Title 24 Part 6 and Part 11 Building Code Triggers

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Agenda

- Environmental Laws
- When is CALGreen Required
- Best Practices
- Avoid Pitfalls
California Legislation & Efficiency Goals
Global Warming Solutions Act (AB32)

- Requires an 80% cut in Greenhouse gas emissions below 1990 levels by 2050
- Compliance will require a cut in emissions of about 30% per person in California
- Efficiency strategies that pay for themselves through energy savings will be targeted first. Lighting is third on the target list behind insulation and fuel efficiency.
Clean Energy & Pollution Reduction Act (SB 350)

- Renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030.
- Double statewide energy efficiency savings in electricity and natural gas end uses by 2030.
- Explores reducing barriers to businesses providing such services & incentives for low income users.
Clean Energy & Pollution Reduction Act (SB 350)

- California - Half of its electricity from renewable energy sources and double energy efficiency in all buildings by 2030
City of Los Angeles
Existing Building Energy and Water Efficiency ordinance

- Buildings 20,000-square-feet or larger to report energy and water usage
- Report every 5 years (High energy users are required to reduce consumption)
  - Energy or water audit
  - Retro-commissioning
  - Proof of Energy Star Certificate
  - Or proven reduction in water (20%) and energy (15%)
Programs to achieve greater energy efficiency in existing buildings (AB-758)

- Energy assessments; (Audits)
- Building benchmarking; (a’ la AB 802)
- Energy rating; (Portfolio Manager)
- Cost-effective energy efficiency improvements;
- Public and private sector energy efficiency financing;
- Public outreach and education; and
- Green workforce training.
Lighting Efficiency and Toxic Reductions Act (AB 1109)

- Reduce commercial lighting energy consumption by more than 25% from 2007 levels by 2018
- Develop new systems for the recycling of hazardous lighting products that is free and convenient for end users
- Require manufacturers to provide certification attesting that lights contain safe levels of hazardous substances
Energy Benchmarking and Disclosure Law (AB 802)

- Mandates disclosure of building energy data to prospective buyers and lessees of the entire building or lenders financing entire buildings

- Buildings 10,000 sq. ft. or more after Jan 1, 2014

- Buildings 5,000 sq. ft. or more after July 1, 2016
CA State Goals
Title 24 Path to Net Zero - Residential

2008 Title 24 part 6 Standards in Effect

2010 CA Green Building Standards in Effect

2010 CALGreen 18 month Supplement

2013 CALGreen Adopted

2013 CALGreen In Effect

2014

2015

2016 Title 24 Pt 6 Standards Adopted

2016 Title 24 Pt 6 Standards in Effect

2016 CALGreen Adopted

2016 CALGreen In Effect

2017

2018

2019 Title 24 Pt 6 Standards Adopted

2019 Title 24 Pt 6 Standards in Effect

2020

All Res New Construction Starts are Zero Net Energy

Key:
T24 Part 6 – Energy Efficiency Standards
T24 Part 11 – Green Building Standards
CA Long-Term Strategic Plan Goals
Solar On-site renewables in base case
Title 24 Path to Net Zero – Nonresidential Building Standards

2008 Title 24 Part 6 Standards in Effect

2013 T-24 Pt 6 Std Adopted

2016 Title 24 Pt 6 Standards Adopted

2016 CALGreen Adopted

2019 Title 24 Pt 6 Standards Adopted

2016 CALGreen Adopted

2022 Title 24 Pt 6 Standards Adopted

2022 CALGreen Adopted ZNE for some bld

2025 Title 24 Pt 6 Standards Adopted ZNE for some new bld

2025 Title 24 Pt 6 Standards Adopted ZNE for all new bld

2025 CALGreen Adopted ZNE for all

2026

2027

2028

2029

2030


All NonRes New Construction Starts are Zero Net Energy

Key:
T24 Part 6 – Energy Efficiency Standards
T24 Part 11 – Green Building Standards
CA Long-Term Strategic Plan Goals
☀ On-site renewables in base case
CALGreen
Triggers
Title 24 – Building Standards Code

