.
Update the PAF credit for daylight dimming plus off to be based on LED lighting technology.

**Daylight continuous dimming Controls**
- a continuous dimming controls that varies the luminous flux in response to available daylight.
- Daylight stepped dimming controls would no longer be qualified for this PAF.
Questions
Acceptance Testing for Daylighting Controls

New option and method to improve the procedure for:

- Full Daylight Test
- Partial Daylight Test
Acceptance Testing for Daylighting Controls

Full Daylight Test

- Simulate by shining a bright light into the daylight sensor.
- Lighting power reduction is at least 90 percent under fully dimmed conditions.
Acceptance Testing for Daylighting Controls

An Alternate Partial Daylight test

Prerequisites:

• Outdoor horizontal illuminance is at least 4000 fc; and
• Interior Daylight illuminance at Reference Location is no greater than 95 percent of Reference Illuminance (Design Illuminance)

Test Outlines:

1. Take a measurement of the Combined daylight and electric lighting illuminance (Combined Illuminance) at Reference Location
2. Pass if the measured value is within the range:
   Reference Illuminance ≤ measured value ≤ Max. Combined Illuminance
Partial daylight test
The recommended outdoor horizontal illuminance is proposed and developed based on CIE clear sky model.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Total Horizontal Illuminance on Winter Solstice (fc)</th>
<th>Total Horizontal Illuminance on Fall and Spring Equinox (fc)</th>
<th>Total Horizontal Illuminance on Summer Solstice (fc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>372</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1,040</td>
<td>1,784</td>
</tr>
<tr>
<td>8</td>
<td>644</td>
<td>3,083</td>
<td>3,840</td>
</tr>
<tr>
<td>9</td>
<td>2,066</td>
<td>5,118</td>
<td>5,889</td>
</tr>
<tr>
<td>10</td>
<td>3,430</td>
<td>6,762</td>
<td>7,696</td>
</tr>
<tr>
<td>11</td>
<td>4,348</td>
<td>7,869</td>
<td>9,113</td>
</tr>
<tr>
<td>12</td>
<td>4,699</td>
<td>8,353</td>
<td>10,036</td>
</tr>
<tr>
<td>13</td>
<td>4,447</td>
<td>8,178</td>
<td>10,400</td>
</tr>
<tr>
<td>14</td>
<td>3,618</td>
<td>7,357</td>
<td>10,181</td>
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<tr>
<td>15</td>
<td>2,313</td>
<td>5,953</td>
<td>9,393</td>
</tr>
<tr>
<td>16</td>
<td>841</td>
<td>4,082</td>
<td>8,091</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td>1,968</td>
<td>6,370</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>362</td>
<td>4,365</td>
</tr>
</tbody>
</table>
**Estimated Cost for Implementation**

- No incremental first cost
- No incremental maintenance or replacement cost.

<table>
<thead>
<tr>
<th>Typical Components of automatic daylighting control systems</th>
<th>Preliminary Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photocells</td>
<td>No change in equipment from the current requirements</td>
</tr>
<tr>
<td>Daylighting logic controllers</td>
<td>No change in equipment from the current requirements</td>
</tr>
<tr>
<td>Power controllers</td>
<td>Those that dim to 10 percent is expected to be standard. LED technology is the baseline lighting technology.</td>
</tr>
</tbody>
</table>
# Benefits for Implementation

## Statewide Energy and Energy Cost Impacts

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>First-Year Electricity Savings (GWh)</th>
<th>First-Year Peak Electrical Demand Reduction (MW)</th>
<th>First-Year Natural Gas Savings (million therms)</th>
<th>15-Year Present Valued Energy Cost Savings (PV$ million in 2023)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>12.6</td>
<td>0.2</td>
<td>(0.0859)</td>
<td>$24.4</td>
</tr>
<tr>
<td>Additions and Alterations</td>
<td>42.9</td>
<td>0.6</td>
<td>(0.2825)</td>
<td>$83.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>55.5</td>
<td>0.8</td>
<td>(0.3684)</td>
<td>$107.6</td>
</tr>
</tbody>
</table>
Greenhouse Gas (GHG) Emissions Reduction

