



COMMITTEE REPORT

PRESENTED FOR COMMISSION MEETING DATE: 11/20/18	SUBMITTED BY: David Freedman
COMMITTEE NAME: Standing Committee on Green Building & Solar	SUBMITTED DATE: 11/14/18
COMMITTEE MEETING DATE: 11/14/18	NEXT COMMITTEE MEETING DATE: TBD

Committee Meeting Goals:

- Debriefing on the 2019 Energy Code Workshop
- Follow-up with Center for Sustainable Energy on Energy Code Coach Program
- Discussion of Reach Code Best Practices Workshop
- Preparation for Modernism Week

Summary:

With CVAG Director of Environmental Resources Katie Barrows and DVBA CEO Gretchen Gutierrez participating by phone, the meeting began with a debriefing on the 2019 Energy Code training session, which took place on October 29 at UCR Palm Desert. Representatives from the California Energy Commission, Southern California Edison, Southern California Gas and various energy consulting firms spoke, and Hot Purple Energy President Nate Otto served as MC. More than 50 people attended, and attendee feedback was positive. The presentations have been posted on the Commission’s website and sent to the attendees.

Although Committee members, Ms. Barrows and Gutierrez agreed that the training session achieved its goal of introducing stakeholders to the core content of the 2019 Energy Code, they noted the large amount of work required to out it together. They suggested having a third-party provider do the next training session, in the fall of 2019. In the meantime, a link can be added to the Commission’s website to that of one of the leading third-party providers, Energy Code Ace, which is an initiative of the state’s investor-owned utilities.

Ms. Barrows indicated that she had contacted the Center for Sustainable Energy (CSE), one of the speakers at the training session, about the potential for CVAG to participate in the Center’s Energy Code Coach Program, under which a CSE consultant would travel to groups of Coachella Valley cities to provide support and training to building and planning department staffs. A conference call will be scheduled with CSE for the first week of December, and Commissioner Freedman will participate. One of the questions is the cost, so CVAG can identify possible funding sources it might have. The Commission may be able to provide support for any training for Palm Springs staff out of its budget.

Commissioner Freedman summarized the Reach Code Best Practices Workshop that he attended on October 22. A working group affiliated with the investor-owned utilities and various local governments will be preparing a cost-effectiveness study analyzing energy efficiency measures that go beyond the requirements of the 2019 Energy Code and a draft ordinance that local governments could consider adopting. Office of Sustainability staff will look into requesting completion of the cost-effectiveness study on behalf of Palm Springs. The request is not a commitment to take follow-up action.

Following receipt of the cost-effectiveness study, Commissioner Freedman will resume work on a green building policy for consideration by the Committee and full Sustainability Commission, and then by the Planning Commission and ultimately the City Council. Commissioner Goins suggested the policy include building orientation and shading and that partnering with the Planning Commission can serve as a template for other issues the Sustainability Commission is doing, such as walkability. Commissioner Goins also suggested outreach to the cannabis industry through its CVCann association to discuss how grow facilities can use sustainable building and operating techniques.

Commissioner Goins reported that he would soon begin work on the Modernism and Sustainability workshop during Modernism Week 2019. The workshop will take place at 2 pm on Saturday, February 23, at the Modernism Week CAMP facility. Commissioner Goins asked for recommendations of architects and designers that could be on the workshop panel. Staff sent Commissioner Goins a recommendation for an architect.

Recommendation/Request:

Continuing working with stakeholders on Energy Code issues as it moves towards effectiveness.

ACTION ITEMS REQUEST TO COMMISSION	Approve draft Solar Zoning Ordinance and solar policy when presented.
ACTION ITEMS REQUEST TO OFFICE OF SUSTAINABILITY	Request Reach Code cost-effectiveness study.
POTENTIAL FISCAL IMPACT/REQUEST IF ANY:	There was no cost to the Commission of the Energy Code training session, as Hot Purple Energy covered the food cost and CVAG covered the room rental and cost of the flash drives the attendees received. The Modernism Week workshop is expected to cost \$500 - \$1,000, including brochure printing. There may be a request to support the Energy Code Coach program, but no cost estimate is available yet. These funds have been approved in the Committee's FY 2018-19 outreach budget.