Part 1 – California Administrative Code
Part 2 – California Building Code
Part 2.5 – California Residential Code
Part 3 – California Electrical Code
Part 4 – California Mechanical Code
Part 5 – California Plumbing Code
Part 6 – California Energy Code
Part 7 – Vacant
Part 8 – California Historical Building Code
Part 9 – California Fire Code
Part 10 – California Existing Building Code
Part 11 – California Green Building Standards Code
Part 12 – California Referenced Standards Code
CALGreen Triggers

- All new residential projects or additions in sq. ft.
- All new non-residential buildings
  - Additions 1,000 sf or greater
  - Alterations $200,000 and more
Best Practices
Towards
Code Compliance
Design Reviews

- Pre-Plan check in house or third party
- Reviewer is familiar with the code (City amendments)
- Knowledge of testing requirements prior to occupancy
- Avoid costly change orders
- Avoid delays in occupancy
- Fail to plan, plan to fail
Construction Kick-Off

- Meet with GC and all subcontractors
- Discuss project goal/plans
- Specifications may not align with plans
- Insert Commissioning and Acceptance Testing into construction schedule
- Plan for testing
Acceptance Testing
The requirement for a State certified Acceptance Test Technician to inspect HVAC systems has yet to be triggered.

- Affected projects
- New HVAC Systems – Economizer, demand control ventilation, outside air flow, etc.
- 350 – Required number of independent certified technicians to trigger licensed Acceptance Technician
- Contractor can perform Acceptance Testing – City or owner can require third party.
A State certified Acceptance Test Technician will inspect lighting systems to ensure they comply with the energy code required for C of O.

- Newly constructed Non-Res buildings (Ground up)
- Any Addition (expansion of square footage)
- Any alteration that adds new equipment to an existing space (retrofit) that modifies more than 10% of the existing luminaires or ballasts, or any retrofit of < 70 ballasts or luminaires
- 2016 adds: “Institutional Tuning” and “Daylighting + Off”
- 2016 removes PAF for: Partial ON sensors and Manual Dimming
Lighting Acceptance cont.

All spaces must have On/Off switches plus:

Exception for safety egress submitted to AHJ of <.2 W/sf

<table>
<thead>
<tr>
<th>Space Condition</th>
<th>Acceptance Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Spaces. Exceptions including 24/7, 0.05 W/sf office egress, Equip Rooms</td>
<td>Lighting Control</td>
</tr>
<tr>
<td>Indoor &gt;24sq’ window with 120 W Garage &gt;36sq’ open with 60 W</td>
<td>Automatic Daylight Control</td>
</tr>
<tr>
<td>Buildings &gt;10,000sf not including non-habitable space 0.5W/sf or less</td>
<td>Demand Response</td>
</tr>
<tr>
<td>Optional for credit: Non-user adjustable high-level trim</td>
<td>Institutional Tuning - PAF</td>
</tr>
<tr>
<td>All outdoor lighting. No daylight Op. Motion sensor on 24’ and less.</td>
<td>Outdoor Lighting Control</td>
</tr>
<tr>
<td>All spaces greater than 100 sq ft and containing greater than 0.5 W/sf must have multilevel lighting or dimming control.</td>
<td></td>
</tr>
</tbody>
</table>
Thank you! We’re Here to Help

<table>
<thead>
<tr>
<th>Services</th>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALGreen</td>
<td>- Simplified turn key compliance</td>
<td>- Fewer headaches</td>
</tr>
<tr>
<td>Cx &amp; RCx</td>
<td>- Design Integration</td>
<td>- Less time at the counter</td>
</tr>
<tr>
<td>Energy Modeling</td>
<td>- Identify return on investment</td>
<td>- Mitigate issues early</td>
</tr>
<tr>
<td>Title-24 Energy</td>
<td>- Early due diligence</td>
<td>- Timely occupancy</td>
</tr>
<tr>
<td>LEED / WELL</td>
<td>- Industry organization</td>
<td>- Maximize ROI</td>
</tr>
<tr>
<td>Energy/Water Audits</td>
<td>- Direct relationships</td>
<td>- Timely occupancy</td>
</tr>
<tr>
<td>Compliance Review</td>
<td>- Code development</td>
<td>- Fewer call backs</td>
</tr>
<tr>
<td>HERS</td>
<td>- Special committees</td>
<td>- Happier clients</td>
</tr>
<tr>
<td>Acceptance Testing</td>
<td>- Industry knowledge</td>
<td></td>
</tr>
</tbody>
</table>

