

Round
2

Welcome to the California Statewide Codes and Standards
Enhancement (CASE) Team's Stakeholder Meeting on
Covered Processes Part 2: Controlled Environment Horticulture


We will begin shortly.

In the meantime, please fill out the polls below.



Welcome: Connect Your Audio

Audio – there are **three** options for connecting to the meeting audio:

To view options, click on the  icon on the top ribbon, then select *Connect My Audio*.

- 1 **Dial-out:** receive a call from the meeting. *Please note this feature requires a direct line.*
- 2 **Dial-in:** dial-in to the conference via phone. Conference phone number and room number code provided. *Please then identify your line by entering your unique user ID on your phone.*
- 3 Use the **microphone** from your computer/device.



Join Audio Conference

How would you like to join the meeting's audio conference?

☒ Dial-out [Receive a call from the meeting]

+1 (USA) Phone Number

☐ Dial-in to the Audio Conference via Phone

☐ Using Microphone (Computer/Device)

Join Listen Only

Above: audio conference settings pop-up box

2022 TITLE 24 CODE CYCLE, PART 6

Second Utility-Sponsored Stakeholder Meeting

Covered Processes Part 2: Controlled Environment Horticulture

Statewide CASE Team

April 16, 2020

Meeting Guidelines

Part 1 of 4 - Muting

Muting Guidelines:

To keep meetings running smoothly, all participants will be **muted upon entry**.

Please wait for instructions and/or permission to unmute yourself during designated Q&A periods, when participant lines are open.

Two Options to Mute:

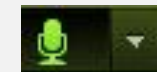
- 1 **Manually** mute your device, or;
- 2 Mute your phone or microphone **icon** in the top ribbon of the Adobe Connect window.



NOT MUTED



MUTED



NOT MUTED



MUTED

Meeting Guidelines

Part 2 of 4 - Pairing

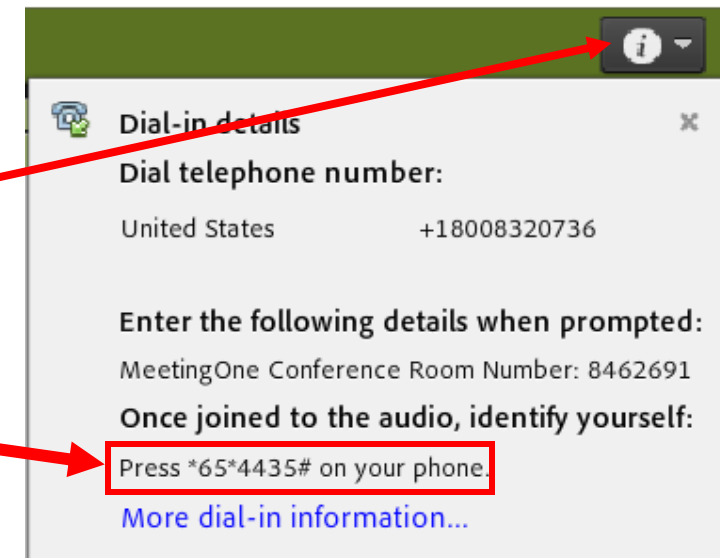
Pairing Guidelines:

If you dialed in to join the audio, please **pair your line**.

- Please keep yourself **MUTED**.
- Navigate to the (i) button in the top right of your screen.
- Click the pull-down menu and ***identify your line by entering your unique user ID on your phone.***

Steps to Pair Line:

- 1 **Select (i) button** pull-down on the top right of Adobe Connect window;
- 2 Identify your line using your unique code.



Meeting Guidelines

Part 3 of 4 - Participation

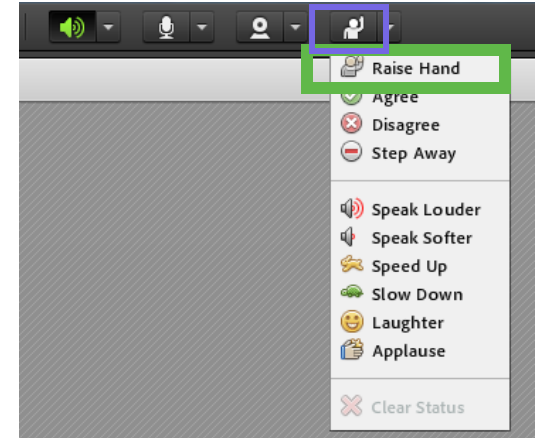
Participation Guidelines:

- **Questions & Comments**

- Click “**Raise Hand**” if you would like to speak. Those with a hand raised will be called on by the speaker.
- The Title 24 Advocacy team will then **unmute** your line, enabling others to hear your audio.
- All questions and comments are also welcome via the chat window.

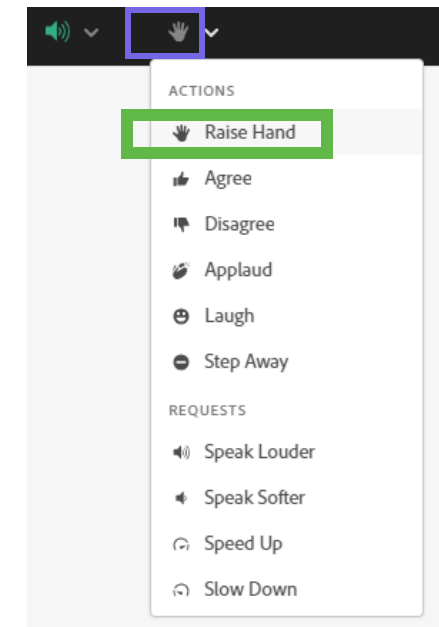
- **Other Meeting Feedback**

- Provide live meeting feedback from the **top toolbar drop-down**.



Above: feedback view for Adobe Connect [app users](#).

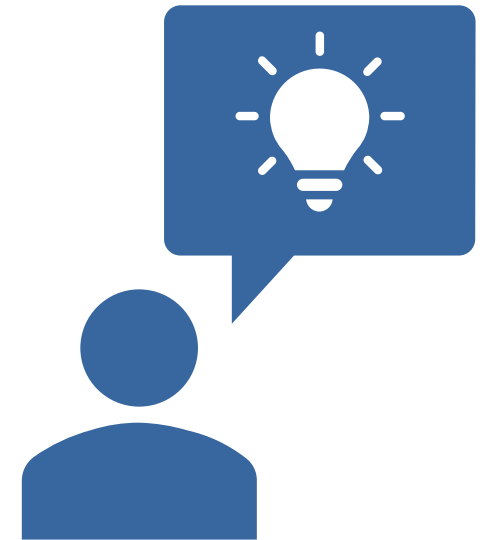
Below: feedback view for [HTML users](#).



Meeting Guidelines

Part 4 of 4 – Discussion Ground Rules

- **We want to hear your thoughts.**
 - Supporting and opposing viewpoints are welcome.
- **When making comments, please:**
 1. Raise your hand; you will be unmuted and called on;
 2. Clearly state your name and affiliation prior to speaking; and
 3. Place yourself back on mute when done speaking.
- **Calls are recorded** for note development, recordings will not be publicized.
- Notes and presentation material will be posted on Title24Stakeholders.com/events.



Agenda

1	Meeting Guidelines	<i>8:30 am</i>
2	Opening Remarks from the California Energy Commission	<i>8:35 am</i>
3	Overview & Welcome from the Statewide Utility Team	<i>8:40 am</i>
4	Presentation I: Controlled Environment Horticulture	<i>8:45 am</i>
6	Wrap Up & Closing	<i>11:15 am</i>

Opening Remarks: California Energy Commission





Policy Drivers: Building Standards

The following policy documents establish the goal for new building standards:

- **2008 CPUC/CEC Energy Action Plan** – ZNE for residential buildings by 2020 and nonresidential buildings by 2030
- **SB 100** – Clean electricity by 2045
- **B-55-18** – Governor Jerry Brown’s Executive Order to achieve carbon neutrality
- **AB 3232** – Assess the potential for the state to reduce the emissions of greenhouse gases from the state’s residential and commercial building stock by at least 40 percent below 1990 levels by January 1, 2030

2022 Updated Standards Schedule



Estimated Date	ACTIVITY OR MILESTONE
November 2018 – November 2019	Updated Weather Data Files
November 2018 – December 2019	Metric Development
November 2018 - July 2019	Measures Identified and Approved
April 24, 2019	Present the Efficiency Measure Proposal Template for public to submit measures
October 17, 2019	Compliance Metrics and Climate Data Workshop
August 2019 – November 2019	First Round of Utility-Sponsored Stakeholder Workshops
January 2020	Research Version of CBECC Available with new weather data files and updated metric
March 2020 – April 2020	Second Round of Utility-Sponsored Stakeholder Workshops
March 10, 2020	Staff Workshop on the proposed changes for the ATTCP program
March 26, 2020	Staff Workshop on the EDR1
March 2020 – May 2020	All Initial CASE/PUBLIC Reports Submitted to Commission
July 2020 – August 2020	All Final CASE/PUBLIC Reports Submitted to the Commission
August 2020 – October 2020	Commission-Sponsored Staff Workshops
September 2020 – November 2020	Express Terms Developed (including New Multifamily Section)
February 2021	45-Day Language posted and sent to list serve, Start of 45-Day review/comment period
March 2021	Lead Commissioner Hearing
July 2021	Adoption of 2022 Standards at Business Meeting
September 2021	Final Statement of Reasons Drafted and Approved
July 2021	Adoption of CALGreen (energy provisions) - Business Meeting
December 2021	Approval of the Manuals
October 2021	Final Rulemaking Package delivered to CBSC
December 2021	CBSC Approval Hearing
January 2021	Software, Compliance Manuals, Electronic Documents Available to Industry
January 1, 2023	Effective Date

2022 Standards Contact Info

Mazi Shirakh, PE

ZNE Technical Lead
Building Standard Staff.