2020 Vision

Reach Codes Best Practices Workshop



**CALIFORNIA
ENERGY**
CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

**Irwindale, California
October 22, 2018**

Agenda

Welcome, Introductions, and Objectives

9:00 – 9:15

State of the Standards: Reaching Beyond

9:15 – 9:45

2019 Initial Analysis Status and Results

9:45 – 10:45

BREAK

10:45 – 11:00

Putting It All Together (Discussion)

- Reach Code Process
- Options for 2019 and What's Right for Your Jurisdiction

11:00 – 12:15

Wrap-Up

12:15 – 12:30

Workshop Objectives



Green Building Ordinances & Reach Codes

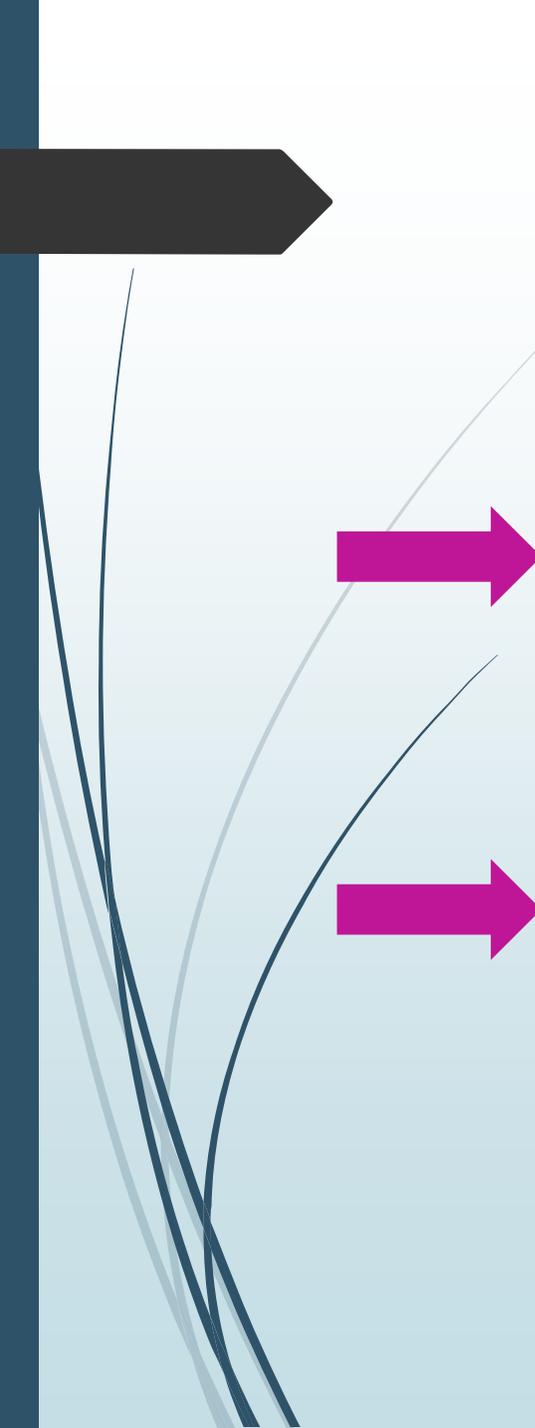




California Building Standards Code (Title 24)

Title 24 is Composed of 12 "Parts," Described Below:

- ◉ [Part 1 - California Building Standards Administrative Code](#)
 - ◉ [Part 2 - California Building Code - Vol. I & II](#)
 - ◉ [Part 3 - California Electrical Code](#)
 - ◉ [Part 4 - California Mechanical Code](#)
 - ◉ [Part 5 - California Plumbing Code](#)
 - ◉ [Part 6 - California Energy Code](#)
 - ◉ Part 7 - No longer published in Title 24; see Title 8 CCR
 - ◉ [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 Reference Standards Code](#)
- 
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Legal Requirements for Reach Codes

- Compliance with local requirements for ordinances
 - Compliant with all state laws
 - Updated for each new Building Code cycle
 - Filed with the State
 - Accessible to the public
 - **More stringent than state requirements**
 - **Cost effective**
 - **May not preempt federal regulations**
(effectively, may not specifically require high efficiency HVAC and DHW equipment or any other appliances for which there is a federal standard)
- 

State of the Standards

Ingrid Neumann
Building Standards Office
CALIFORNIA ENERGY COMMISSION

REACHING BEYOND

Tuesday, October 22, 2018
Irwindale, California





EXECUTIVE ORDER B-30-15

- April 29, 2015 “Governor Brown Establishes Most Ambitious Greenhouse Gas Reduction Target in North America”
- **greenhouse gas reduction target of 40 percent below 1990 levels by 2030**
- aligns California with leading international governments
- California is on track to meet or exceed the current target of reducing greenhouse gas emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (AB 32)
- Makes it possible to reach the ultimate goal of reducing emissions 80 percent under 1990 levels by 2050.



