



HORT *webinar* *wednesdays*

July 29, August 26 & September 23, 2020

Incentives vs. Regulations - What Do They Mean for Product Selection?

August 26, 2020
1 p-2:15p

Agenda



1:00pm-1:05pm

Welcome & Introductions (*5 minutes*)



1:05pm-1:45pm

Panelist Presentations (*40 min*)



1:45pm-2:15pm

Q&A Session with Panelists (*30 minutes*)



2:15pm-2:20pm

Break (*5 minutes*)



2:20pm-3:00pm

Breakout Discussion Sessions (*40 minutes*)

About This Session



Leora Radetsky
Senior Lighting Scientist
DesignLights Consortium

Discussion between cannabis/horticulture regulators and utility energy efficiency program administrators that compares approaches to constraining energy use and increasing grower/licensee participation. Topics will include:

- Energy codes versus regulations
- Incenting beyond regulations
- Key challenges for market transformation

LEARNING OBJECTIVES:

- Explore different approaches to constrain energy use in controlled environment agriculture.
- Review challenges with accelerating adoption and offering incentives for products in states and/or regions where DLC listed products are required in code or regulations.
- Understand how incentives can be structured to differentiate products above code.

The Panel



Derek Smith
Executive Director
Resource Innovation Institute



Thao Chau
Electrical Engineer
California Energy Commission



Brendan Place
Clean Energy Engineer
Massachusetts Department of Energy
Resources



Lauren Gaikowski
Energy Advisor II
Franklin Energy

We advance resource efficiency
to cultivate a better agricultural future.



Derek Smith, Executive Director

Objective non-profit | Data-driven | Stakeholder-engaged | Anti-racist

We bring together stakeholders to establish:

- **Benchmarks & Baselines**
 - Energy (e.g., grams/kWh, kBtu/sq ft)
 - Water
 - Waste
 - Carbon emissions
- **Best practices**
 - Lighting
 - HVAC
 - Automation & Controls
- **Standards**
 - Governments
 - Utilities
 - Standards organizations



Trusted by Programs, Cultivators, Supply Chain, & Governments



Technical Advisory Council

Multi-disciplinary body facilitated by RII to aggregate knowledge and data to support cultivators, governments, utilities, standards bodies and other stakeholders with objective, peer-reviewed information on cultivation resource use and quantification of performance

1. Provides guidance on development of standards
2. Shapes tools and resources to support best practices
3. Informs advocacy on policies, incentives and regulations



Utility Working Group on CEA

Advancing utility engagement in issues related to controlled environment agriculture and indoor cannabis cultivation

2020 Work Product:

Program Design and Market Engagement Primer

- *Baseline development guidance*
- *Measure savings calculations guidance*
- *Incentive program structure & delivery*
- *Outreach and education best practices*

Future Work Products

- *Baseline studies*
- *Typical cultivation facility energy use profiles*
- *Catalog of available technologies and energy use and demand impacts & loadshapes*
- *LED lighting studies*
- *Lessons from cannabis to support emerging CEA programs*



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thought leaders in 2021!**

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ResourceInnovation.org/

[JoinWithUs](#)

Benchmark your operational efficiency with



Competitive

- **KPIs** benchmark facility resource efficiency:
 - Energy: **grams / kWh**
 - Water: **gallons / sq ft**
- **Ranks** competitive position relative to other facilities



Trusted

- Used by **300+ cultivators & facilities**
- Metrics **peer-reviewed** by Technical Advisory Council
- **Specified by governments** including Massachusetts



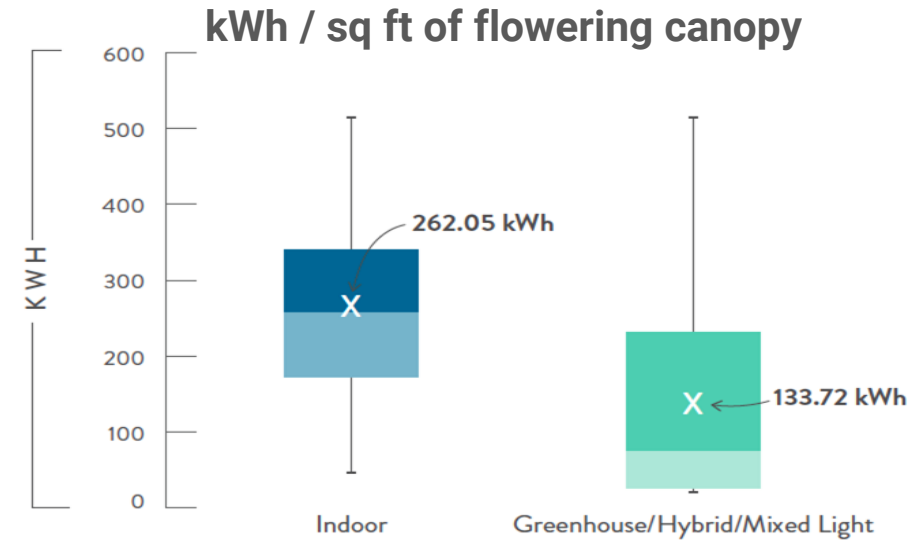
Confidential

- Maintained by a **non-profit**
- **Confidential** survey
- **Protected** individual farm data