Mazi.Shirakh@energy.ca.gov

916-654-3839

Payam Bozorgchami, PE

Project Manager, 2022 Building Standards

Payam.Bozorgchami@energy.ca.gov

916-654-4618

Peter Strait

Supervisor
Building Standards Development

Peter.Strait@energy.ca.gov

916-654-2817

Larry Froess, PE

CBECC Software Lead

Larry.froess@energy.ca.gov

916-654-4525

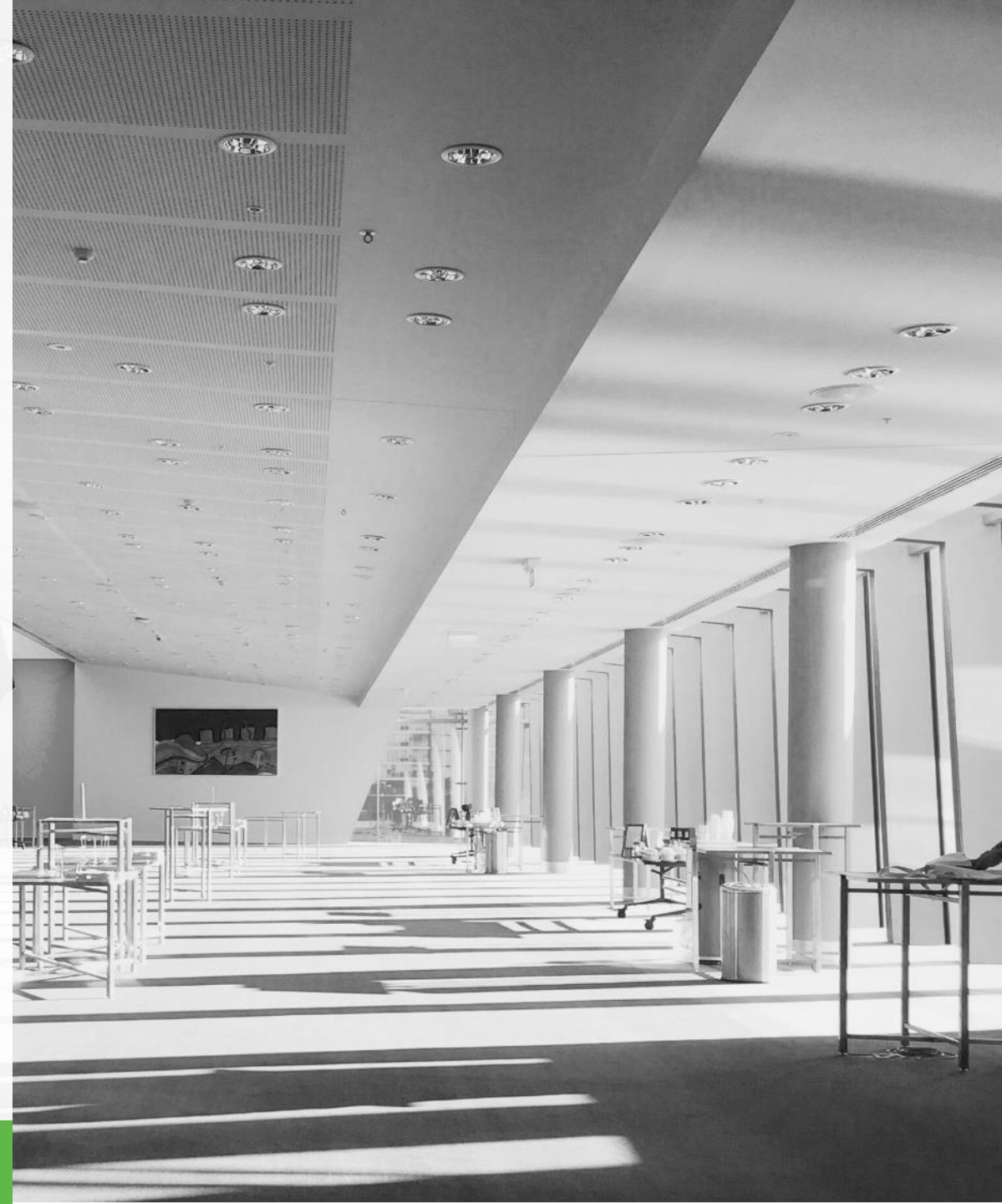


More information on pre-rulemaking for the 2022 Energy Code at:

<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency>

Title 24, Part 6 Overview

Kelly Cunningham
Codes and Standards
Pacific Gas & Electric



Statewide Utility Codes and Standards Team

Actively support the California Energy Commission in developing proposed changes to the Energy Code (Title 24, Part 6) to achieve significant statewide energy use reductions through the development of code change proposals for the 2022 cycle that are:

Feasible | Cost effective | Enforceable | Non-proprietary



Utility-Sponsored Stakeholder Meetings

- All meetings can be attended **remotely**
- Check Title24Stakeholders.com/events for information about meetings and topic updates
- **Sign up** to receive email notifications



Stay Informed

Receive email notifications about upcoming meetings, notes and presentations from past meetings, and announcements about the California Energy Commission's rulemaking process.

Sign Up

Second Round Utility-Sponsored Stakeholder Meetings

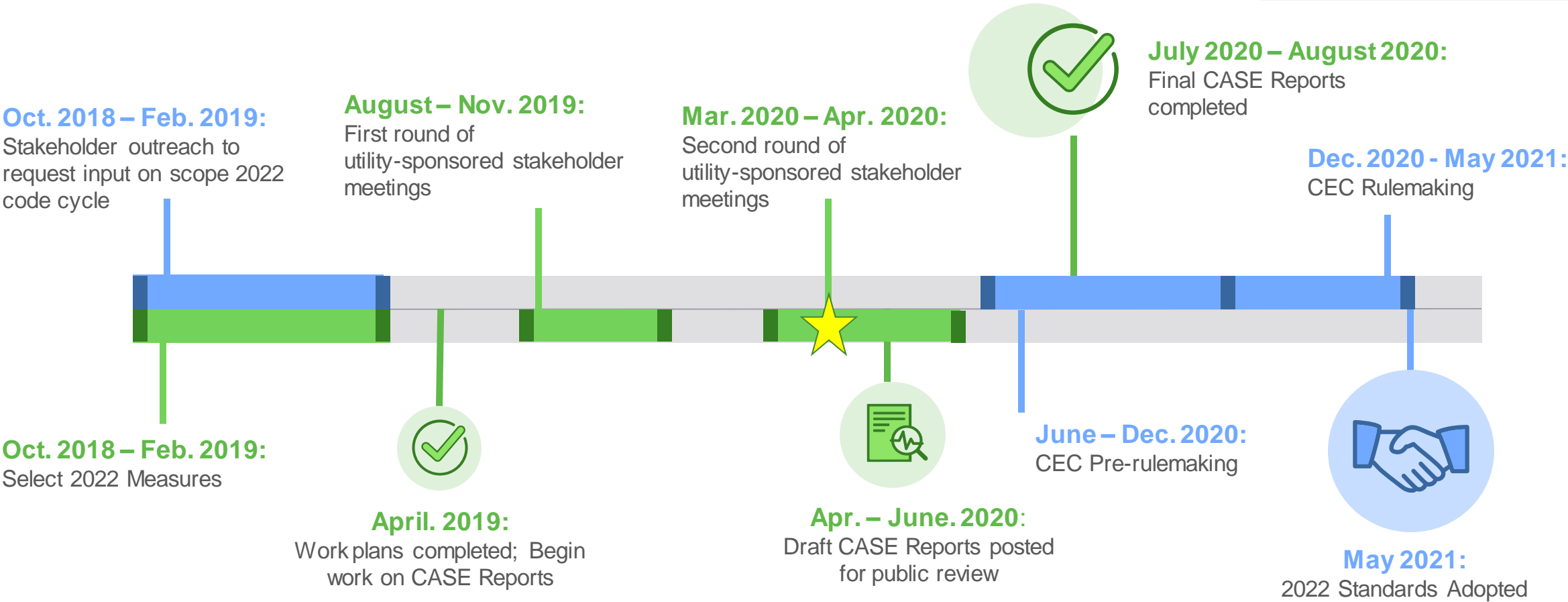
Meeting Topic	Building Type	Date
Lighting	NR/MF	Tuesday, March 3, 2020
Single Family Whole Building	SF	Thursday, March 5, 2020
Nonresidential and Single Family HVAC Part 1: Data Centers, Boilers, Air Distribution, Variable Capacity	NR/SF	Thursday, March 12, 2020
Water Heating and Multifamily All Electric Package	MF	Tuesday, March 17, 2020
Single Family Grid Integration	SF	Thursday, March 19, 2020
Multifamily HVAC and Envelope	MF	Wednesday, March 25, 2020
Covered Processes Part 1: Refrigeration System Opportunities	NR	Thursday, April 2, 2020
Nonresidential HVAC and Envelope Part 2: Reduced Infiltration, HVAC Controls (Air Efficiency, DOAS)	NR	Tuesday, April 14, 2020
Covered Processes Part 2: Controlled Environmental Horticulture	NR	Thursday, April 16, 2020
Nonresidential Envelope Part 1: High Performance Envelope	NR	Thursday, April 23, 2020
Multifamily Restructuring	MF	Thursday, May 7, 2020

Sign up for all meetings at title24stakeholders.com/events/

2022 Code Cycle – Key Milestones

CEC Milestone

Utility Team Milestone



Comply With Me

Learn how to comply with California's building
and appliance energy efficiency standards

www.EnergyCodeAce.com

offers **No-Cost**

Tools ♠ Training ♠ Resources
to help you decode Title 24, Part 6 and Title 20



This program is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E[®]), Southern California Edison Company (SCE), and Southern California Gas Company (SoCalGas[®]) under the auspices of the California Public Utilities Commission.