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Lighting Requirements
Lighting Compliance

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.
“Sections 130.0 through 130.5 apply to newly constructed buildings.”
“Section 141.0 specifies which requirements of Sections 130.0 through 130.5 also apply to additions and alterations to existing buildings.”
Lighting Compliance – the 130.1’s

CALCTP-Acceptance Testing may apply.

- 130.1 (a): Area Controls: “All luminaires shall be functionally controlled with manually switched ON and OFF lighting controls.”
130.1 (b): Multi-Level Lighting Controls: “The general lighting of any enclosed area 100 square feet or larger, with a connected lighting load that exceeds 0.5 watts per square foot shall...”
- Meet uniformity requirements
- Not override other lighting controls
- Shall be controlled by one or more:
  A. Manual dimming
  B. Lumen maintenance
  C. Tuning
  D. Automatic daylighting
  E. Demand responsive lighting
130.1 (c): Shut-OFF Controls: “In addition to lighting controls installed to comply with Sections 130.1(a) and (b), all installed indoor lighting shall...”

- Be controlled with an occupant sensing control,
- Automatic time-switch control
- OR some type of control to automatically shut off ALL lighting when the space is typically unoccupied.
Lighting Compliance – the 130.1’s

- 130.1 (c): Shut-OFF Controls (continued):
  - Separate controls for the lighting on each floor
  - Separate controls for a space enclosed by ceiling height partitions not exceeding 5,000 square feet
  - Separate controls for general, display, ornamental, and display lighting
Lighting Compliance – the 130.1’s

- 130.1 (c): Shut-OFF Controls continued:
  - Occupancy/Vacancy sensors are required
    - In offices 250 square feet or smaller
    - Multipurpose rooms of less than 1,000 square feet
    - Classrooms of any size
    - Conference rooms of any size
- Partial ON/OFF occupant sensing
  - In aisle ways and open areas in warehouses
  - In library book stack aisles
  - Corridors and stairwells
130.1 (d): Automatic Daylighting Controls:

- Triggered at 24 sqft of glass and 120 W or greater lighting power in zone adjacent to glass if power density above 0.3W/sf.
  - Skylit Daylit Zone
    - 0.7 x ceiling height
  - Primary Sidelit Daylit Zone
    - 1.0 x head height in  +  0.5 x head height sideways
  - Secondary Sidelit Daylit Zone (optional)
    - 1.0 x head height in  +  0.5 x head height sideways

- 36 sqft of glass or opening for parking garages
Lighting Compliance – the 130.1’s

- 130.1 (e): Demand Responsive Controls (ADR):
  - Triggered at 10,000 square feet, excluding spaces with a lighting power density of 0.5 watts per square foot or less.
  - 15% Reduction of total power
    - No single space dimmed more than 50% light level
  - Capable of receiving a remote signal

[Images of Demand Responsive Controls (ADR) devices]
Lighting Compliance – Outdoor

- 130.2 (a): Outdoor Incandescent Lighting: Over 100 Watts must be controlled by motion sensor

- 130.2 (b): Luminaire Cutoff Requirements: greater than 150 lamp watts shall comply "BUG“ ratings in accordance with IES TM-15-11, Addendum A.

- 130.2 (c): Controls for Outdoor Lighting: Shall be controlled by a photo-control or outdoor astronomical time-switch.

- Pole Lights 24’ or less in height must be controlled by Motion Sensor and reduce power by 40-90% with Auto-On capability
130.2 (c): Controls for Outdoor Lighting: continued

Building Facades, Ornamental, Dining lighting shall:
  • Be controlled by Part night controls, or
  • Motion sensors diming from 40-90%, or
  • Centralized lighting system, or
  • If 24’ or less wall packs, comply like pole lights
130.3 (a): Controls for Sign Lighting:

- Indoor Signs shall:
  - Be controlled by time-switch or Astro time-switch

- Outdoor Signs shall:
  - Be controlled by photo-control in addition to an time-switch or Astro time-switch
  - Sign lighting that is ON both day and night must have a dimmer to reduce sign lighting power by at least 65% during nighttime hours.

