Retail Lighting: Title 24 & Technology Update

Supporting compliance with California’s 2013 Title 24 standards

Kelly Cunningham
Outreach Director
kcunning@ucdavis.edu
California Lighting Technology Center, UC Davis
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OBJECTIVES

At the close of the class, attendees should be able to:

• Effectively apply the Title 24, Part 6 Building Energy Efficiency Standards requirements specific to lighting for retail applications.

• Identify mandatory and prescriptive Standards’ requirements, apply compliance methodology, and procedures in professional practice.

• Identify current lighting technologies and controls, including LED luminaires, that are available to fulfill code requirements.

• Implement the lighting-related content in the 2013 Building Energy Efficiency Standards code.

• Access resources through utility and lighting technology training centers for continued professional development
CALIFORNIA LIGHTING TECHNOLOGY CENTER, UC DAVIS

CLTC’s Mission: To stimulate, facilitate and accelerate the development, application and commercialization of energy-efficient lighting and daylighting technologies in partnership with utilities, manufacturers, occupants, builders, designers, researchers, academicians, and government agencies.

Mission-driven Activities:
• Research & Development
• Demonstration & Outreach
• Education & Training
## Founding Organizations

- UC Davis University of California
- pLIER
- NEMA
- [Logo] (Link to NEMA)

## Utilities

- Pacific Gas and Electric Company
- Southern California Edison
- [SDG&E Logo] (Link to SDG&E)
- SMUD
- [Los Angeles Department of Water & Power Logo] (Link to LA DWP)
- [Roseville Electric Logo] (Link to Roseville Electric)
- Silicon Valley Power
- BC Hydro

## Manufacturers

- Acuity Brands
- Entech Solar
- IDEAL
- Leviton
- Qualcomm
- Cooper Lighting [by Eaton]
- FineLite
- Intermatic
- Lumenetix
- Sharp
- Cree
- Jade Technologies
- Lumenair
- Soraa
- [LGE Logo] (Link to LG)
- [Siemens Logo] (Link to Siemens)
- Everlast Lighting
- Kenall
- Lutron
- Universal Lighting Technologies
- Daintree Networks
- [Logos for Daintree Networks]
- GE Lighting
- Konica Minolta
- Microsoft
- Echelon
- Enlighted
- Kuraray
- Osram Sylvania
- Velux Skylights
- Enlighted

## Large End-Users

- DGS
- Department of General Services
  - Building Green • Buying Green • Working Green
- CSU The California State University
  - Working for California
- LACCD
- National Park Service
- Forest Service
- [Logos for Walmart and Other Large End-Users]
Lighting is the largest electrical load in commercial businesses, accounting for about 40% of annual electricity use.

California Energy Consumption Database, [http://ecdms.energy.ca.gov](http://ecdms.energy.ca.gov), updated January 2013
CONTROLS IN U.S. COMMERCIAL SPACES

Half of the retail spaces in California do not use automated lighting controls. Of those that do, the majority employ an energy management system (EMS).

Nationally, lighting controls are even less prevalent.

<table>
<thead>
<tr>
<th>LIGHTING TYPE</th>
<th>NONE</th>
<th>DIMMER</th>
<th>LIGHT SENSOR</th>
<th>MOTION DETECTOR</th>
<th>TIMER</th>
<th>EMS</th>
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<tbody>
<tr>
<td>INCANDESCENT</td>
<td>76%</td>
<td>55%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>16%</td>
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<tr>
<td>HALOGEN</td>
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<td>5%</td>
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<td>1%</td>
<td>3%</td>
<td>18%</td>
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<tr>
<td>CFL</td>
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<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>2%</td>
<td>18%</td>
</tr>
<tr>
<td>LINEAR FLUORESCENT</td>
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<td>1%</td>
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<tr>
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<td>2%</td>
<td>1%</td>
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<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>15%</td>
</tr>
</tbody>
</table>
**LIGHTING & ENERGY EFFICIENCY**

**Luminous Efficacy**
- One-time, long-term change
- Reduction of baseline
- Light Source Efficacy
- Luminaire Efficacy
- Application Efficacy

**Lighting Controls**
- Continuous, real-time change
- Fluctuations from baseline
  - Occupancy / Vacancy
  - Daylighting
  - Demand Response
  - Tuning
  - Personal Control
ADAPTIVE LIGHTING SYSTEMS…

automatically adjust their light output…

- Total Luminous Flux
- Spectral Power Distribution
- Candle Power Distribution

based on sensor input from the space…

- Occupancy / Vacancy
- Daylight
- DR Signals

to optimize space and building performance.

- Comfort
- Energy Savings
- Peak Demand Reduction
INTEGRATED CONTROL STRATEGY

During **occupancy**, focus on **comfort**
- Adjust fenestration for daylight penetration
- Adjust electric lighting for daylight contribution
- Offer manual control options
- Adjust electric lighting for demand response
- Adjust HVAC

During **vacancy**, focus on **energy efficiency**
- Adjust fenestration for cooling/heating loads
- Turn electric lighting off or dim down
- Adjust electric lighting for demand response
- Adjust HVAC
Select the Appropriate Source + Luminaire + Controls (for the application)