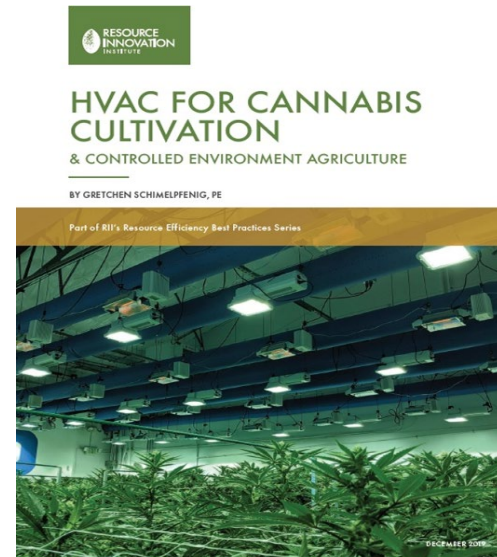
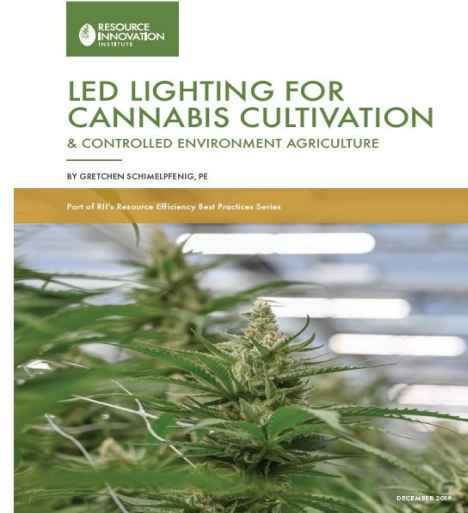
Cannabis & Energy Use: Why Governments Are Acting

- Energy-intensive emerging industry
 - Long equipment run hours
 - High-wattage lighting
 - High-tonnage HVAC
 - Large electrical demand
- Disruptive to communities
- Efficient technologies are proving to save energy



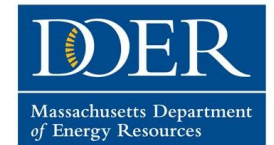
Cannabis & Energy Use: How States are Responding

- Policy/regulation
- Building energy codes
- Cultivator support systems



BEST PRACTICES ON ENERGY EFFICIENT CULTIVATION
MASSACHUSETTS VIRTUAL WORKSHOPS

WED JUN 17 **COMPETING & COMPLYING VIA EFFICIENCY** 1 - 3 PM
WED JUL 15 **CULTIVATING WITH LED LIGHTING** 1 - 3 PM
WED AUG 5 **HVAC BEST PRACTICES** 1 - 3 PM (ALL TIMES EST)



FREE

FOR MORE INFORMATION & TO REGISTER, GO TO:
RESOURCEINNOVATION.ORG/EVENTS

Efficient yields
CULTIVATION WORKSHOPS
Best practices on energy. Grower-led. No sales pitches.



Cannabis & Energy Use: Subjects Addressed by Governments

- **Regulations** requiring energy plans and engagement with utilities / efficiency programs:
 - Lighting requirements (W/sf, photon efficacy, DLC)
 - HVAC requirements (Illinois)
 - On-site renewable energy generation
 - Reporting on resource consumption
- **Energy codes** evolving to address controlled environment agriculture (CEA), not just cannabis
 - Lighting
 - Greenhouse envelope
 - Standalone dehumidification



Massachusetts Energy & Water Reporting and Resource Tracking

For Marijuana Cultivators



Cannabis & Energy Use: Implications of Government Actions

- New baselines / reduction in incentives / higher CapEx
- Need for cultivator and supply chain education
- Improved OpEx for cultivators / Higher likelihood of long-term tax revenues for communities
- Program implementers and cultivators working more closely to find additional savings



California Horticultural Lighting Regulation

Hort Webinar Wednesdays Session 2



Thao Chau

Electrical Engineer

Building Standards Office, California Energy Commission

Date: 8/26/2020



California Energy Commission

- Advance state energy policy
- Achieve energy efficiency
- Invest in energy innovation
- Develop renewable energy
- Transform transportation
- Oversee energy infrastructure
- Prepare for energy emergencies





Energy Code History

The Warren-Alquist Act established California Energy Commission (CEC) 1974

- Authority to develop and maintain Building Energy Efficiency Standards
- Required to update periodically, typically every three years
- Required to be cost effective over the lifetime of the buildings