First-Year Statewide GHG Emissions Impacts

<table>
<thead>
<tr>
<th>Measure</th>
<th>Electricity Savings (GWh/yr)</th>
<th>Reduced GHG Emissions from Electricity Savings (Metric Tons CO2e)</th>
<th>Natural Gas Savings(^a) (million therms/yr)</th>
<th>Reduced GHG Emissions from Natural Gas Savings (Metric Tons CO2e)</th>
<th>Total Reduced CO(_2)e Emissions (Metric Tons CO2e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylighting Dimming to 10%</td>
<td>55.5</td>
<td>13,340</td>
<td>(0.3)</td>
<td>(1,824)</td>
<td>11,516</td>
</tr>
</tbody>
</table>
Preliminary Findings

Technical Feasibility
• Daylighting controls products are readily available for usage in daylighting applications in buildings.
• Daylighting controls has been a lighting control requirement in California Energy Code since 2005.

Cost Effectiveness
• Cost effective in all climate zones.
• Cost effective in all proposed building types.
Daylighting, Electric Lighting, Energy

(source: website at www.windows.lbl.gov; windows and daylighting)
Questions
Comments for Today’s Workshop

Due Date: October 6, 2020 By 5:00 PM

Comments to be submitted to:
Contact Information

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• Phone: (916) 651-3005
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Thank You!
Outdoor Lighting Proposal for 2022
Staff Pre-Rulemaking Workshop

Presenters: Simon Lee, Electrical Engineer
Date: September 22, 2020
Proposal Summary

Nonresidential Outdoor Lighting

The proposal contained three primary measures:

• Reclassification of nonresidential lighting zones
• Adjustments to nonresidential outdoor Lighting Power Allowances
• Creation of a separate code section for multi-family outdoor lighting
Sections Affected – Outdoor Lighting

- Part 6 Sections
  - Section 10-114
  - Table 10-114-A
  - Section 100.1
  - Section 130.2
  - Section 140.7
  - Table 140.7-A
  - Table 140.7-B
- Reference Appendix sections
  - N/A

- A new code section in Title 24, Part 6, will be introduced for multifamily outdoor lighting requirements.
- Existing requirements in Sections 130.2, 140.7 and 150.0(k)3 relating to multifamily buildings will be relocated to the new code section.
Reclassification of Lighting Zones
Reclassification of Lighting Zones

• Rural areas are moved from a default Lighting Zone of 2 to 1.

• A new census classification, urban clusters, receives a default Lighting Zone of 2.

• Building types likely to occur in each zone are added to Table 10-114.

• The conditions for designating a higher or lower lighting zone are revised.
## Reclassification of Lighting Zones

Example Text: Table 10-114-A

<table>
<thead>
<tr>
<th>Zone</th>
<th>Statewide Default Location</th>
<th>Moving Up to Higher Zones</th>
<th>Moving Down to Lower Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZ1</td>
<td>Rural areas, as defined by the 2010 U.S. Census. These areas include: single or dual family residential areas, parks, and agricultural zone districts, developed portion of government designated parks, recreation areas, and wildlife preserves. Those that are wholly contained within a higher lighting zone may be considered by the local government as part of that lighting zone.</td>
<td>Retail stores, located in a residential neighborhood, and rural town centers, as defined by the 2010 U.S. Census, can be designated as LZ2 if the business operates during hours of darkness. Developed portion of government designated parks, recreation areas, and wildlife preserves. can be designated as LZ2 or LZ3 if they are contained within such a zone.</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
# Reclassification of Lighting Zones