Welcome to LocalEnergyCodes.com

New! 2019 Reports

[Learn More >](#)

[Toolkit ▼](#)

[Resources](#)

[Contact Us](#)

[Search](#)

The **Codes and Standards Reach Codes Program** provides technical support to local jurisdictions considering adopting a local energy and efficiency ordinance

www.LocalEnergyCodes.com

This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

Thank You

Kelly Cunningham

Pacific Gas & Electric

Kelly.Cunningham@pge.com

James Kemper

Los Angeles Department of
Water and Power

James.Kemper@ladwp.com

Christopher Kuch

Southern California Edison

Christopher.Kuch@sce.com

Jeremy Reeve

San Diego Gas & Electric

jmreefe@sdge.com

Joshua Rasin

Sacramento Municipal Utility
District

Joshua.Rasin@smud.org



Meeting Guidelines Reminder

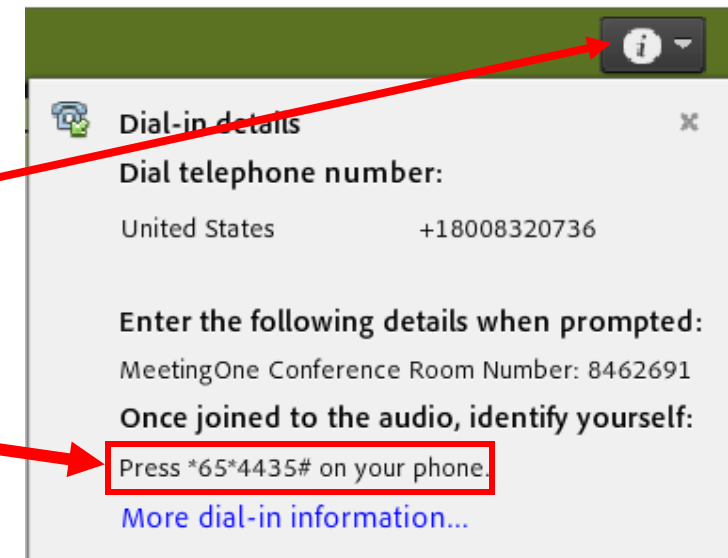
Pairing Guidelines:

If you dialed in to join the audio, please **pair your line**.

- Please keep yourself **MUTED**.
- Navigate to the (i) button in the top right of your screen.
- Click the pull-down menu and ***identify your line by entering your unique user ID on your phone.***

Steps to Pair Line:

- 1 **Select (i) button** pull-down on the top right of Adobe Connect window;
- 2 Identify your line using your unique code.



2022 CALIFORNIA ENERGY CODE (TITLE 24, PART 6)

Controlled Environment Horticulture

Codes and Standards Enhancement (CASE) Proposal
Covered Processes | Controlled Environmental Horticulture

Kyle Booth, Steffi Becking; *Energy Solutions*

Joe Sullivan; *Cultivate Energy Optimization*

April 16, 2020

Agenda

1 Background

2 Submeasure A: Greenhouse Envelope

3 Submeasure B: Lighting Efficacy

4 Submeasure C: Efficient Dehumidification



Proposal Background

Code Change Proposal: Additional Resources

First-Utility Sponsored Meeting

The Statewide CASE Team held its first utility-sponsored stakeholder meeting for this topic on **September 19, 2019.**



Resources on Title24Stakeholders.Com

[Presentation slides](#) and [Submeasure summary](#) documents available that cover the following:

- ✓ Measure Background
- ✓ Market Overview & Analysis
- ✓ Technical Feasibility
- ✓ Compliance & Enforcement
- ✓ Draft Code Language

Also available in the **resources tab** in today's presentation.

Code Change Proposal Summary

Submeasure	Type of Change	Software Updates Required	Sections of Code Updated	Compliance Documents Updated
Greenhouse Envelope Updates	Mandatory	No	120.6(i)	Nonresidential Compliance Manual
Lighting Efficacy	Mandatory, Prescriptive	No	120.6(h)5; 140.6G; 141.1; 120.6(i)1	Nonresidential Compliance Manual; NRCC-PRC-E
Efficient Dehumidification	Mandatory, Prescriptive	No	120.6(h)3; 141.1	Nonresidential Compliance Manual; NRCC-PRC-E

Changes Since the Round 1 Stakeholder Meeting

1. Additions

1. Greenhouses added as building type to the horticultural lighting submeasure
2. Greenhouse envelope code cleanup

2. Integrated

1. Environmental controls submeasure being integrated with respective technologies

3. Removed Measures

1. Circulation fan
2. Irrigation controls portion of environmental controls

Methodology for Energy Impacts Analysis

The Statewide CASE Team generated indoor horticulture and greenhouse prototypes in order to simulate savings potential of these proposals.

Tools Used	Excel simulation for heat loss / gain calculations
Building Prototypes Used	Generated Indoor agriculture and greenhouse prototype
Climate Zones Modeled	All climate zones to be modeled.
Forecast	CalCannabis licensing data and DOE Report ¹

1. https://www.energy.gov/sites/prod/files/2017/12/f46/ssl_horticulture_dec2017.pdf

Impacts by Climate Zone

- The Statewide CASE Team used data from **CalCannabis** in order to determine the location of cannabis facilities.
 - Database contains zip codes.
- Information from the **U.S. Department of Agriculture's AgCensus** contains county level information for non-cannabis stock that was equated to climate zone.

Baseline Technology Determination

- Interviewed producers and designers and attended in-person producer events.
- Analyzed market research reports.
- Aggregated grower data from PowerScore.

Do you have additional data to support the development of a representative baseline? If so, data received by May 1, 2020 can help inform the Draft CASE Report.

2023 Statewide Construction Forecast

Building Type	New Construction Impacted by Proposal in 2023	Alterations Impacted by Proposal in 2023
	(ft ² of Canopy)	(ft ² of Canopy)
Indoor Horticulture	1,046,684	300,771
Greenhouses	860,000	3,230,000

Assumptions

Cannabis

- 3.36 million ft² indoor horticulture; 29% annual growth rate
- 15 million ft² greenhouses; 10% annual growth rate

Non-Cannabis

- 148 million ft² greenhouses; 2.3% annual growth rate
- 20% with supplemental lighting

Lighting alternations rate: Every 12 years

Examples of What Triggers Code

1. Converting a factory to a grow facility is considered an **ALTERATION** and triggers the requirements.
 - The building is still a covered process.
2. Converting a warehouse to a grow facility is considered **NEW CONSTRUCTION**
 - The building has a different use type.



Submeasure A: Greenhouse Envelope

Submeasure B: Lighting Efficacy

Submeasure C: Efficient Dehumidification

SS

Greenhouse Envelope Background

Challenge

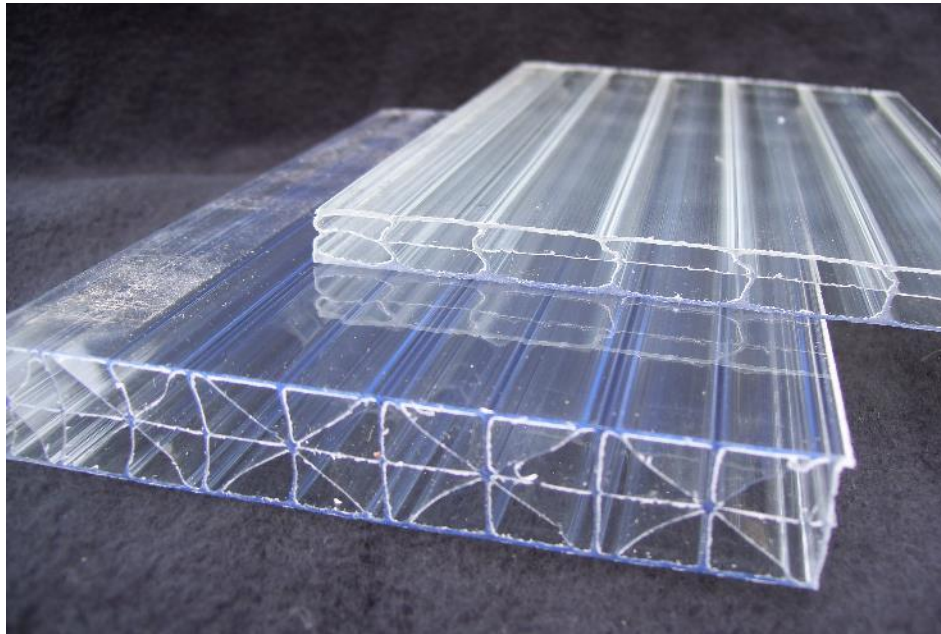
- Greenhouses with heating > 10 Btu/h per ft^2 or mechanical cooling > 5 Btu/hr- ft^2 are defined as “**conditioned space**” in Title 24, Part 6 2019.
- “**Conditioned spaces**” must meet nonresidential building envelope requirements, but greenhouses were likely not taken into consideration.

Proposal

- Develop appropriate requirements for greenhouse construction.
- Provide a feasible compliance path.

Proposed Greenhouse Envelope Requirements

**Wall and ceiling material
U-value of 0.71 or less**



OR

**Installation of shade
curtain system**



Poll

What % of greenhouses that you work with have ONE of these:

- Envelope with U-value ≤ 0.71
- Shade curtain system

- A. Less than 20%
- B. Between 20%-40%
- C. Between 40%-60%
- D. Over 60%
- E. Unsure

Technical Considerations

- Impact of envelope improvements on growing conditions;
- Impact of light transmittance based on material choice; and
- Greenhouse structure required for shade curtain system

Are there other technical considerations that are essential to take into consideration for this greenhouse envelope proposal?