Legislative Mandates

Clean Energy & Pollution Reduction Act

SB 350 Overview

- **SB 350 codifies the Governor's aggressive clean energy goals**
- signed into law on October 7, 2015
- SB 350 increases California's **renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030.**
 - Increases the use of Renewables Portfolio Standard (RPS) eligible resources, including solar, wind, biomass, geothermal, and others.
- SB 350 requires the state to **double statewide energy efficiency savings in electricity and natural gas end uses by 2030**



Legislative Mandates

Clean Energy & Pollution Reduction Act

SB 350 Overview

Directs state agencies to undertake various studies to identify and assess the following:

Barriers to, and opportunities for, solar photovoltaic energy generation as well as barriers to, and opportunities for, access to other renewable energy by low-income customers; and barriers to contracting opportunities for local small businesses in disadvantaged communities. Barriers for low-income customers to energy efficiency and weatherization investments, including those in disadvantaged communities, as well as recommendations on how to increase access to energy efficiency and weatherization investments to low-income customers

This study was conducted by the Energy Commission and was adopted December 14, 2016. “Low-Income Barriers Study”



Legislative Mandates

Supporting Legislation – **Assembly Bill 802**

- Signed into law on October 8, 2015 **authorizing the Energy Commission to create a building energy-use benchmarking and disclosure program**
- Existing law requires **electric and gas utilities to maintain records of the energy consumption data of all nonresidential buildings**, in a format compatible for uploading to the United States Environmental Protection Agency's ENERGY STAR Portfolio Manager
- Existing law requires the Energy Commission to develop and implement a comprehensive program to **achieve greater energy savings in existing residential and nonresidential building stock.**



Legislative Mandates

Supporting Legislation – **Assembly Bill 802**

- **AB 802 directed the Energy Commission to create a statewide building energy use benchmarking and public disclosure program for buildings larger than 50,000 square feet.**
 - **require building owners to report building characteristic information and energy use data to the Commission by June 1 annually, beginning in 2018 for buildings with no residential utility accounts, and in 2019 for buildings with 17 or more residential utility accounts.**
- effective January 1, 2017, also requires that energy utilities provide building-level energy use data to building owners, owners' agents, and operators upon request for buildings with no residential utility accounts and for buildings with five or more utility accounts.



Legislative Mandates

Supporting Legislation – **Assembly Bill 802**

- The Energy Commission will publicly disclose some of the reported information beginning in 2019 for buildings with no residential utility accounts, and 2020 for buildings with residential utility accounts.
- ***The cities of San Francisco, Berkeley, and Los Angeles have local benchmarking and public disclosure programs whose requirements exceed those of the state program.***



Legislative Mandates

“The 100 Percent Clean Energy Act of 2018”

SB 100 Overview September 10, 2018

- Under existing law, the California Renewables Portfolio Standard Program requires that the total kilowatt-hours of products sold to retail end-use customers achieve 25% of retail sales by December 31, 2016, **33% by December 31, 2020, 40% by December 31, 2024, 45% by December 31, 2027, and 50% by December 31, 2030.**
- This bill revises the above-described legislative findings and declarations to state that the goal of the program is to **achieve that 50% renewable resources target by December 31, 2026, and to achieve a 60% target by December 31, 2030.**



Legislative Mandates

“The 100 Percent Clean Energy Act of 2018”

SB 100 Overview September 10, 2018

- This bill states that **it is the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100% of retail sales of electricity to California end-use customers and 100% of electricity procured to serve all state agencies by December 31, 2045.**
 - *The bill would require the PUC and the Energy Commission, in consultation with the state board, to take steps to ensure that a transition to a zero-carbon electric system for the State of California does not cause or contribute to greenhouse gas emissions increases elsewhere in the western grid.*



The **Warren-Alquist Act** is the legislation that created and gives statutory authority to the California Energy Commission

§ 25402. **Reduction of wasteful, uneconomic, inefficient or unnecessary consumption of energy**

- Prescribe, by regulation, lighting, insulation climate control system, and other building design and **construction standards that increase the efficiency in the use of energy and water for new residential and new nonresidential buildings.**
- Prescribe, by regulation, energy and water conservation design standards for new residential and new nonresidential buildings. The standards shall be **performance standards** and shall be promulgated in terms of energy consumption per gross square foot of floorspace, but may also include devices, systems, and techniques required to conserve energy and water. The commission shall periodically review the standards and adopt any revision that, in its judgment, it deems necessary.