Example Text: Table 10-114-A

<table>
<thead>
<tr>
<th>Zone</th>
<th>Statewide Default Location</th>
<th>Moving Up to Higher Zones</th>
<th>Moving Down to Lower Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZ2</td>
<td>Urban clusters Rural areas as defined by the 2010 U.S. Census. The following building types are likely to occur here: multifamily housing, mixed use residential neighborhoods, religious facilities, schools, and light commercial business districts or industrial zoning districts.</td>
<td>Special districts within a default LZ2 zone may be designated as LZ3 or LZ4 by a local jurisdiction. Examples include special commercial districts or areas with special security considerations located within a mixed-use residential area or city center rural areas.</td>
<td>Special districts and government designated parks within a default LZ2 zone maybe designated as LZ1 by the local jurisdiction for lower illumination standards, without any size limits.</td>
</tr>
</tbody>
</table>
Reclassification of Lighting Zones

Example Text: Table 10-114-A

<table>
<thead>
<tr>
<th>Zone</th>
<th>Statewide Default Location</th>
<th>Moving Up to Higher Zones</th>
<th>Moving Down to Lower Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZ3</td>
<td>Urban areas as defined by the 2010 U.S. Census. The following building types are likely to occur here: high intensity commercial corridors, entertainment centers, and heavy industrial or manufacturing zone districts.</td>
<td>Special districts within a default LZ3 zone may be designated as LZ4 by a local jurisdiction for a high intensity nighttime use, such as entertainment or commercial district or areas with special security considerations requiring very high light levels.</td>
<td>Special districts and government designated parks may be designated as LZ1 or LZ2 by the local jurisdiction without any size limits.</td>
</tr>
</tbody>
</table>
Census Classifications

- **Rural areas** - include all population, housing, and territory not included within an urban area.
- **Urbanized Areas** (UAs) - territories with 50,000 or more people
- **Urban Clusters** (UCs) - territories with at least 2,500 and less than 50,000 people.

Source: U.S. Census webpage on urban and rural classification. Link: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html
Reclassification of Lighting Zones

Cost to implement the measure:

- No incremental first costs
- No incremental maintenance and replacement cost
## Benefits for Implementation

### Statewide Energy and Energy Cost Impacts - Reclassification of Lighting Zones

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>First-Year Electricity Savings (GWh)</th>
<th>First-Year Peak Electrical Demand Reduction (MW)</th>
<th>First-Year Natural Gas Savings (million therms)</th>
<th>15-Year Present Valued Energy Cost Savings (PV$ million in 2023)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>0.69</td>
<td>0.11</td>
<td>N/A</td>
<td>$1.86</td>
</tr>
<tr>
<td>Additions and Alterations</td>
<td>2.13</td>
<td>0.34</td>
<td>N/A</td>
<td>$5.74</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.82</td>
<td>0.45</td>
<td>N/A</td>
<td>$7.60</td>
</tr>
</tbody>
</table>
**Greenhouse Gas (GHG) Emissions Reduction**

First-Year Statewide GHG Emissions Impacts

<table>
<thead>
<tr>
<th>Measure</th>
<th>Electricity Savings (GWh/yr)</th>
<th>Reduced GHG Emissions from Electricity Savings (Metric Tons CO2e)</th>
<th>Natural Gas Savings (million therms/yr)</th>
<th>Reduced GHG Emissions from Natural Gas Savings (Metric Tons CO2e)</th>
<th>Total Reduced CO2e Emissions (Metric Tons CO2e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reclassification of Lighting Zones</td>
<td>2.82</td>
<td>676.91</td>
<td>N/A</td>
<td>N/A</td>
<td>676.91</td>
</tr>
<tr>
<td>General Hardscape LPA</td>
<td>24.30</td>
<td>5,841.46</td>
<td>N/A</td>
<td>N/A</td>
<td>5,841.46</td>
</tr>
<tr>
<td>Multifamily Outdoor LPA</td>
<td>11.75</td>
<td>2,812.68</td>
<td>N/A</td>
<td>N/A</td>
<td>2,812.68</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>38.87</strong></td>
<td><strong>9,331</strong></td>
<td>N/A</td>
<td>N/A</td>
<td><strong>9,331</strong></td>
</tr>
</tbody>
</table>
Reclassification of Lighting Zones

**Technical Feasibility**

- Continuation with a population-based approach for lighting zone classifications
- Local jurisdictions can designate areas to a lower or higher lighting zones with the same process.