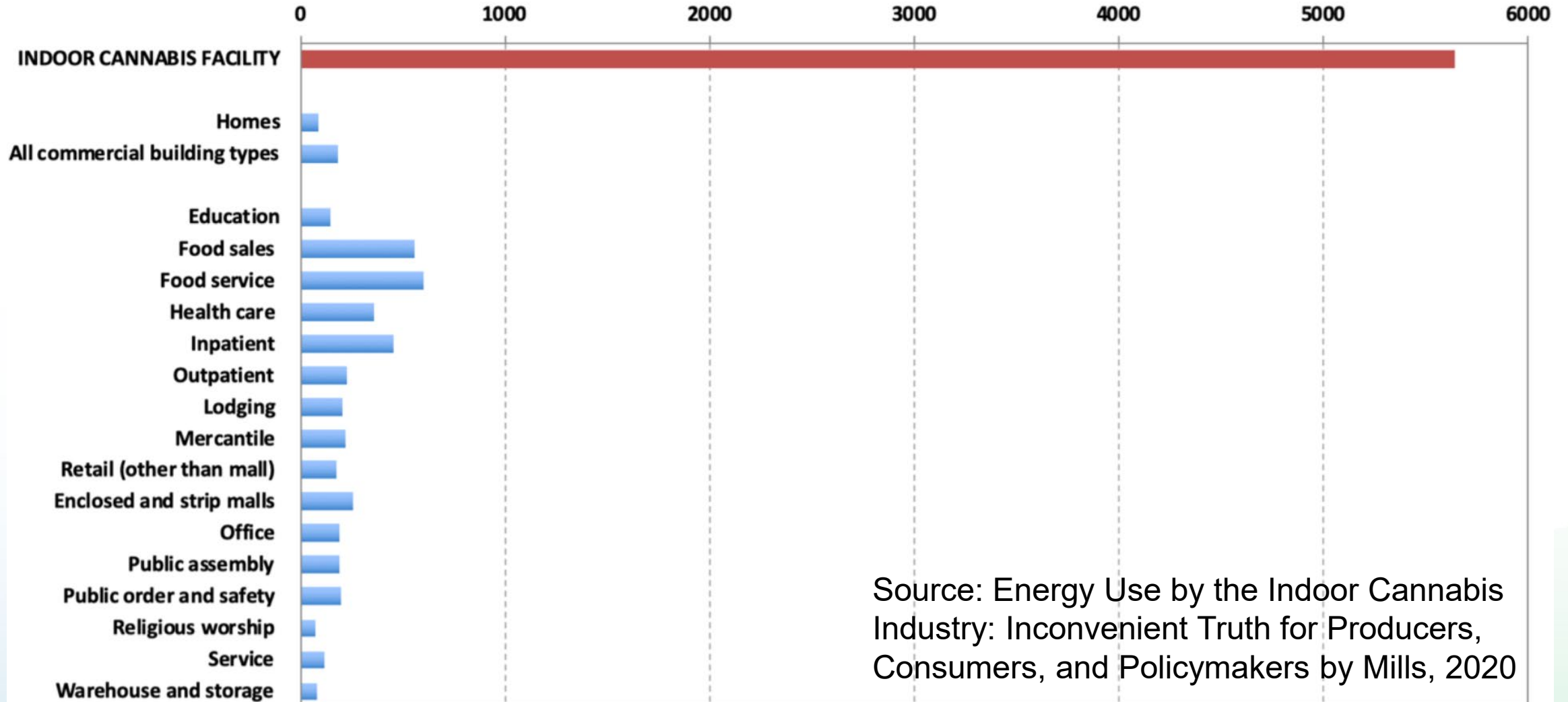
Building Energy Efficiency Standards

- Title 24 – Part 6, California Energy Code
- Regulate all buildings including new constructions, additions, and alterations.
- Apply to both residential and commercial buildings
- Include envelope, lighting, mechanical, and water heating requirements



Cannabis Facility Energy Intensity

Primary energy for electricity production (kBTU per square foot per year)

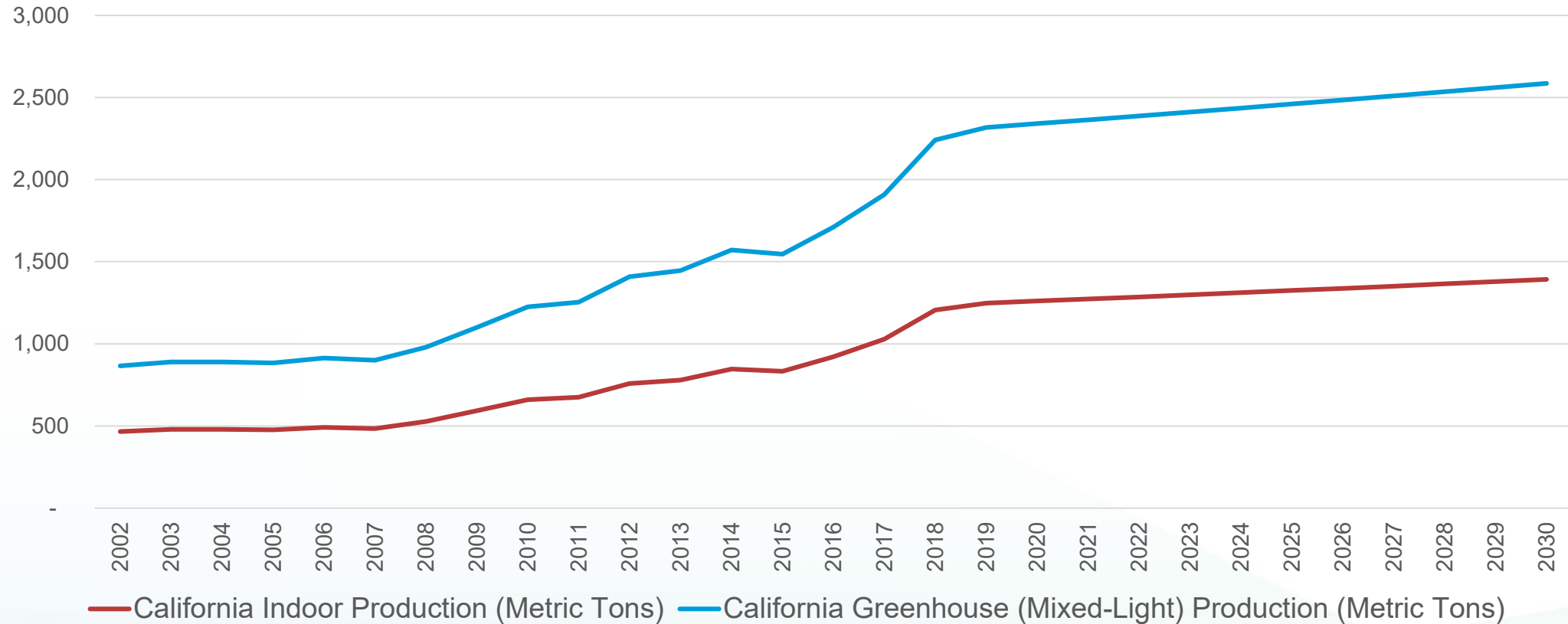


Source: Energy Use by the Indoor Cannabis Industry: Inconvenient Truth for Producers, Consumers, and Policymakers by Mills, 2020