- Signs over 15 kW must have ADR
Lighting Compliance – Acceptance

- 130.4 (a): Lighting Control Acceptance Requirements:

- “Before an occupancy permit is granted, indoor and outdoor lighting controls serving the building, area, or site shall be certified as meeting the Acceptance Requirements for Code Compliance…”
Electrical Power Compliance

- 130.5: Electrical Power Distribution Systems: “...buildings shall comply with...”
- 130.5 (a): Service Electrical Metering
- 130.5 (b): Separation of Electrical Circuits for Electrical Energy Monitoring
- 130.5 (c): Voltage Drop [<5%]
- 130.5 (d): Circuit Controls for 120-Volt Receptacles and Controlled Receptacles
- 130.5 (e): Demand responsive controls and equipment
### 130.5 (a): Service Electrical Metering

**TABLE 130.5-A MINIMUM REQUIREMENTS FOR METERING OF ELECTRICAL LOAD**

<table>
<thead>
<tr>
<th>Metering Functionality</th>
<th>Electrical Services rated 50 kVA or less</th>
<th>Electrical Services rated more than 50kVA and less than or equal to 250 kVA</th>
<th>Electrical Services rated more than 250 kVA and less than or equal to 1000kVA</th>
<th>Electrical Services rated more than 1000kVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instantaneous (at the time) kW demand</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Historical peak demand (kW)</td>
<td>Not required</td>
<td>Not required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Tracking kWh for a user-definable period</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>kWh per rate period</td>
<td>Not required</td>
<td>Not required</td>
<td>Not required</td>
<td>Required</td>
</tr>
</tbody>
</table>

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*VCA Green*
130.5 (b): Separation of Electrical Circuits for Electrical Energy Monitoring

<table>
<thead>
<tr>
<th>Electrical Load Type</th>
<th>Electrical Services rated 50kVA or less</th>
<th>Electrical Services rated more than 50kVA and less than or equal to 250 kVA</th>
<th>Electrical Services rated more than 250 kVA and less than or equal to 100kVA</th>
<th>Electrical Services rated more than 100kVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting, including exit and egress lighting and interior lighting</td>
<td>Not required</td>
<td>All lighting in aggregate</td>
<td>All lighting disaggregated by floor, type or area</td>
<td>All lighting disaggregated by floor, type or area</td>
</tr>
<tr>
<td>HVAC systems and components, including chillers, fans, electric water heaters, pumps, package units, cooling towers, and circulation pumps associated with HVAC systems, pumps, and related systems and components</td>
<td>Not required</td>
<td>All HVAC in aggregate</td>
<td>All HVAC in aggregate and each HVAC load rated at least 50 kVA</td>
<td>All HVAC in aggregate and each HVAC load rated at least 50 kVA</td>
</tr>
<tr>
<td>Domestic and service water system pumps and related systems and components</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Plug load including appliances rated less than 25 kVA</td>
<td>Not required</td>
<td>All plug load in aggregate</td>
<td>All plug load separated by floor, type or area</td>
<td>All plug load separated by floor, type or area</td>
</tr>
<tr>
<td>Elevators, escalators, moving walks, and transit systems</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Other individual non-HVAC loads or appliances rated 25 kVA or greater</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Industrial and commercial load centers 25 kVA or greater including theatrical lighting installations and commercial kitchens</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Renewable power source (net or total)</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
</tr>
<tr>
<td>Loads associated with renewable power source</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Charging stations for electric vehicles</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
</tbody>
</table>
Electrical Power Compliance

- 130.5 (b): Separation of Electrical Circuits for Electrical Energy Monitoring

Panels are already made with circuit level monitoring built in.
130.5 (d): Circuit Controls for 120-Volt Receptacles and Controlled Receptacles