Draft Code Language

6. Greenhouses, Envelope. Greenhouses with heating that has a capacity exceeding 10 Btu/hr-ft² or mechanical cooling that has a capacity exceeding 5 Btu/hr-ft² shall meet one of the following two requirements:

- A. Non-opaque wall and roof assemblies shall have the weighted average U-factor of 0.71 or less.
- B. Shade curtain system shall be installed.



Submeasure A: Greenhouse Envelope

Submeasure B: Lighting Efficacy

Submeasure C: Efficient Dehumidification

SS

Proposed Lighting Efficacy Requirement

Challenges

- Lighting is the biggest energy usage for indoor horticulture.
- Lighting energy can cost up to **\$475,000/yr for a 10,000 ft² canopy facility**.
- Simple payback on LED technology can be as low as 2.5 years, but it can take time to adjust other parameters such as height between lights and canopy, HVAC controls, temperature, humidity, and watering rates.
- Learning curve for LED grow lights is around 6 months.

Proposed Horticultural Lighting Requirements

Greenhouse:
Minimum 1.4 $\mu\text{Mol}/\text{J}$



OR

Indoor:
Minimum 2.1 $\mu\text{Mol}/\text{J}$



Photosynthetic Photon Efficacy (PPE) of Common Lighting Types

Lighting Type	PPE (micromoule per joule)	Meet Greenhouse Proposal?	Meet Indoor Proposal?
Metal Halide Fixture	0.8	No	No
Fluorescent Lighting Fixture	0.84 - 0.95	No	No
Single-ended HPS lamp with magnetic ballast	0.9	No	No
Single-ended HPS	1.0	No	No
Ceramic Metal Halide Fixture	1.5	Yes	No
Double-ended HPS lamp with electronic ballast	1.7 - 2.1	Yes	Maybe highest efficacy fixtures
LED Lighting Fixture	1.1 - 3	Yes	Yes

Poll

What is the most common type of horticultural lighting you see in greenhouses?

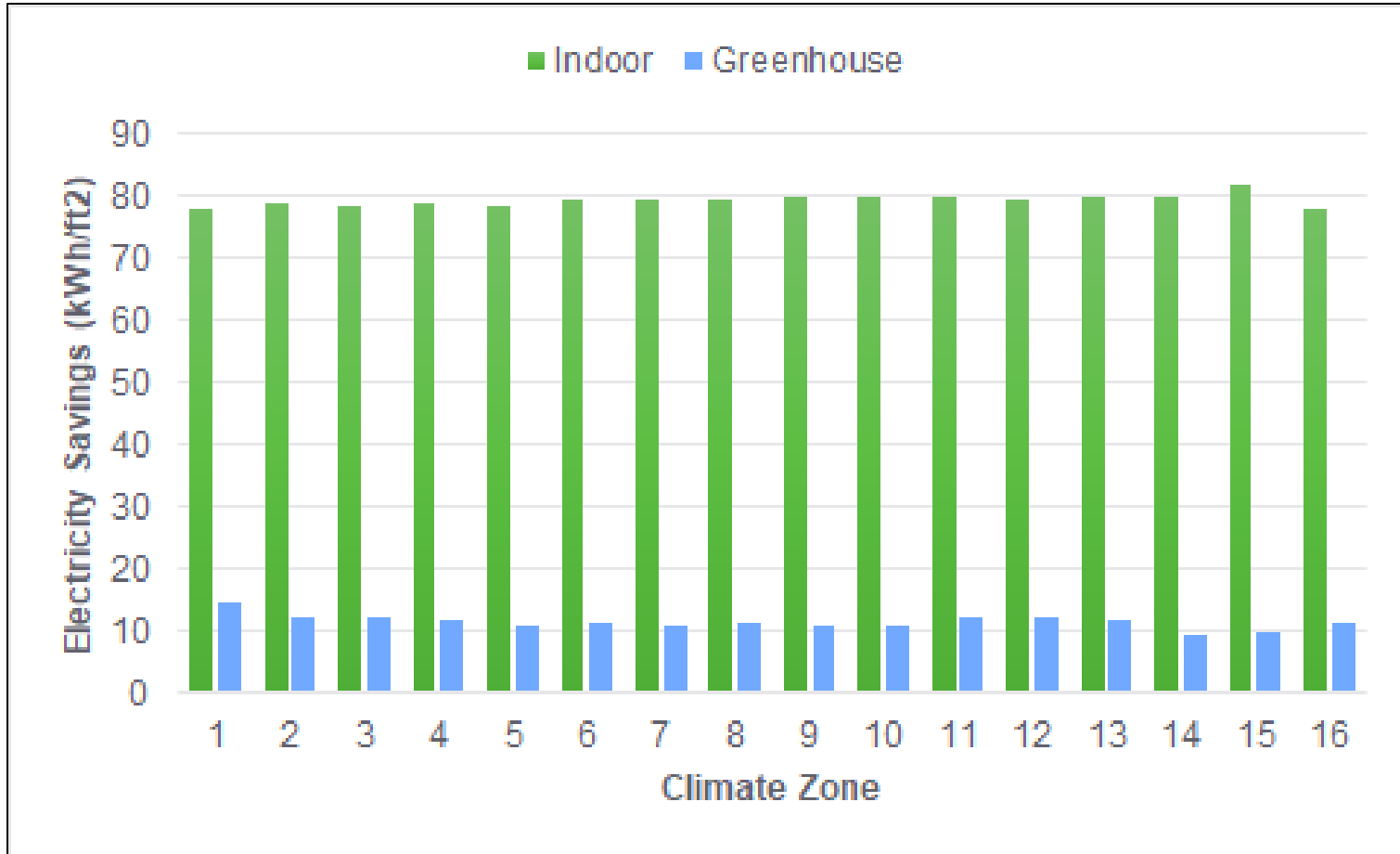
- A. Single-ended HPS
- B. Double-ended HPS
- C. Standard Metal Halide
- D. Ceramic Metal Halide
- E. T5/T8 Fluorescent
- F. LED
- G. Not Applicable

Poll

For NEW CONSTRUCTION in 2023, Title 24, Part 6 should have:

- A. Standards that only prevent using the most inefficient technologies
- B. Standards that prevent using everything except double-ended HPS and LEDs
- C. Standards that require LEDs

First-year Energy Savings per Canopy Square Foot

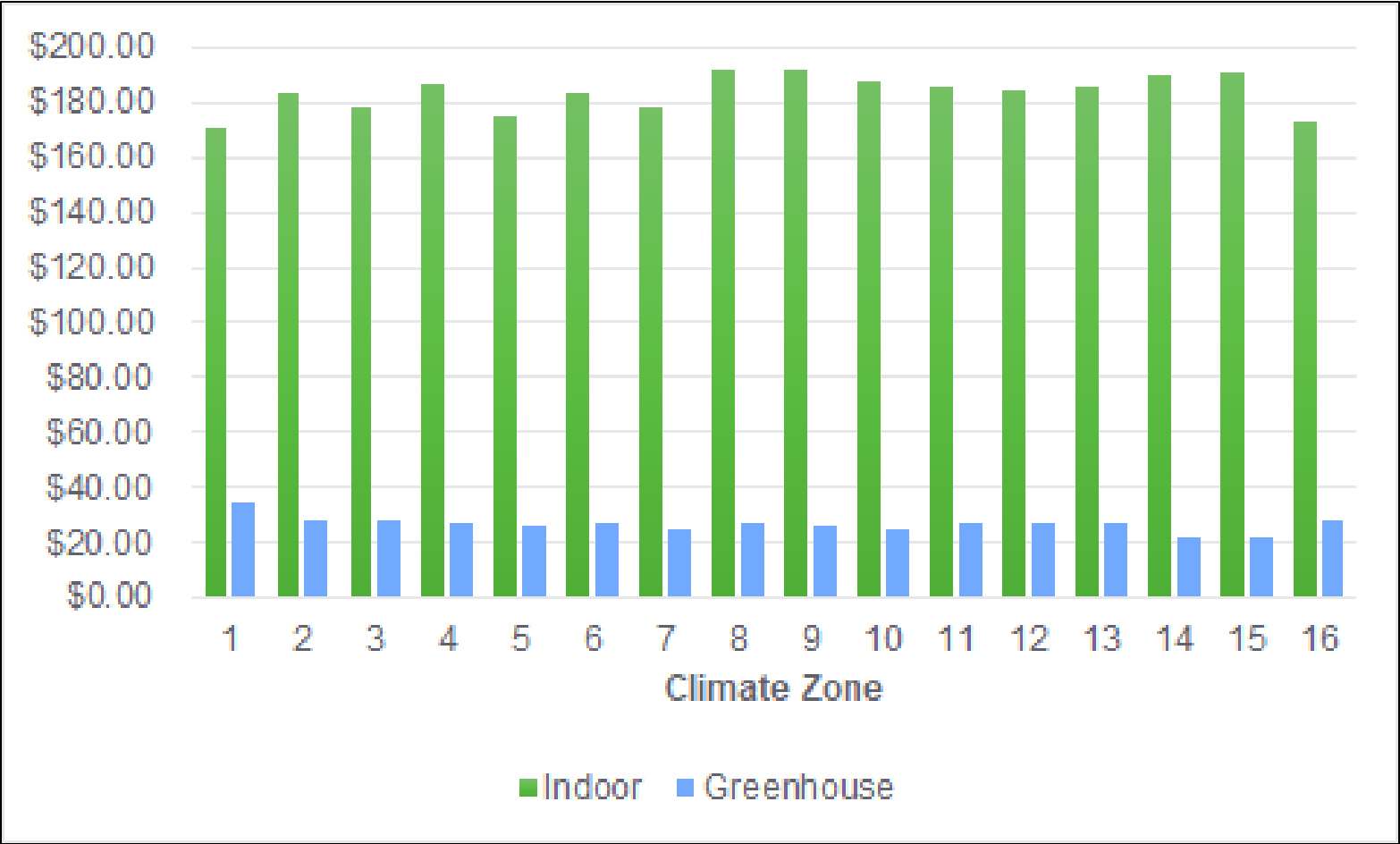


Savings do not vary much by climate zone, and as expected, indoor facilities see much more savings than greenhouses