**Cost Effectiveness**

- Cost effective in all climate zones
- Cost effective in all building types
Staff Questions – Reclassification of Lighting Zones

• Will the introduction of the Census-based-default LZ of urban/rural area reclassification possibly be out of unison to any area classification from local development plan or zoning map?

• Will providing more discretion to local jurisdictions be enough to address this issue?
  
  Pros: Local jurisdictions could use granted authority to determine appropriate lighting zones for specific projects or regions, if they can do so without needing to file materials with the CEC.
Staff Questions – Reclassification of Lighting Zones (Continue)

• Will the move to LZ result in underlighting?
  • Census blocks can be fairly large, and there can be areas of dense development within a less populous region.
  • There are jurisdictions, such as the City of Industry, City of Vernon, and City of Irwindale that are focused on commercial or industrial development and are comprised of highly urbanized areas despite having low population.
Example - City of Industry

• 3,000 businesses and 67,000 jobs, approximately
• 219 residents (2010 Census)
• Very heavily urbanized

• May need outdoor lighting for industrial and commercial operations during nighttime

• Lighting zone would be changed from LZ3 to LZ1.

(source: city website at www.cityofindustry.gov; 2010 Census)
Example - City of Vernon

- 1,800 businesses and 55,000 jobs, approximately
- 112 residents (2010 Census)
- Primarily composed of industrial areas
- Lighting zone would be changed from LZ3 to LZ1.

(source: city website at www.cityofvernon.gov; 2010 Census)
Questions
General Hardscape
Lighting Power Allowances
General Hardscape Lighting Power Allowances

Align the outdoor lighting power allowance with the recommended illuminance values for parking lots

- Outdoor lighting power allowances are based on the recommended illuminance values of Illumination Engineering Society
- Addendum 1 of IES RP-8-18 Chapter 17 was published on February 2020
- Align the proposed outdoor lighting power allowance values in Table 140.7-A with the recommended illuminance values in the new Addendum.
General Hardscape Lighting Power Allowances

Highlights of the proposed changes:

• Establishes one set of lighting power allowance values for parking lot facilities at a level suitable for both asphalt and concrete surface.

• A new lighting power allowance is added for general hardscape lighting applications with security cameras.

• The term “cutoff” is replaced with “shielding”
### Proposed Language

Example language: Table 140.7-A

<table>
<thead>
<tr>
<th>Types of lighting power allowance</th>
<th>Lighting Zone</th>
<th>LZ0</th>
<th>LZ1</th>
<th>LZ2</th>
<th>LZ3</th>
<th>LZ4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No allowance</td>
<td>0.016 W/ft²</td>
<td>0.019 W/ft²</td>
<td>0.021 W/ft²</td>
<td>0.024 W/ft²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.018 W/ft²</td>
<td>0.023 W/ft²</td>
<td>0.025 W/ft²</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.025 W/ft²</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td><strong>Area Wattage Allowance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Linear Wattage Allowance</strong></td>
<td></td>
<td>No allowance</td>
<td>0.13 W/ft</td>
<td>0.15 W/ft</td>
<td>0.20 W/ft</td>
<td>0.29 W/ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.15 W/ft</td>
<td>0.17 W/ft</td>
<td>0.25 W/ft</td>
<td>0.35 W/ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial Wattage Allowance</strong></td>
<td></td>
<td>No allowance</td>
<td>150 W</td>
<td>200 W</td>
<td>250 W</td>
<td>320 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>480</td>
<td>250</td>
<td>350</td>
<td>400</td>
</tr>
</tbody>
</table>
## Lighting Applications