California Cannabis Production

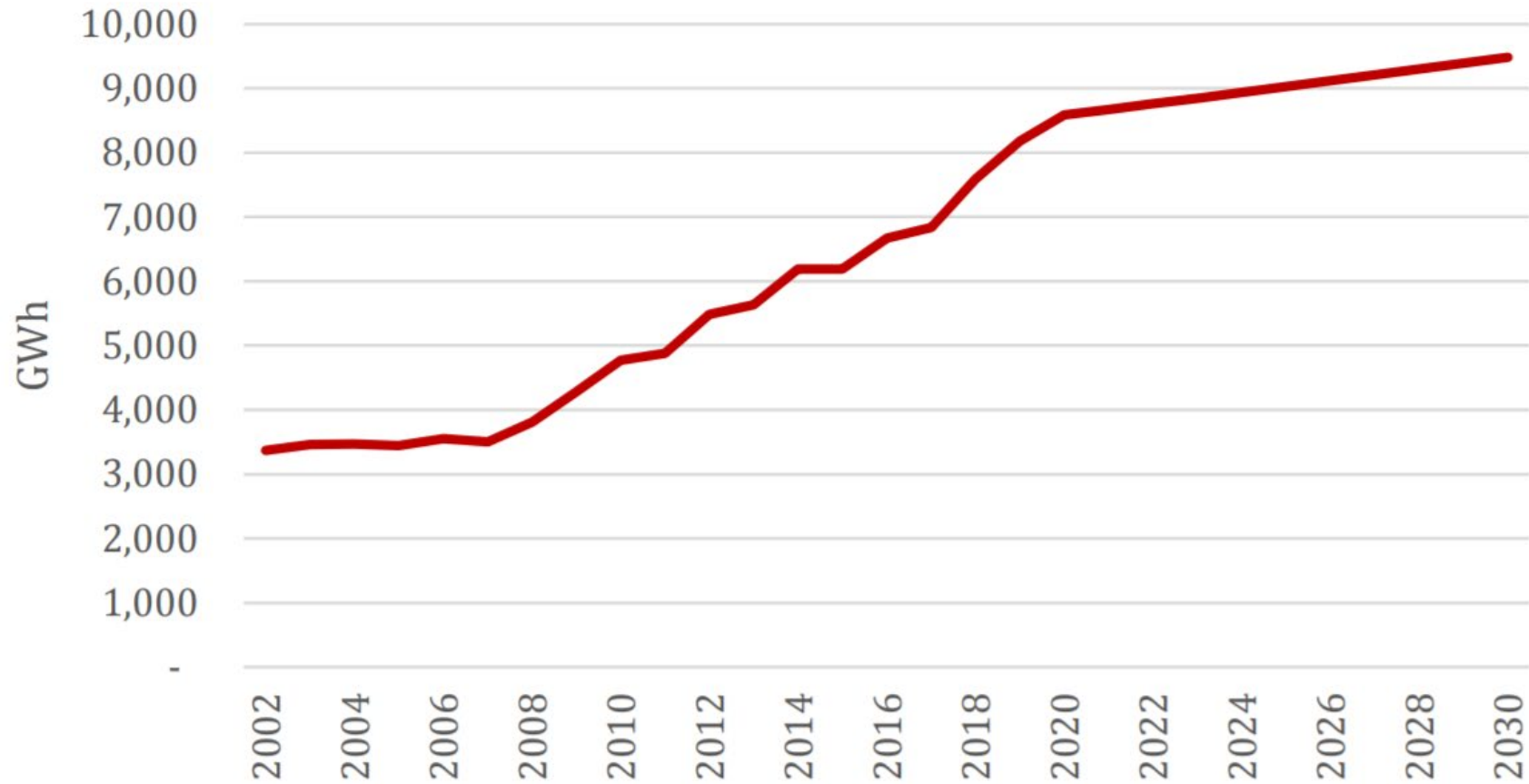
Amount of Indoor Marijuana Produced in California (Metric Tons)