Indoor: **78-82 kWh / ft²**

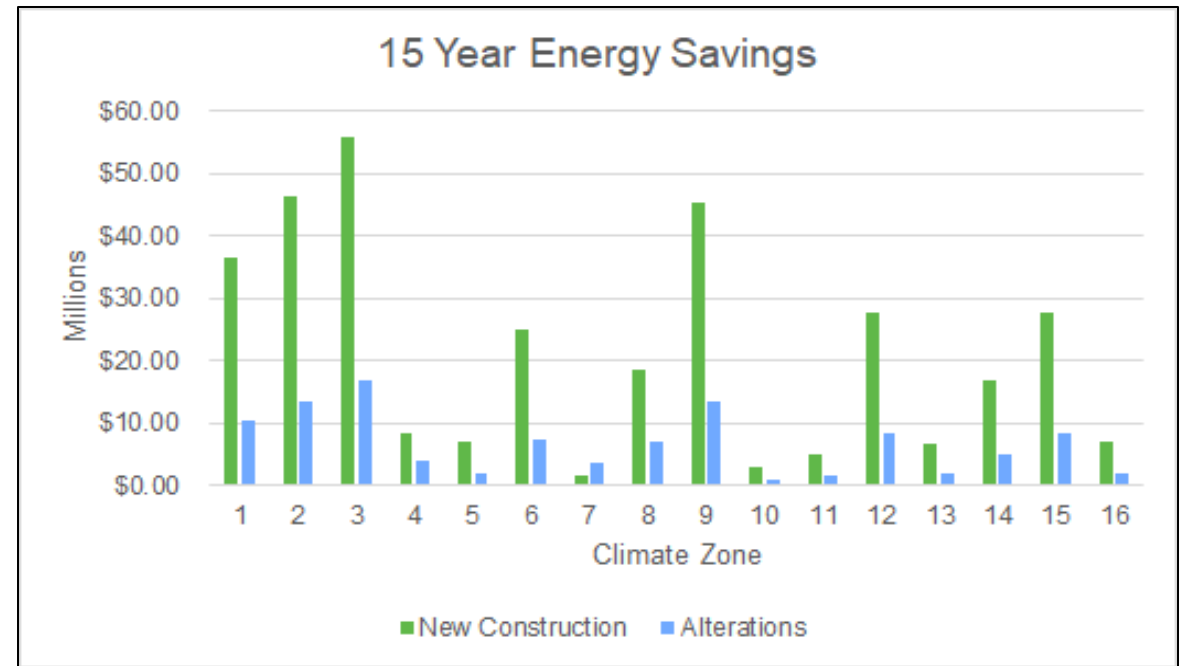
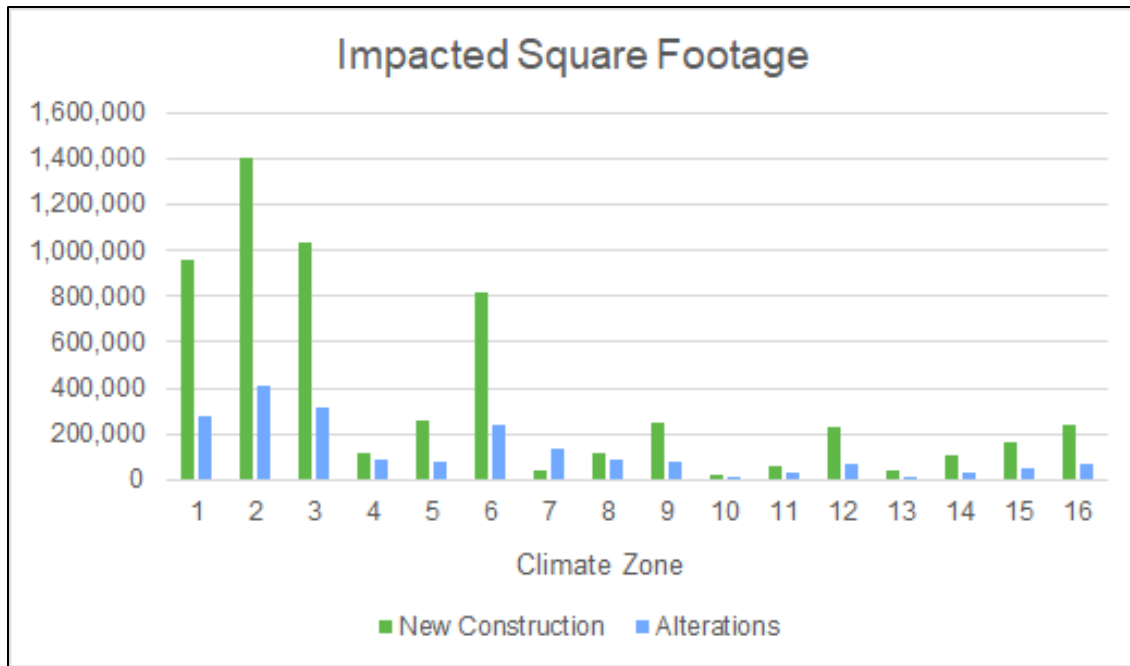
Greenhouse: **11-12 kWh / ft²**

TDV Energy Cost Savings per Square Foot Over 15 Years



Per square foot
cost savings are roughly
8x greater for indoor
facilities

Statewide Savings



In total, roughly **\$440 million** is expected to be saved from reduced energy costs.

Incremental Per Unit Cost

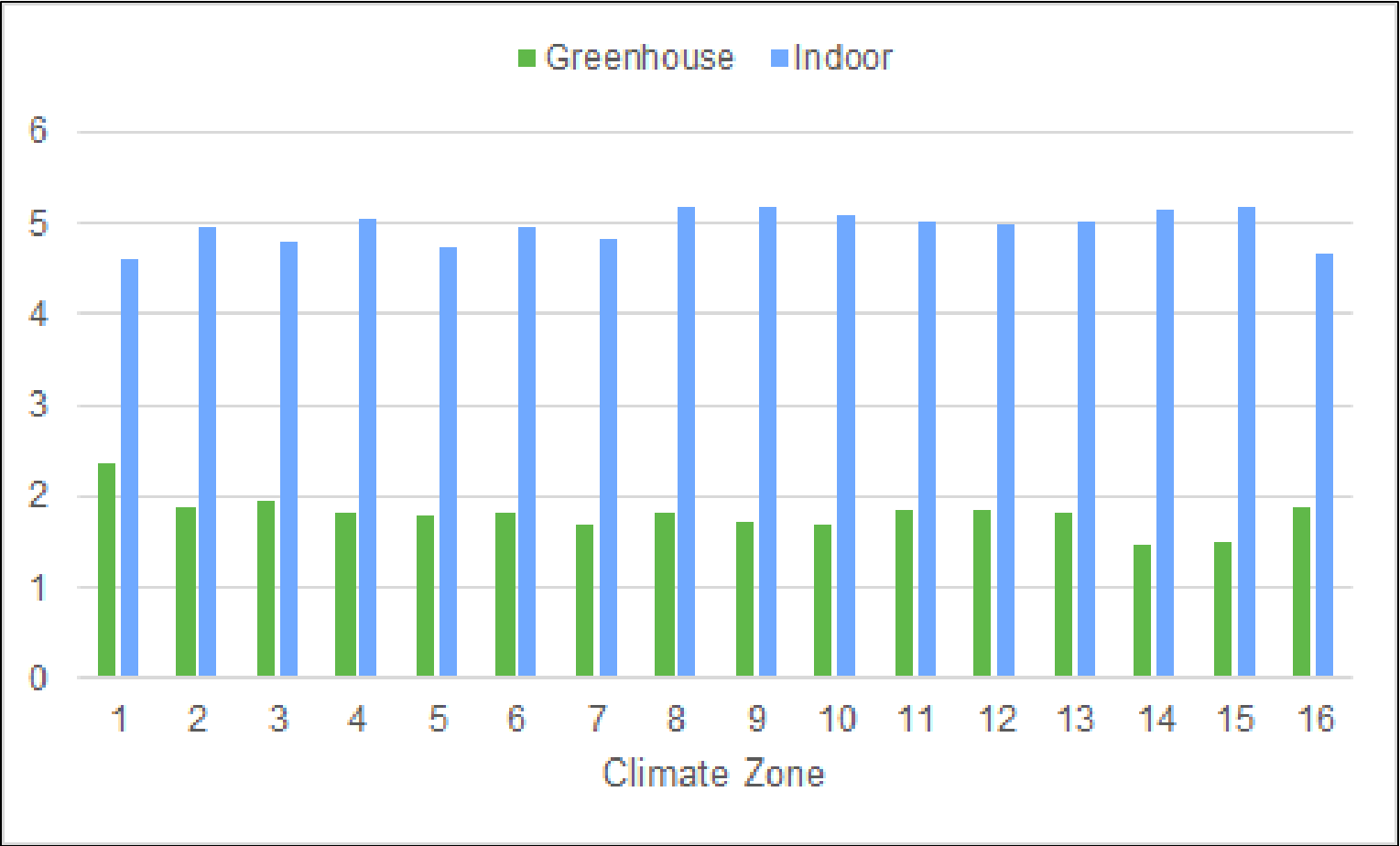
Over 15 Year Evaluation Period

Equipment Type	Incremental Equipment Cost per Fixture	Incremental Maintenance Cost per Fixture	Total Incremental First Cost per Fixture
Greenhouse (single-ended HPS to double-ended HPS)	\$185	\$540	\$724
Indoor (double-ended HPS to LED)	\$2,027	(\$1,287)	\$740

Assumptions

- HPS lamp replacement once a year
- Fixture replacement at 10 years for both baseline and proposed technology
- No significant labor cost difference between baseline and proposed technology

Benefit-to-Cost Ratio



The indoor proposal is over twice as cost effective as the greenhouse proposal.