<table>
<thead>
<tr>
<th>Lighting Applications</th>
<th>LZ0</th>
<th>LZ1</th>
<th>Lighting Zone 2, 3, 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Camera. This additional allowance is for the illuminated general hardscape area. This allowance shall apply when a security camera is installed within 2 mounting heights of the general hardscape area and mounted more than 10 feet away from a building.</td>
<td>Not applicable</td>
<td>No Allowance</td>
<td>0.018 W/ft²</td>
</tr>
</tbody>
</table>

New definition: **Security cameras** are any operational camera used to enhance the safety and security within a general hardscape area.
Estimated Cost for Implementation

General Hardscape Lighting Power Allowances

Cost to implement the measure:
  • No incremental first cost
  • No incremental maintenance or replacement cost
### Statewide Energy and Energy Cost Impacts - General Hardscape Lighting Power Allowance

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>First-Year Electricity Savings (GWh)</th>
<th>First-Year Peak Electrical Demand Reduction (MW)</th>
<th>First-Year Natural Gas Savings (million therms)</th>
<th>15-Year Present Valued Energy Cost Savings (PV$ million in 2023)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>5.91</td>
<td>0.76</td>
<td>N/A</td>
<td>$15.70</td>
</tr>
<tr>
<td>Additions and Alterations</td>
<td>18.40</td>
<td>2.35</td>
<td>N/A</td>
<td>$48.89</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24.30</td>
<td>3.11</td>
<td>N/A</td>
<td>$64.58</td>
</tr>
</tbody>
</table>
# Greenhouse Gas (GHG) Emissions Reduction

## First-Year Statewide GHG Emissions Impacts

<table>
<thead>
<tr>
<th>Measure</th>
<th>Electricity Savings (GWh/yr)</th>
<th>Reduced GHG Emissions from Electricity Savings (Metric Tons CO2e)</th>
<th>Natural Gas Savings(a) (million therms/yr)</th>
<th>Reduced GHG Emissions from Natural Gas Savings (Metric Tons CO2e)</th>
<th>Total Reduced CO(_2)e Emissions (Metric Tons CO2e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting Zone Reclassification</td>
<td>2.82</td>
<td>676.91</td>
<td>N/A</td>
<td>N/A</td>
<td>676.91</td>
</tr>
<tr>
<td>General Hardscape LPA</td>
<td>24.30</td>
<td>5,841.46</td>
<td>N/A</td>
<td>N/A</td>
<td>5,841.46</td>
</tr>
<tr>
<td>Multifamily Outdoor LPA</td>
<td>11.75</td>
<td>2,812.68</td>
<td>N/A</td>
<td>N/A</td>
<td>2,812.68</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>38.87</strong></td>
<td><strong>9,331</strong></td>
<td>N/A</td>
<td>N/A</td>
<td><strong>9,331</strong></td>
</tr>
</tbody>
</table>
Technical Feasibility
• LED luminaires useful for achieving revised default lighting levels are widely available
• Builders and designers are familiar with available products – no novel technologies or techniques are required

Cost Effectiveness
• Cost effective in all climate zones
• Cost effective in all building types
Q: The outdoor lighting power allowance values are developed to provide sufficient lighting power to cater for the recommended illuminance level. Are there any other illuminance levels that should be considered (besides those in the CASE report and its appendices)?
Questions
Multifamily Outdoor Lighting
Proposal Description

New Section for Multifamily Outdoor Lighting

Overall Restructuring

- A new dedicated chapter for multifamily; a new section for multifamily outdoor lighting
- Consolidates existing outdoor lighting provisions applicable to multifamily buildings
- Provides consistency between overlapping residential and nonresidential requirements
Example language, Section 130.0:
(a) The design and installation of all lighting systems and equipment in nonresidential, high-rise residential, hotel/motel buildings, outdoor lighting, and electrical power distribution systems within the scope of Section 100.0(a) shall comply with the applicable provisions of Sections 130.0 through 130.5.