Source: California Energy Commission



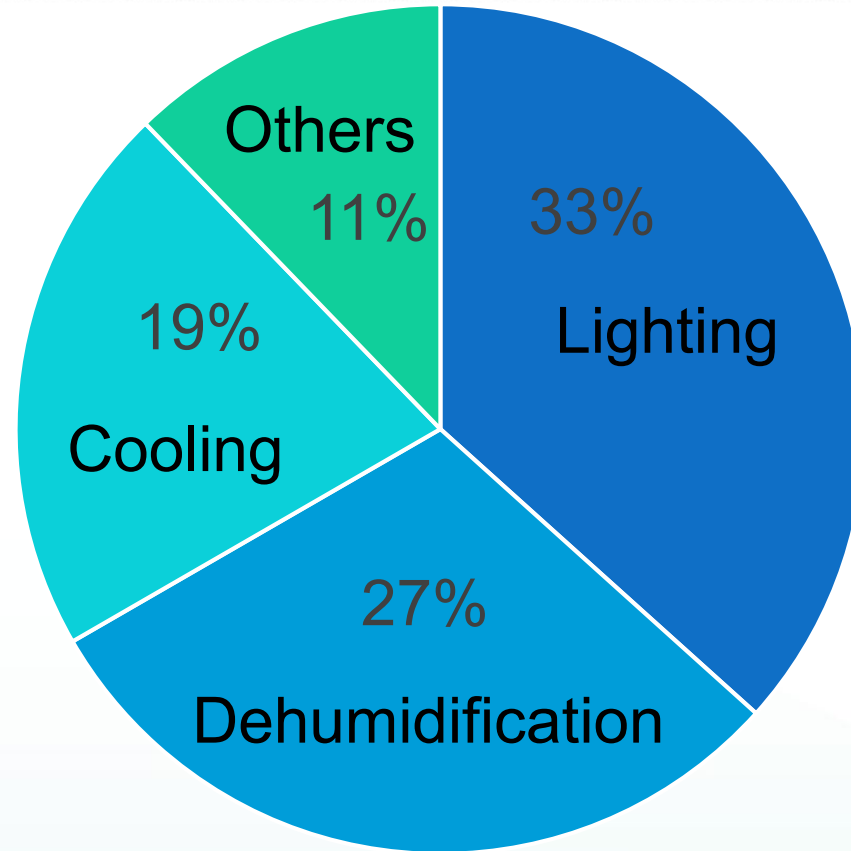
CA Cannabis Grow Energy Usage



Source: California Energy Commission



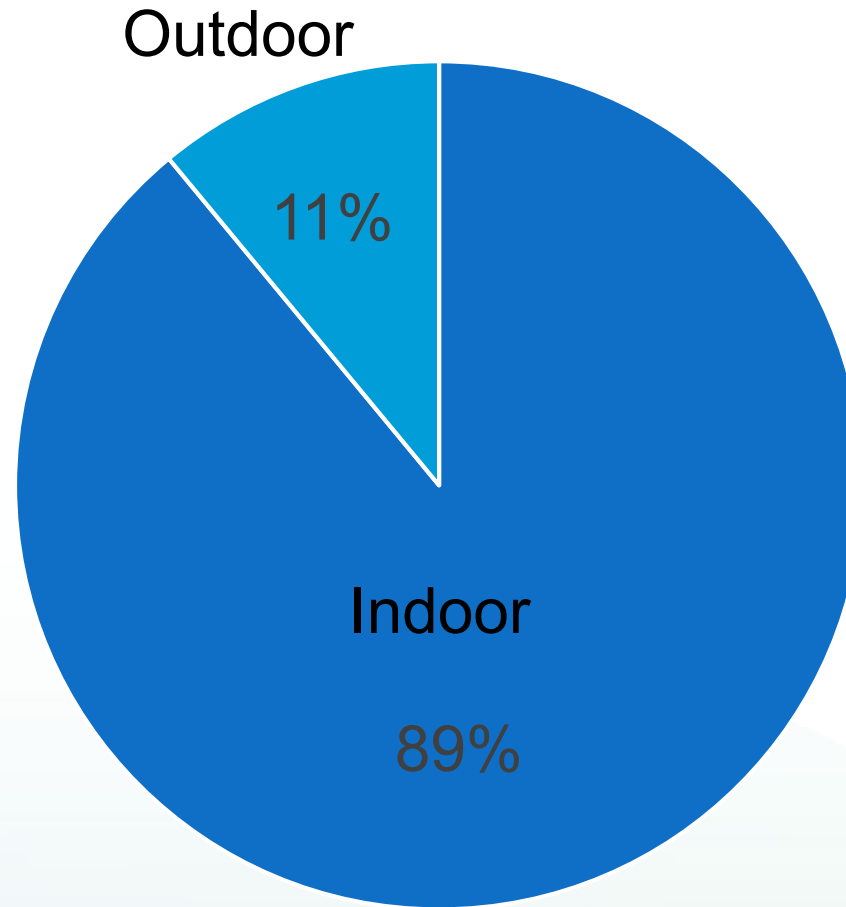
Cannabis Indoor Grow Usage



Source: The Carbon Footprint of indoor Cannabis Production by Mills, 2012



California Cannabis Production



Source: Drugscience.org 2017



Horticultural Lighting Proposal

- For **all new construction** starting on January 1, 2023
- Indoor growing facilities with $> 1,000$ sqft of canopy
 - Photosynthetic Photon Efficacy (PPE) $\geq 2.1 \mu\text{mol/J}$
- Conditioned greenhouses with $> 1,000$ sqft of canopy
 - Photosynthetic Photon Efficacy (PPE) $\geq 1.7 \mu\text{mol/J}$
- Time switch controls and multi-level controls are also required for both types of all sizes



Horticultural Lighting Proposal

- For **additions and alterations** starting on January 1, 2023
- Adding or altering the existing lighting systems
 - causing **increase** in lighting wattage, *and*
 - $\geq 10\%$ of the existing luminaires
- Must meet all new horticultural lighting requirements
- Exception: alterations limited to adding lighting controls and replacing lamps, ballasts, or drivers



CEC Public Workshop

- Currently scheduled for September 24, 2020
- Currently open Docket
<https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=19-BSTD-03>
- Controlled Horticultural Environment Code Change Proposal
<https://title24stakeholders.com/measures/cycle-2022/controlled-environment-horticulture/>



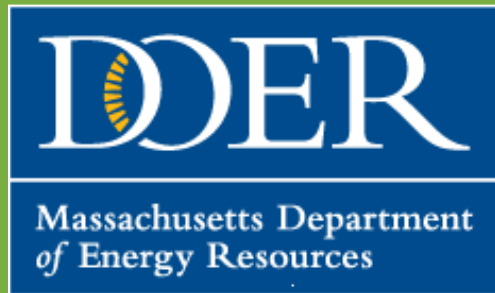
Thank You!

Thao Chau

(916) 654 – 4168

thao.chau@energy.ca.gov

Cannabis in Massachusetts



MA Department of Energy Resources
Brendan Place, Clean Energy Engineer
August 2020

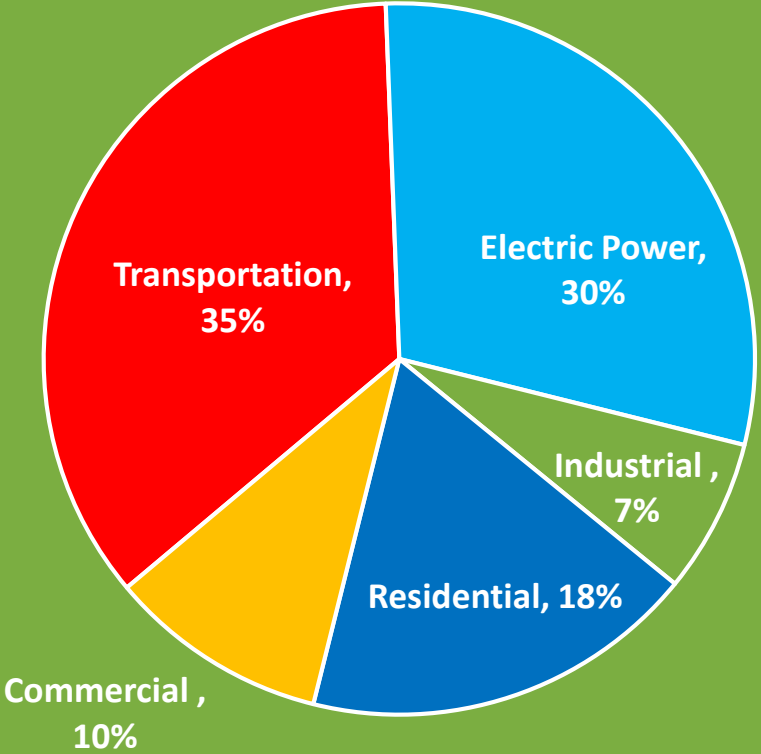


Agenda

- Background
 - GWSA Net Zero by 2050
 - Goals
- Regulations and Guidance
 - Establishments
 - Cultivators
- DOER's Role
- Incentives