Both proposals only slightly vary by climate zone.

Both proposals are cost-effective in all climate zones.

Assumptions for Energy Impacts Analysis of Horticultural Lighting

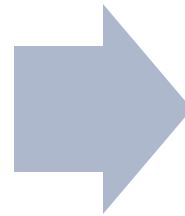
- Consistent Photosynthetic Photon Flux Density (PPFD) for code and baseline cases
- $PPFD = \text{luminaire density} \times \text{power} \times PPE \times \text{dimming level}$
- $\text{Energy Savings} = (PPFD \times \text{Operating Hours}) / PPE$
- Calculate for all variations
 - Crop type
 - Growth stage



Market Overview

71 products on DesignLight Consortium's (DLC) Qualified Product List (QPL) for horticulture lighting meet the proposed PPE level of 2.1 and all 83 products meet the proposed PPE level of 1.4.

Challenge: Products not listed on DLC's QPL are not typically tested for PPE



Solution: Accurately characterize and include reference table in code

Technical Considerations

- Interactive impacts of lighting on HVAC systems;
- Resistance of lighting products to dust and moisture; and
- Different lighting requirements across crop types

What are other critical technical considerations when considering the feasibility of these proposed lighting standards for greenhouses?



Submeasure A: Greenhouse Envelope

Submeasure B: Lighting Efficacy

Submeasure C: Efficient Dehumidification

Dehumidification Efficiency Requirement

Challenges

- Humidity control is essential to plant health.
- No standards or test procedures specific to horticulture exist yet for dehumidification.
- Dehumidification requirements affected by lighting technology.



Proposed Dehumidification Efficiency Standard

- Indoor grow facilities shall **utilize one of the following** dehumidification equipment:
 1. Free-standing unit with minimum energy factor of 1.9 L/kWh
 2. Chilled water system with heat recovery for reheating dehumidified air
 3. Integrated HVAC system with heat recovery for reheating dehumidified air
- Heat recovery system design must meet 60% of the facility's dehumidification load. The remainder of reheating can be met with gas or electric reheat
- This applies to **newly constructed** facilities and **newly installed** dehumidification systems
- This standard is modeled after code recently **adopted by Denver, CO**¹

¹ <https://swenergy.org/Data/Sites/1/media/aaa-documents-2019/industrial/iecc-c403-dehu-final-approved-version.pdf>

ENERGY STAR® Dehumidification

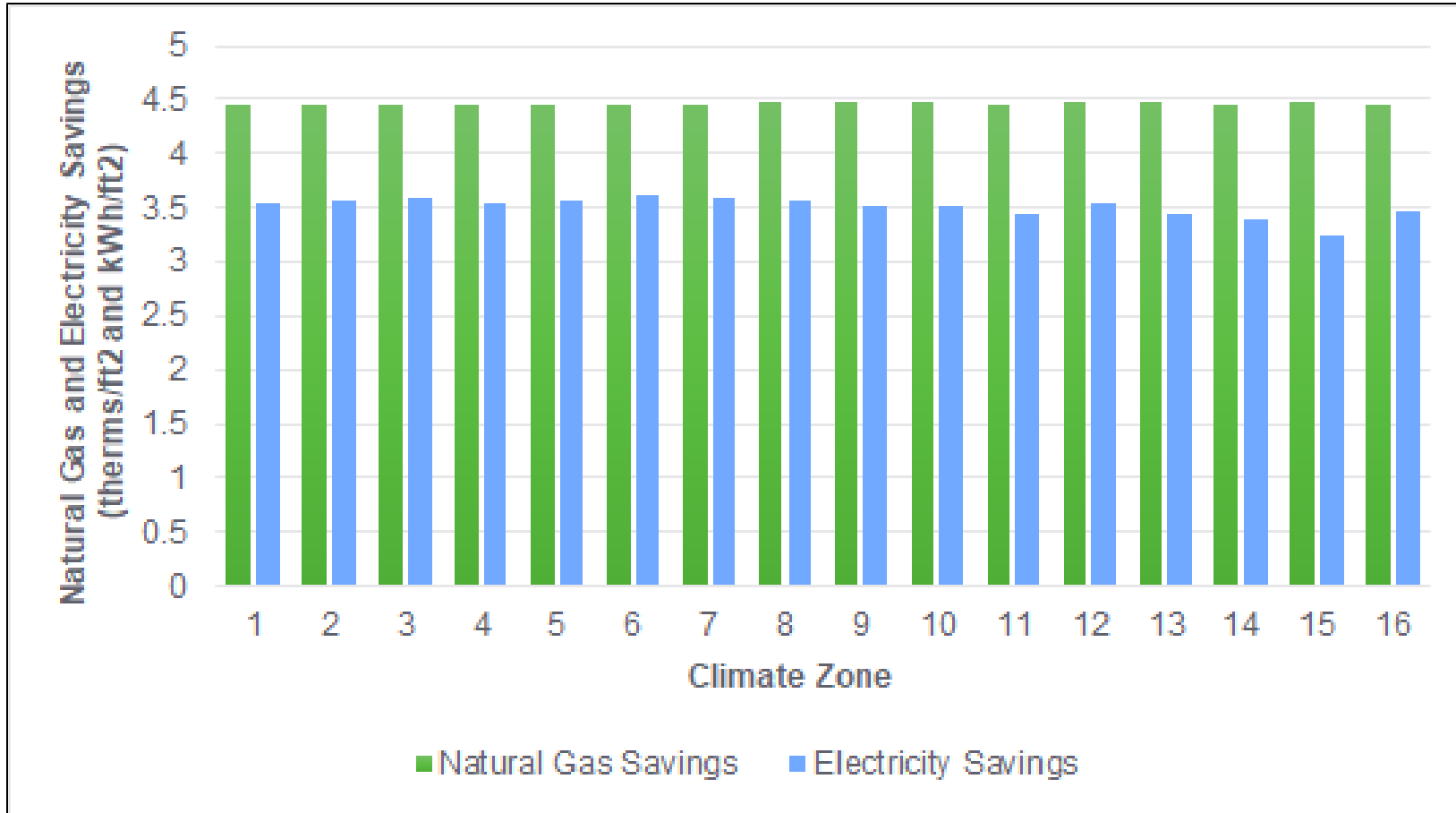
The following table shows the ENERGY STAR® criteria for portable dehumidifiers

Product Capacity (pints/day)	Integrated Energy Factor Under Test Conditions (L/kWh)
≤ 25	≥ 1.57
25.01 to 50	≥ 1.80
≥ 50	≥ 3.30

Assumptions for Energy Impacts Analysis

		Flower Room		Veg Room		Clone Room	
		Lights On	Lights Off	Lights On	Lights Off	Lights On	Lights Off
Room Conditions	Temperature (°F)	80	70	75	65	75	65
	RH (%)	50%	50%	55%	55%	55%	55%
	Wet bulb temperature (°F)	66.6	58.4	63.9	55.5	63.9	55.5
Lighting	Power density (W/sq. ft.)	44.2	0.0	26.5	0.0	8.9	0.0
	Lights on (Hour)	7		7		0	
	Lights off (Hour)	19		25		24	
	Schedule (hr/day)	12	12	18	6	24	0
Irrigation	Watering Rate (lb/sq.ft./day)	0.95		0.6		0.3	