**EXCEPTION to Section 130.0(a): Outdoor lighting for high-rise residential buildings.**

Example language, Section 130.2:
Outdoor Lighting Controls and Equipment. Nonresidential, high-rise residential and hotel/motel buildings shall comply with the applicable requirements of Sections 130.2(a) through 130.2(c).
Example language, Section 150.0(k)3:

B. For low-rise residential buildings with four or more dwelling units, outdoor lighting for private patios, entrances, balconies, porches; and residential parking lots and carports with less than eight vehicles per site shall comply with either:
   i. Section 150.0(k)3A; or
   ii. the Multifamily Outdoor Lighting Section. The applicable requirements in Sections 110.9, 130.0, 130.2, 130.4, 140.7 and 141.0.

C. For low-rise residential buildings with four or more dwelling units, any outdoor lighting for residential parking lots or carports with a total of eight or more vehicles per site and any outdoor lighting not regulated by Section 150.0(k)3B or the Multifamily Outdoor Lighting Section 150.0(k)3CD shall comply with the applicable requirements in Sections 110.9, 130.0, 130.2, 130.4, 140.7 and 141.0.
Highlights of the to outdoor multifamily lighting proposal:

• Allow mixed-use buildings (properties) with residential dwelling units to use the new section
• Simplify calculation of the allowed outdoor lighting wattage for multifamily buildings
• A single, common allowance for canopy lighting
• Setback control requirements will apply – to reduce outdoor lighting power by at least 60 percent
• Exception to lighting for public streets and roadways - including those owned or maintained by municipality or utility
### Example language: TABLE X - General Hardscape Lighting Power Allowance For Multifamily Buildings

<table>
<thead>
<tr>
<th>Types of power allowance</th>
<th>Lighting Zone LZ 0</th>
<th>LZ 1</th>
<th>LZ 2</th>
<th>LZ 3</th>
<th>LZ 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Wattage Allowance (AWA)</td>
<td>No allowance</td>
<td>0.026 W/ft²</td>
<td>0.030 W/ft²</td>
<td>0.038 W/ft²</td>
<td>0.055 W/ft²</td>
</tr>
<tr>
<td>Initial Wattage Allowance (IWA)</td>
<td>No allowance</td>
<td>300 W</td>
<td>350 W</td>
<td>400 W</td>
<td>450 W</td>
</tr>
</tbody>
</table>
Example language, Section X:

EXCEPTIONS:

3. Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way owned or maintained by the local municipality or utility.

Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants, and aviation facilities.

In theme parks: outdoor lighting only for themes and special effects.
Estimated Cost for Implementation

Multifamily Outdoor Lighting Power Allowances

Cost to implement the measure:

• No or zero incremental first costs
• No or zero incremental maintenance and replacement cost
## Benefits for Implementation

### Statewide Energy and Energy Cost Impacts – Multifamily Outdoor Lighting Allowance

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<tr>
<th>Construction Type</th>
<th>First-Year Electricity Savings (GWh)</th>
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</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>2.28</td>
<td>0.45</td>
<td>N/A</td>
<td>$1.89</td>
</tr>
<tr>
<td>Additions and Alterations</td>
<td>9.47</td>
<td>1.85</td>
<td>N/A</td>
<td>$7.84</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11.75</td>
<td>2.30</td>
<td>N/A</td>
<td>$9.73</td>
</tr>
</tbody>
</table>
## Greenhouse Gas (GHG) Emissions Reduction

### First-Year Statewide GHG Emissions Impacts

<table>
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<td><strong>N/A</strong></td>
<td><strong>9,331</strong></td>
</tr>
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Preliminary Findings

Multifamily Outdoor Lighting Power Allowance Measure

Technical Feasibility
• LED luminaires useful for achieving revised lighting levels are widely available
• Builders and designers are familiar with available products – no novel technologies or techniques are required

Cost Effectiveness
• Cost effective in all climate zones
Questions
Comments for Today’s Workshop

Due Date October 6, 2020 By 5:00 PM

Comments to be submitted to:
Contact Information

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• Email: Simon.Lee@energy.ca.gov

Peter Strait, Supervisor
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• Phone: (916) 654-4618
• Email: Payam.Bozorgchami@energy.ca.gov
Thank You!