Massachusetts GWSA Target – Net Zero by 2050

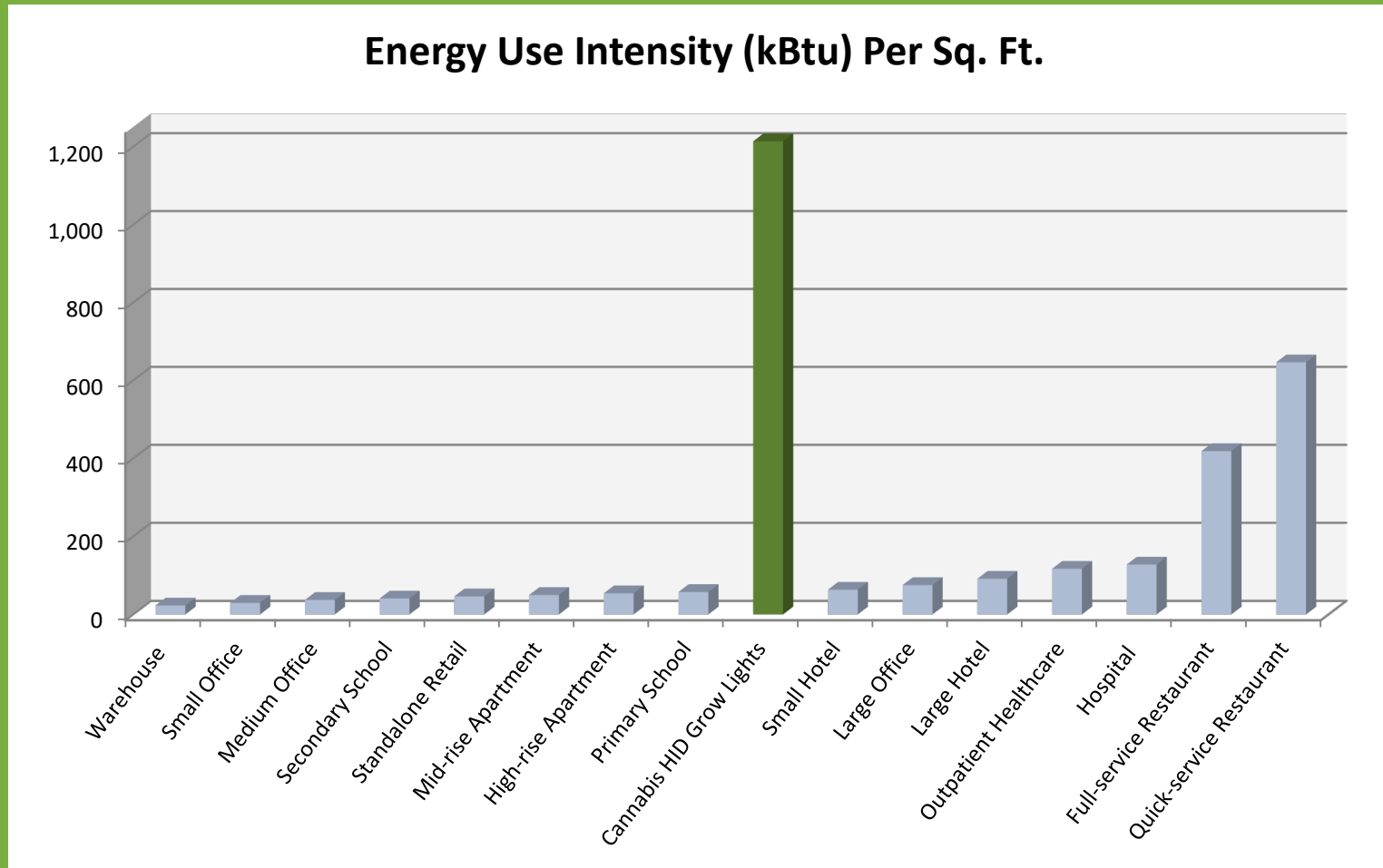


- Electricity Generation
- Transportation
- Building Sector



Energy Use – Indoor Growing

- Cultivation facilities are high energy use industrial buildings



Lighting



Dehumidification



Cooling

What is Massachusetts doing to limit a significant increase in emissions?



Regulations and Guidance

Establishments

- Microbusiness
- Manufacturing
- Retailer
- Transporter(s)
- Craft Marijuana Cooperative
- Independent Testing Laboratory
- Research Laboratory
- **Cultivators**



Cultivators

- Higher energy use in cultivation than other uses, therefore there are specific requirements for cultivators.



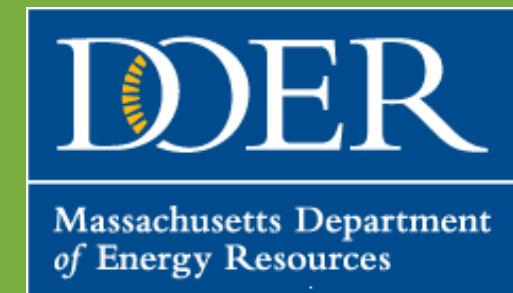
Lighting



Dehumidification



HVAC



Areas of Compliance for Establishments

- Establishments must demonstrate compliance in four areas:
 - 1) Energy Efficiency - Identification of potential energy use reduction opportunities (such as natural lighting and energy efficiency measures), and a plan for implementation of such opportunities;
 - 2) Renewables - Consideration of opportunities for renewable energy generation, including, where applicable, submission of building plans showing where energy generators could be placed on the site, and an explanation of why the identified opportunities were not pursued, if applicable;
 - 3) Demand - Strategies to reduce electric demand (such as lighting schedules, active load management, and energy storage); and
 - 4) Mass Save - Engagement with energy efficiency programs offered pursuant to M.G.L. c. 25, § 21, or through municipal lighting plants.