First Year Per Canopy Square Foot Energy Savings



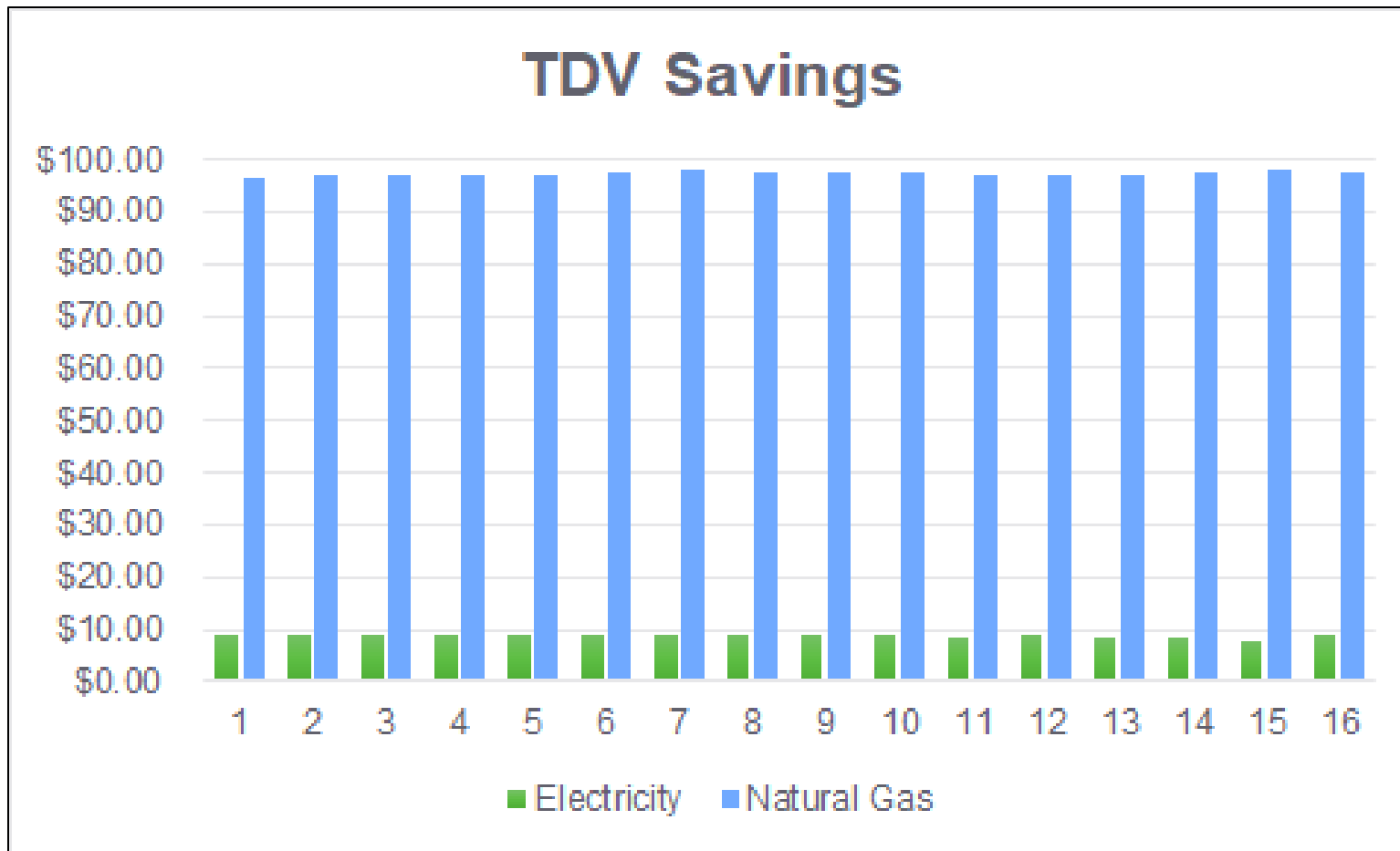
Savings only slightly vary by climate zone

First Year Savings

Gas: **4.4 Therms / ft²**

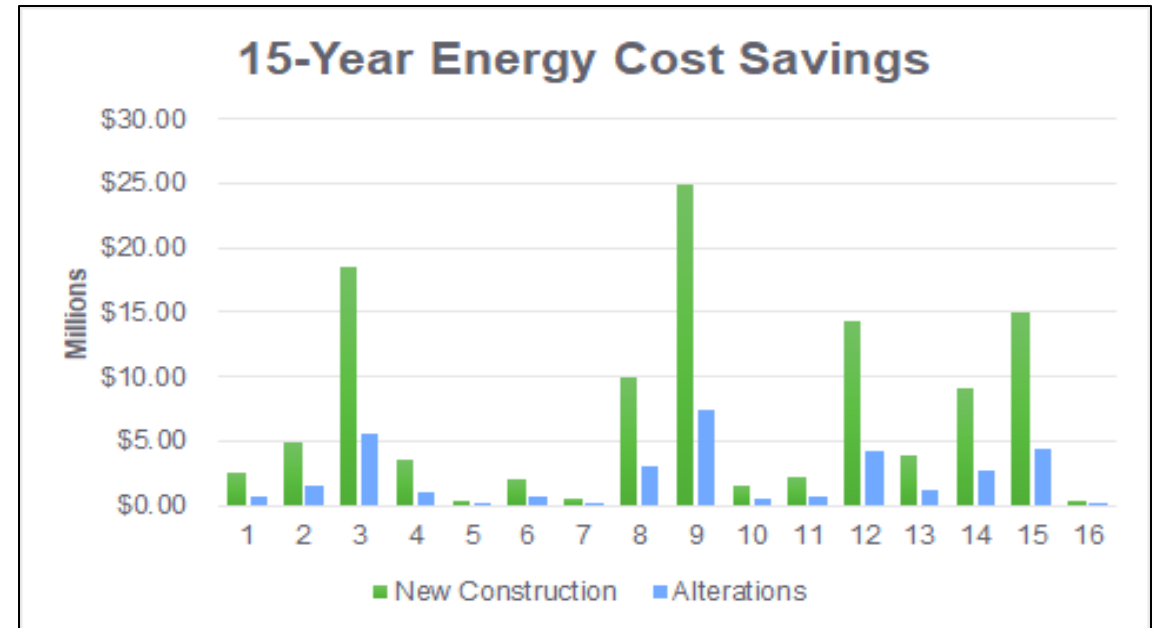
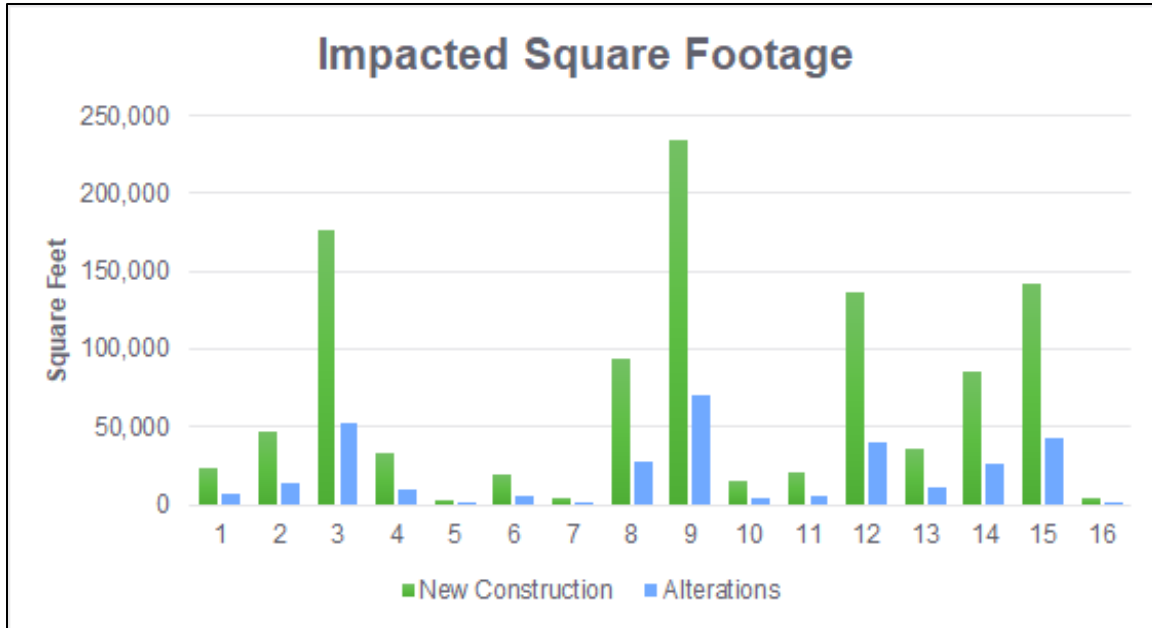
Electric: **3.2-3.6 kWh / ft²**

Statewide Energy Savings



Vast majority of TDV savings are from Natural Gas but there are notable electricity savings.

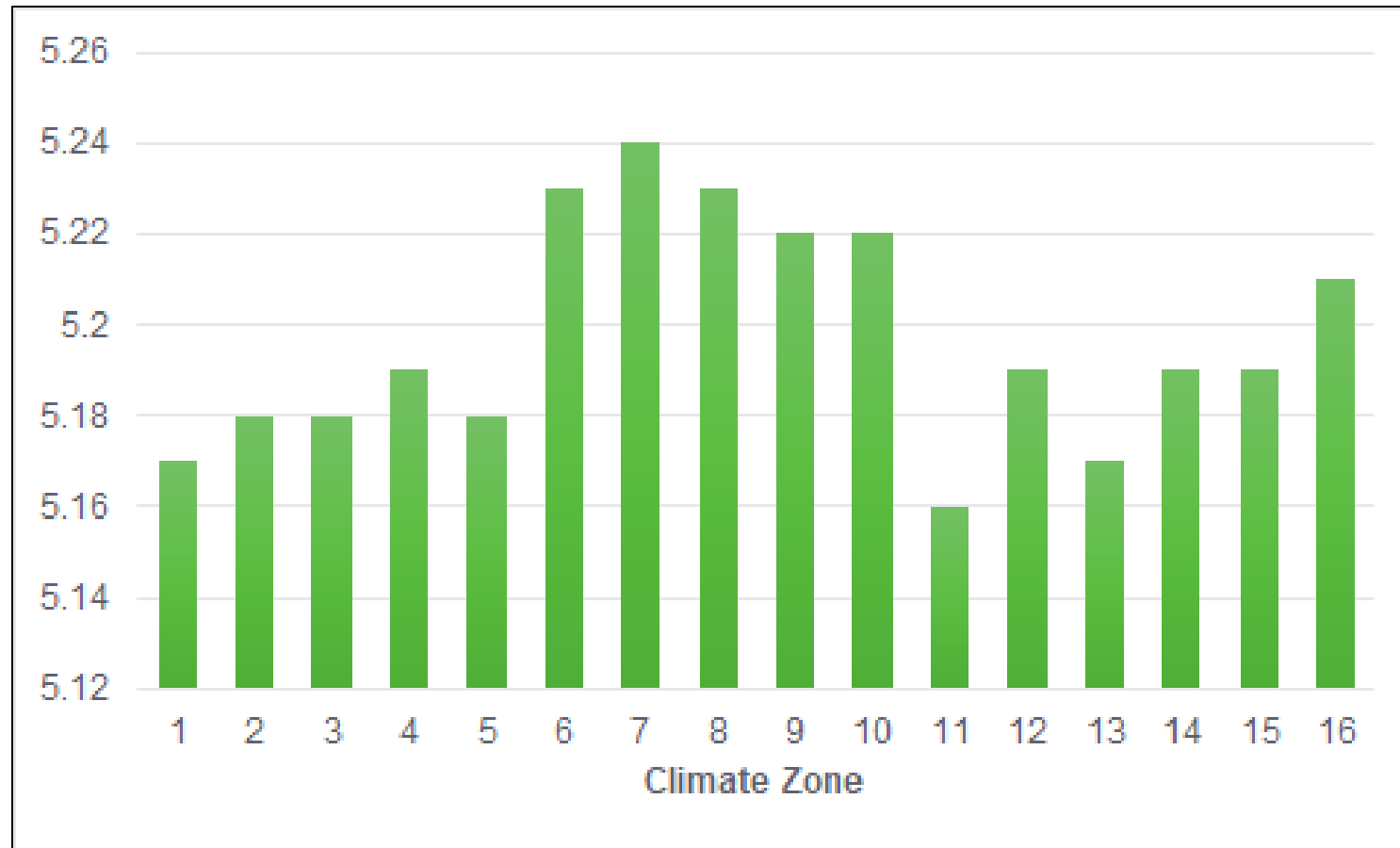
Statewide Savings



Roughly **1.5 million ft²** will be impacted and **\$145 million** would be saved from this proposal.