The **Warren-Alquist Act** is the legislation that created and gives statutory authority to the California Energy Commission

§ 25402.1. Duties of commission; **public domain computer program**; certification process; **manual, sample calculations, and model designs**; pilot project of field testing; technical assistance program; enforcement and resolutions

§ 25402.2. **Building standards**

§ 25402.3. Regional training centers for local building officials and enforcement personnel; locations; sessions; workshops for rural areas

§ 25402.4. Nonresidential building standards; option using passive or semi passive thermal systems; construction techniques

§ 25402.5. Lighting device; lighting subject to § 25402; declaration of existing law; adoption of efficiency standards for outdoor lighting

§ 25402.5.4. General purpose lights; standards; adoption; purchase of lights meeting or exceeding standards

§ 25402.6. **Decrease of wasteful peak-load energy consumption** in existing residential and nonresidential buildings; development and implementation of plan

§ 25402.7. **Support for specified building standards and other regulations by electric and gas utilities**

§ 25402.8. Indoor air pollution; assessment of new building standards



California Building Standards Code

Title 24 of the California Code of Regulations

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



Title 24

PART 6 - CALIFORNIA ENERGY CODE

Subchapter 1 describes the scope of the standards and includes the definitions and rules of construction that apply to Part 6.

Subchapter 2 contains mandatory requirements for all buildings.

Subchapter 3 contains additional mandatory requirements for new nonresidential, high-rise residential, and hotel/motel buildings.

Subchapter 4 contains still more mandatory requirements for new nonresidential, high-rise residential, and hotel/motel buildings.

Subchapter 5 sets the performance (energy budget) and prescriptive (package of measures) compliance approaches for new nonresidential, high-rise residential, and hotel/motel buildings.

Subchapter 6 establishes the requirements for additions, alterations, and repairs to existing nonresidential, high-rise residential, and hotel/motel buildings.



Title 24

PART 6 - CALIFORNIA ENERGY CODE

Subchapter 7 contains the mandatory requirements for new low-rise residential buildings.

Subchapter 8 sets for the performance (energy budget) and prescriptive (package of measures) compliance approaches for new residential buildings.

Subchapter 9 establishes the requirements for additions and alterations to existing low-rise residential buildings.

Part 6 also includes a set of appendices that are adopted along with and are a part of the standards. Due to their volume and complexity, they are not codified, but are incorporated by reference.



PART 6 - CALIFORNIA ENERGY CODE 2019 UPDATES

Three key areas:

1. proposing new requirements for **installation of solar photovoltaics** for newly constructed low-rise residential buildings
2. updating current ventilation and Indoor Air Quality (IAQ) requirements, including references to **ASHRAE 62.1 and 62.2**
3. extending Title 24 Part 6 to apply to **healthcare facilities**



PART 6 - CALIFORNIA ENERGY CODE

2019 Residential UPDATES

For **solar**:

- Adding new prescriptive requirements for installing solar photovoltaic systems in newly constructed residential buildings, including exceptions to address conditions where meeting the solar photovoltaic systems requirements are not feasible or cost effective
- specifying use of an **Energy Design Rating** in the performance approach to compliance to support solar photovoltaic requirements
- adding Joint Appendix 11 and 12 to **support solar photovoltaic and battery storage systems** installed to comply with Part 6.
- Adding a **performance standards exception allowing community shared solar electric generation or battery storage systems** to serve as a full or partial option for the onsite solar photovoltaic systems requirements, and adding an administrative process in Part 1 for Commission approval of compliance options for community shared systems that 6 provide equal or greater energy saving benefits to buildings that would otherwise have onsite solar PV systems, in a manner that is both valid and enforceable.



PART 6 - CALIFORNIA ENERGY CODE

2019 Residential UPDATES

For **ventilation**:

- References to [ASHRAE 62.2](#) have been updated to incorporate the current version by reference.
 - Amendments to the current version of ASHRAE 62.2 are proposed as found to be appropriate to ensure efficiency and indoor air quality.
- Increasing air filter filtration requirements to a Minimum Efficiency Reporting Value ([MERV](#)) of **13**, necessary for filtering out the smallest category of potentially harmful particulates.
- Extending air filtration requirements to apply to supply-only ventilation systems and the supply side of balanced ventilation systems.
- Changes to multifamily ventilation include specifying that dwelling units may either use balanced ventilation or verify leakage rates with a blower door test.
- Updating HERS procedures specified in the Residential Appendix where needed to support the changes in Part 6.



PART 6 - CALIFORNIA ENERGY CODE

2019 Residential UPDATES

For **attics**, increasing the prescriptive R-value for below roof deck insulation from R-13 to R19.

For **walls**:

- Increasing prescriptive R-value requirements from R19 fill and R5 continuous insulation to R21 fill with R5 continuous insulation, reflecting an overall decrease in the performance U-factor for the assembly from 0.051 to 0.048
- Adding QII to the prescriptive requirements for newly constructed buildings.