Energy Efficiency



Demand



Renewables



Areas of Compliance for Cultivators

- Per 935 CMR 500.120(11):
 - a) Building Envelope - The building envelope for all facilities, except Greenhouses, must meet minimum Massachusetts Building Code requirements and all Massachusetts amendments (780 CMR: State Building Code), International Energy Conservation Code (IECC) Section C402 or The American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) Chapters 5.4 and 5.5 as applied or incorporated by reference in 780 CMR: State Building Code, except that facilities using existing buildings may demonstrate compliance by showing that the envelope insulation complies with code minimum standards for Type Factory Industrial F-1, as further defined in guidelines issued by the Commission.
 - b) Horticultural Lighting Power Density - Lighting used for Cannabis Cultivation must meet one of the following compliance requirements:
 1. Horticulture Lighting Power Density must not exceed 36 watts per square foot, except for Tier 1 and Tier 2 which must not exceed 50 watts per square foot; or
 2. All horticultural lighting used in a facility is listed on the current Design Lights Consortium 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% above the minimum Horticultural QPL threshold rounded up to the nearest 0.1 :mol/J (micromoles per joule).
 3. A facility seeking to use horticultural lighting not included on the Horticultural QPL or other similar list approved by the Commission shall seek a waiver pursuant to 935 CMR 500.850 and provide documentation of third-party certification of the energy efficiency features of the proposed lighting. All facilities, regardless of compliance path, shall provide third-party safety certification by an OSHA NRTL or SCC-recognized body, which shall certify that products meet a set of safety requirements and standards deemed applicable to horticultural lighting products by that safety organization
 - c) HVAC and dehumidification systems - Massachusetts Building Code requirements and all Massachusetts amendments (780 CMR State Building Code), IECC Section C403 or ASHRAE Chapter 6 as applied or incorporated by reference in (780 CMR: State Building Code). As part of the documentation required under 935 CMR 500.120(11)(b), a Marijuana Cultivator must provide a certification from a Massachusetts Licensed Mechanical Engineer that the HVAC and dehumidification systems meet Massachusetts building code as specified in this 935 CMR 500.120(11)(c) and that such systems have been evaluated and sized for the anticipated loads of the facility.
 - d) Safety - *Safety protocols must be established and documented to protect workers and consumers (e.g., eye protection near operating grow light).*
 - e) Exemption - Requirements in 935 CMR 500.120(11)(b) and (c) shall not be required if an indoor Marijuana Cultivator is generating 80% or more of the total annual on-site energy use for all fuels (expressed on a MWh basis) from an onsite clean or renewable generating source, renewable thermal generation, as provided in M.G.L. c. 25A § 11F and 11F½. Additionally, the Marijuana Establishment must document that renewable energy credits or alternative energy credits representing the portion of the Licensee's energy usage not generated onsite has been purchased and retired on an annual basis

Key Compliance Pathways

- Lighting Compliance Pathways:
 - (1) the HLPD standard: HLPD must not exceed 36 watts per gross square foot, but for Tier 1 and Tier 2 which must not exceed 50 watts per square foot.; or
 - (2) the Horticultural Lighting Qualified Product List (Horticultural QPL): All horticultural lighting used in a facility must be:
 - a) listed on the current Design Lights Consortium Solid-State Horticultural QPL or other similar list approved by the Commission as of the date of license application, AND
 - b) lighting Photosynthetic Photon Efficacy (PPE) is at least 15 percent above the minimum Horticultural QPL threshold rounded up to the nearest 0.1 micromoles per joule ($\mu\text{mol}/\text{J}$).
- Exemption:
 - Indoor cultivation facilities may be exempt from the regulatory requirements for horticultural lighting, HVAC, and dehumidification systems if they are generating 80% or more of the total annual onsite energy use for all fuels (expressed on a MWh basis) from:
 - 1. a clean or renewable generating source; or
 - 2. renewable thermal generation.
 - Additionally, the Cultivation Facility must document that renewable energy credits or alternative energy credits representing the portion of the Licensee's energy usage not generated onsite has been purchased and retired on an annual basis

What does DOER do?



DOER CCC Support

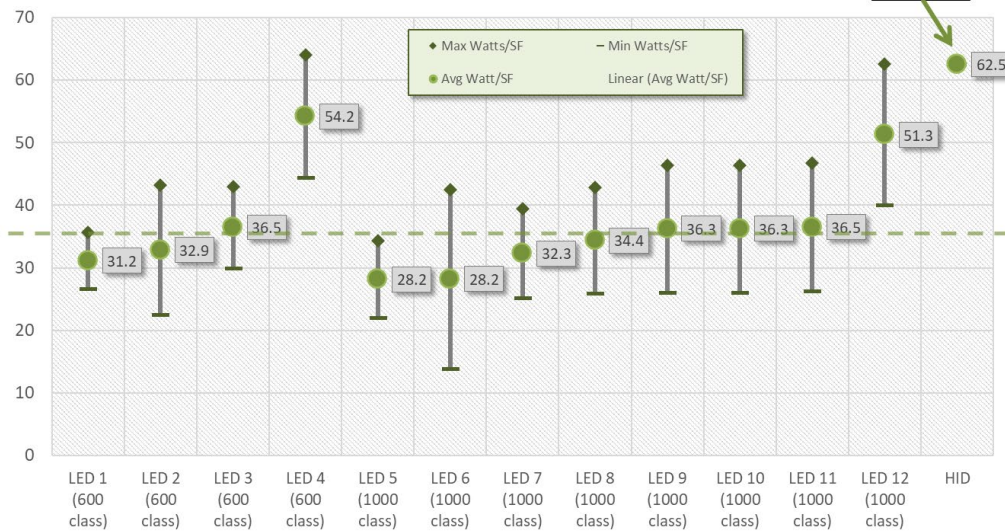
- Cannabis Control Commission Support
 - Regulations
 - Guidance
 - Technical Resource



Energy and Environment Compiled Guidance

January 2020

Range of Lighting Power Density (LPD)



Cannabis PowerScore Dashboard | derek@resourceinnovation.org | Calculate PowerScore

PowerScore Report #1879

Indoor — Canby, Oregon — Climate Zone 4C

Overall: Leader
Your farm is performing overall in the **91st percentile** within the overall data set of indoor farms in the U.S.