Like the lighting proposal, most savings come from new construction.

Cost-Effectiveness Results



Results are virtually the same between climate zones.

Thank You

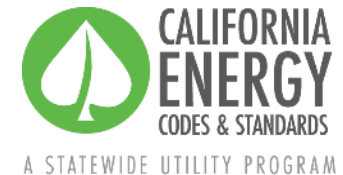
Questions?

Kyle Booth

Energy Solutions

617-245-4101

kbooth@energy-solution.com



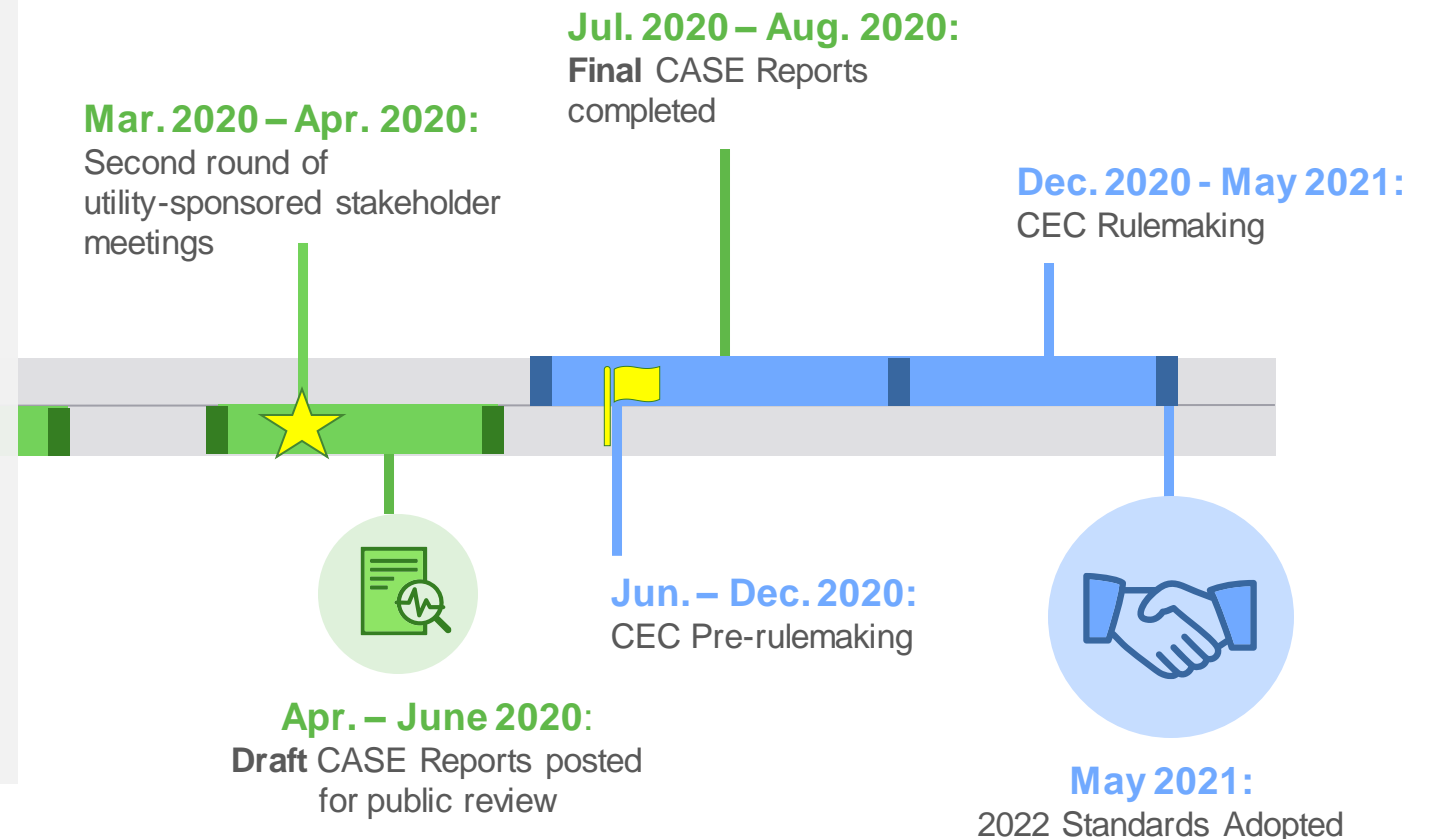
We want to hear from you!

- + Stakeholder meeting feedback informs utility-sponsored CASE Reports.
- + Draft CASE Reports for today's topics will be published in **June 2020**.

*Comments will be considered as they are received. Stakeholders are invited to submit feedback on [today's presentation](#), and the [Draft CASE Report](#) to help shape the **Final** CASE Report submitted to the Energy Commission.*



info@title24stakeholders.com



Upcoming Meetings

Meeting Topic	Building Type	Date
Lighting	NR/MF	Tuesday, March 3, 2020
Single Family Whole Building	SF	Thursday, March 5, 2020
Nonresidential and Single Family HVAC Part 1: Data Centers, Boilers, Air Distribution, Variable Capacity	NR/SF	Thursday, March 12, 2020
Water Heating and Multifamily All Electric Package	MF	Tuesday, March 17, 2020
Single Family Grid Integration	SF	Thursday, March 19, 2020
Multifamily HVAC and Envelope	MF	Wednesday, March 25 2020
Covered Processes Part 1: Refrigeration System Opportunities	NR	Thursday, April 2, 2020
Nonresidential HVAC and Envelope Part 2: Reduced Infiltration, HVAC Controls (Air Efficiency, DOAS)	NR	Tuesday, April 14, 2020
Covered Processes Part 2: Controlled Environmental Horticulture	NR	Thursday, April 16, 2020
Nonresidential Envelope Part 1: High Performance Envelope	NR	Thursday, April 23, 2020
Multifamily Restructuring	MF	Thursday, May 7, 2020

Thank you for your participation today

Kyle Booth

kbooth@energy-solution.com

Steffi Becking

sbecking@energy-solution.com

Joe Sullivan

joe@cultivateEO.com

Please complete the closing polls below



Appendix



Dehumidification Draft Code Language – 120.6(h)

3. Dehumidification.

A. Dehumidification equipment in CEH facilities shall be one of the following:

- a. Free-standing dehumidification units with a minimum energy factor of 1.9 l/kWh. The test method for minimum energy factor shall be as specified in 10 CFR Part 430, Subpart B - Appendix X.
- b. Chilled water system with heat recovery from the condenser coil to achieve dehumidification reheat.
- c. Integrated HVAC system with heat recovery from the condenser coil (hot gas reheat) to achieve dehumidification reheat.

B. Electric or fossil fuel reheat systems may be employed as supplementary heat for dehumidification when the primary dehumidification system in Section 120.6(h).3.A is designed to fulfill at least 60% of the facility's dehumidification needs during peak dehumidification periods.

C. Facilities shall have thermostatic and humidity controls that comply with Section 120.2(k).

D. CEH facilities with more than XX square feet of canopy and with stand-alone dehumidification system(s) shall reuse transpired water for irrigation.

-

EXCEPTION to Section 120.6(h)3: If air conditioning systems have humidistatic controls, then mechanical cooling may be used in lieu of a stand-alone dehumidification system.

IECC 2021 Greenhouse envelope code

- Opaque envelope assemblies comply with the current commercial building thermal insulation requirements (C402.2) and air leakage requirements (C402.4.5)
 - Low-energy greenhouses are excepted
- The thermal envelope of interior partitions must comply with the thermal insulation requirements, air leakage requirements, and fenestration U-factor levels (C402.4.3).
- Fenestration assemblies maximum requirements (Btu/h ft²):
 - Skylight – 0.5
 - Vertical Fenestration – 0.7
- This would apply to newly built greenhouses and alterations to envelope assemblies.

Compliance & Enforcement for Greenhouse Lighting

- Market actors will have to comply with lighting efficacy standards for the first time.
- Owners and developers in many cases will be familiar with Title 24 but would still need to familiarize themselves with the updated code.

Compliance & Enforcement for Greenhouse Envelope

- Building owners will have to choose if they will follow the U-Factor requirements or the shade curtain exception.
- Designers will need to be aware of new U-Factor requirements when selecting wall and ceiling products.
- Building inspectors will need to ensure requirements are met or that a shade curtain has been installed.