

Proposal Summary



Controlled Environment Horticulture

Updated: Monday, January 30, 2023
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Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on February 9, 2023. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by February 23, 2023.

Measure Description

Lighting Efficiency

The current code requires luminaires or lamps that are used for plant growth to have a photosynthetic photon efficacy (PPE) of at least 1.9 micromoles per joule ($\mu\text{mol}/\text{J}$) for indoor grow facilities with more than 40 kW of horticultural lighting load. Luminaires or lamps used for plant growth in greenhouses with more than 40 kW of horticultural lighting load must have a PPE of at least 1.7 $\mu\text{mol}/\text{J}$. Both the indoor and greenhouse requirements can be met by double-ended high-pressure sodium (HPS) technology, a legacy product that has been in the CEH market for over a decade.

For the 2025 cycle, the Statewide CASE Team is analyzing the potential for increasing the PPE levels for both indoor and greenhouse facilities. Specifically, the Statewide CASE Team is proposing to increase the minimum PPE for luminaires and lamps used to grow plants in indoor facilities from 1.9 to an LED based efficacy, at least 2.3 $\mu\text{mol}/\text{J}$. This change would mandate the use of LEDs whereas HPS lamps can meet the existing requirements. The Statewide CASE Team will investigate the potential for requiring controls that operate indoor lighting systems based on Photosynthetic Photon Flux Density (PPFD) and Daily Light Integral (DLI).

For greenhouses, the Statewide CASE Team is looking into increasing the minimum PPE for luminaires and lamps used to grow plants from 1.7 to 1.9 $\mu\text{mol}/\text{J}$. Double-ended HPS lamps and LED luminaires would be able to meet this proposed level while ceramic metal halides would likely not.



HVAC and Dehumidification (HVAC/D) Equipment and Environmental Controls Integration

The Statewide CASE Team will explore mandatory environmental and irrigation controls in indoor horticulture facilities larger than a certain square feet threshold. The controls will specify the monitoring parameters specific to plant growth such as temperature, humidity, CO2 levels, as well as parameters specific to plant irrigation such as pressure in irrigation lines. Optimal values for environmental parameters will be determined for all crop types. The evaluation will consider simple controls such as thermostats, switches, time clocks, irrigation timers, irrigation controllers, pressure sensors for irrigation lines as well as more complex controls that use computerized equipment. Interactions of lighting and HVAC systems will be considered.

The proposed measure would reduce energy use by requiring the use of more efficient HVAC/D system configurations in indoor growing facilities. These systems utilize site-recovered energy to reheat dehumidified air, have capacity-modulating condensing unit technologies, and have controls that allow systems to modulate with temperature and humidity controls.

Data Needs/Stakeholder Information Requests

- The Statewide CASE Team would like to survey CEH lighting equipment dealers to understand what percent of each CEH lighting technology is sold through their businesses.
- The Statewide CASE Team would like to survey CEH HVAC/D and controls manufacturers to understand what common types of equipment and controls configurations they are specifying.
- What HVAC/D control and equipment strategies are considered inefficient?
- What are typical maintenance requirements for LED grow lights?

Data may be provided anonymously. To participate or provide information, please email Kyle Booth, kbooth@energy-solution.com directly and cc info@title24stakeholders.com.

Draft Code Language

This proposal would modify the following sections of the California Energy Code as shown below.

3. **Indoor Growing, Horticultural Lighting.** In a building with CEH spaces and with more than 40 kW of aggregate horticultural lighting load, the electric lighting systems used for plant growth and plant maintenance shall meet the following requirements:

- A. Luminaires shall have with removable lamps shall contain lamps with a lamp photosynthetic photon efficacy of at least ~~2.3~~ ~~4.9~~ micromoles per joule rated in accordance with ANSI / ASABE S640 for wavelengths from 400 to 700 nanometers; all other luminaires shall have a luminaire photosynthetic photon efficacy of at least ~~2.3~~ ~~4.9~~ micromoles per joule.
- B. Time-switch lighting controls shall be installed and comply with Section 110.9(b)1, Section 130.4(a)4, and applicable sections of NA7.6.2.
- C. Multilevel lighting controls shall be installed and comply with Section 130.1(b).

(...)

- 7. **Greenhouses, Horticultural Lighting.** In a greenhouse with more than 40 kW of aggregate horticultural lighting load, the electric lighting system used for plant growth and plant maintenance shall meet the following requirements:
 - A. Luminaires with removable lamps shall contain lamps with a lamp photosynthetic photon efficacy of at least ~~4.7~~ ~~1.9~~ micromoles per joule, all other luminaires shall have a luminaire photosynthetic photon efficacy of at least ~~4.7~~ ~~1.9~~ micromoles per joule.
 - B. Time-switch lighting controls shall be installed and comply with Section 110.9(b)1, Section 130.4(a)4, applicable sections of NA7.6.2.

Multilevel lighting controls shall be installed and comply with Section 130.1(b).

Reference Appendices

There are no proposed changes to the Reference Appendices.