Facility Efficiency:	243 kWh / sq ft	57 th percentile
Production Efficiency:	1.35 grams / kWh	83 rd percentile
HVAC Efficiency:	65 kWh / sq ft	100 th percentile
Lighting Efficiency:	71.8 kWh / sq ft	91 st percentile

Mother & Veg: (8 fixtures x 165 W) + (30 fixtures x 330 W)
 Flower: 230 fixtures x 660 W

- ((Mother & Veg 11 kW x 18 hrs x 365) / 3,600 sq ft) + ((Flower 152 kW x 12 hrs x 365) / 5,400 sq ft) / 2
 - (Mother & Veg 20.5 kWh / sq ft + Flower 123 kWh / sq ft) / 2

Come back to check your PowerScore again soon, because your rank will change as more farms see how they stack up!

* Overall rankings are determined by an equally weighted average among the categories applied: Facility Efficiency, Production Efficiency, Lighting, HVAC. Please explore the Public Commenting page to share more insight and stakeholder feedback.

Compare to other farms...
 Indoor | All Light Types | All United States | All HVAC Systems | All States | Filter

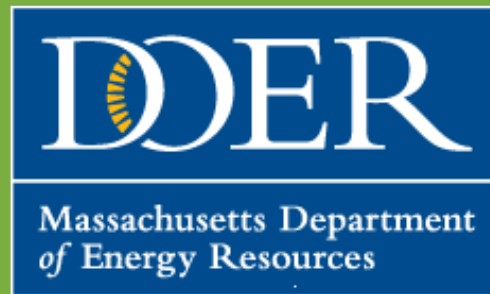
DOER Industry Support

- Best Practices Guide's
 - “Energy Efficiency Best Practices for Massachusetts Marijuana Cultivators”
- Workshops - Efficient Yields Cultivation Workshops
 - Competing & Complying through Efficiency, June 17, 2020
 - Cultivating with LED Lighting, July 15, 2020
 - HVAC Best Practices, Aug 5, 2020
- Cannabis Power Score



Cultivator Incentive Opportunities

- Mass Save® Programs
 - Offer Technical Assistance and incentives for New Construction and Renovation projects
 - Engagement with energy efficiency programs offered pursuant to M.G.L. c. 25, § 21, or through municipal lighting plants required for compliance
- DOER Programs
 - Solar Massachusetts Renewable Target (SMART) Program
 - Renewable Portfolio Standard (RPS) – Electric generation
 - Alternative Portfolio Standard (APS) – Thermal Generation
 - Clean Peak Standard (CPS) – Battery Storage



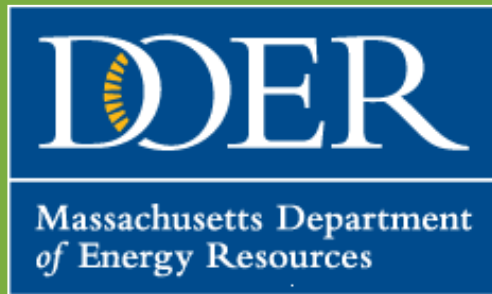
What we learned in MA?

- Coordination and collaboration is key
- Regulations require Guidance
- Allow for different pathways
 - Performance
 - Prescriptive
- Enforcement and benchmarking may require technical support



Thank you

Brendan Place
Clean Energy Engineer
MA Department of Energy Resources
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ComEd[®]
Energy Efficiency Program

**ComEd
Controlled Environmental
Agriculture (CEA)
Custom Offering**

Lauren Gaikowski, Energy Advisor II

Illinois HB 1438

- » Recreational cannabis legal as of January 1, 2020
- » 40 craft grow licenses will be awarded in 2020, with an additional 60 to be awarded in 2021
- » Modeled after Massachusetts cultivation efficiency requirements
- » Cultivation flowering rooms must meet either:
 - 36 Watts per square feet (W/sqft) Lighting Power Density (LPD) of “active and growing space canopy”
 - OR
 - All fixtures must have Photosynthetic Photon Efficacy (PPE) that meets or exceeds 2.2 $\mu\text{mol}/\text{J}$ and DLC Listed
- » Medical cultivators will be required to meet these regulations in 2022 when licenses are renewed
- » This is not legal advice. These are the requirements as understood by ComEd Energy Efficiency personnel. Cultivators need to consult with their own legal counsel.

Cannabis Custom Offering

- » All cannabis projects incentivized through the custom pathway (\$0.07 per kWh saved)
- » Developed the process which allows us to expedite and streamline the application review.

Incentive Method	Path A	Path B
Specifications	LPD ≤ 36 W/sqft	Fixture PPE ≥ 2.2 μmol/J and DLC listed
Incentive Algorithm	Compare proposed LPD to baseline LPD	Compare proposed and baseline wattage (calculated using fixture Photosynthetic Photon Flux (PPF) and PPE)
Required Information	<ul style="list-style-type: none"> • Canopy area of flower rooms • Fixture wattages and quantities 	<ul style="list-style-type: none"> • Fixture PPE • Fixture PPF • DLC Listing

Recreational Cannabis Example Incentives

» Assumptions

- Craft grower with 3,500 square feet of flower cultivation
- Installing 200 – 597 Watt LED fixtures with PPE 2.68 $\mu\text{mol}/\text{J}$ and PPF 1,600 $\mu\text{mol}/\text{s}$

» Path A - W/sqft method

- Proposed W/sqft: 34.1
- kWh savings: 33,541
- Total incentive: \$2,348

» Path B - PPE method

- kWh savings: 247,894
- Total incentive: \$17,532





Contact Us

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OR VISIT

» ComEd.com/Agriculture



Thank You!

ComEd[®]
Energy Efficiency Program

Q&A

- Unmute and ask questions
- OR**
- Send chat to the host



Next Steps

- Thank you for your participation!
- All the notes captured from the assignments will be compiled from ALL Breakout rooms and sent to participants
- Post Event Survey: <https://www.surveymonkey.com/r/8WW7GZ7>
- Next webinar, [**Moving Projects Forward: Leveraging Incentives to Minimize Costs**](#), on Wed., Sept. 23rd