

Massachusetts Energy Efficiency Lighting Requirements for Cannabis Operations

The Massachusetts Cannabis Control Commission recently published draft rules for electric lighting energy consumption. The rules state that cannabis growers must conform to one of the requirements below:

- Horticulture lights must not exceed an electric power density of 36W/ft² for grow operations with a canopy greater than 10,000 ft². License class Tier 1 & Tier 2 operations (canopy less than 10,000 ft²) may have an energy density up to 50W/ft².
- All horticultural lights used in a facility are listed on the current Design Lights Consortium (DLC) Solid-State Horticultural Lighting Qualified Products List (“Horticultural QPL”) or other similar list approved by the Commission as of the date of license application, and lighting Photosynthetic Photon Efficacy (PPE) is at least 15 percent above the minimum Horticultural QPL threshold.
- An indoor Marijuana Cultivator is generating 80% or more of the total annual onsite energy use for all fuels from an onsite clean or renewable generating source and/or alternative energy generating source.

Implementation & Solutions

1. DLC Listed Lights

One approach to meeting the state’s regulation is to ensure all horticulture lights in the grow facility are listed on DLC’s Horticulture QPL, and the lights have an efficacy 15% greater than the minimum threshold. As of August 2019, DLC’s efficacy requirement is 1.9 $\mu\text{mols/j}$ with a measurement tolerance of 5%, which results in a minimum threshold of 1.81 $\mu\text{mols/j}$. Installing DLC listed horticulture lights with an efficacy greater than 2.1 $\mu\text{mols/j}$ (15% greater than 1.81 $\mu\text{mols/j}$) throughout the grow facility would satisfy the Massachusetts requirement. DLC’s efficacy requirement will likely increase over time as LED technology continues to improve, so it is important to understand the current efficacy threshold at the time of selecting a light. DLC’s horticulture qualified product list can be found here: [DLC QPL](#).

2. Optimize 36W/ft²

It is often impractical for growers to have all horticulture lights meet the qualification and efficacy requirements described above – especially for existing facilities. Most growers will need to determine how to most effectively utilize 36W/ft² throughout the facility. A strategy to maximize production yield is presented in the example below.

Example: 100,000 ft² grow operation

Square footage of the grow operation is assumed to consist of 75% flower and 25% Veg/Mom. Veg/Mom plants are illuminated with an intensity of 400 $\mu\text{mols/m}^2/\text{sec}$ using LED lighting with an energy power density of 16W/ft². Flowering plants use 32.5W/ft² of power from LED top lighting to produce 800 $\mu\text{mols/m}^2/\text{sec}$, and 8W/ft² of LED under canopy lighting. The combination of top lighting and under canopy lighting for flowering cannabis has been demonstrated to produce the highest yields, along with THC and terpene enhancement. Additional information on the benefits of under canopy lighting can be found here: [Under Canopy White Paper](#).

	Veg/Mom	Flower (Top)	Flower (Under)	Total Facility
Area (ft ²)	25,000	75,000	75,000	100,000
PPFD ($\mu\text{mols/m}^2/\text{sec}$)	400	800	180	835 (Avg.)
Energy Density (W/ft ²)	16	32.5	8	34.5 (Avg.)