For **fenestration**:

- Updating the definitions of “door” and “glazed door” to match National Fenestration Rating Council (NFRC) definitions. This lowers the threshold for a door to be considered a glazed door from 50% glazing to 25% glazing.
- Updating the prescriptive U-factor for windows from 0.32 to 0.30, and updated the prescriptive Solar Heat Gain Coefficient (SHGC) required in Climate Zones 2 and 5 - 15 from 0.25 to 0.23.



PART 6 - CALIFORNIA ENERGY CODE

2019 Residential UPDATES

For **lighting**, revising JA8 to align testing requirements with current federal, state and ENERGY STAR test procedures, and to allow use of the NEMA 77 test standard for flicker.

For **water heating**:

- The specifications for compact distribution have been revised
- New specifications for Drain Water Heat Recovery have been added.
- Adding an option for prescriptive compliance using a heat pump water heater.

For **furnaces**:

- Updating minimum fan efficacy requirements to 45 cfm per watt.
- Adding options for prescriptive compliance using one or more heat pumps.

For **HVAC**

- Adding airflow requirements specific to Small Duct High Velocity (SHDV) systems. This resolves an issue of flow rates for standard ducting being applied to SHDV systems.

Adding addition and alteration requirements that are specific to creating Accessory Dwelling Units.



PART 6 - CALIFORNIA ENERGY CODE

2019 Nonresidential UPDATES

Extending the Scope of Part 6 to **healthcare facilities**, and incorporating several Exceptions to ensure appropriate application of efficiency standards.

For **ventilation**:

- Incorporate the Natural Ventilation and Exhaust Ventilation Procedures of the **2016 ASHRAE 62.1**.
- Updating the ventilation rate table to list the ventilation rate for more spaces.
- New requirements for ventilation air that can be used for recirculation and transfer air.
- Updating filtration requirements to a minimum **MERV 13**, necessary for filtering out the smallest category of potentially harmful particulates.



PART 6 - CALIFORNIA ENERGY CODE

2019 Nonresidential UPDATES

For **lighting**:

- Updating prescriptive indoor and outdoor **lighting power allowance values to assume the use of LED lighting**, and added new Power Adjustment Factors for several daylighting devices.
- Reducing wattage thresholds for Exceptions to outdoor lighting controls to account for lower wattage LED fixtures.
- Updating the procedure for determining installed lighting power to allow the efficiency of installed lamps to be considered, and to create a more comprehensive framework for evaluating modular lighting (including track lighting).
- Adding **occupancy sensing requirements for restrooms**.
- Merging and standardizing the prescriptive alteration requirements for lighting controls, and limiting the projects that can proceed without determining the square footage of the affected spaces.



PART 6 - CALIFORNIA ENERGY CODE

2019 Nonresidential UPDATES

Adding requirements for **laboratory fume hoods** to use efficient fans and incorporate automatic sash closure.

For **HVAC**:

- Updating requirements in several areas to maintain alignment with ASHRAE 90.1:
 - Fan system power requirements
 - Equipment efficiency requirements
 - Transfer air for exhaust air makeup
 - Demand control ventilation requirements for classrooms
 - Occupant sensor ventilation control requirements (with amended setpoints)
- Waterside economizer requirements (with amended minimum efficiency requirements)
- Expanded the Economizer Fault Detection and Diagnostics requirement to all systems over 4.5 tons of cooling that are equipped with an air economizer.
- Amended the sizing calculations and equipment selection criteria to make it applicable to healthcare facilities.



PART 6 - CALIFORNIA ENERGY CODE

2019 Nonresidential UPDATES

- Expanded the water economizer requirement to also be applicable to system that do not utilize a fan.
- New requirements for water economizer operation and design to limit the impact of pumps.
- New prescriptive efficiency requirements for cooling towers
- New condenser efficiency and system control requirements for adiabatic condensers serving refrigerated warehouses and supermarkets

Acceptance Tests

- Nonresidential Appendix 2 – New procedures were added for high-rise residential dwelling unit ventilation and dwelling unit envelope leakage.
- Nonresidential Appendix 7 – New Acceptance Test were added for occupancy zone control, adiabatic condensers, laboratory and factory exhaust, and automatic closing fume hood sashes.



Title 24 PART 11 “CALGreen”

CALIFORNIA GREEN BUILDING STANDARDS CODE

CHAPTER 1 - ADMINISTRATION

CHAPTER 2 - DEFINITIONS

CHAPTER 3 - GREEN BUILDING (Scope)

CHAPTER 4 - RESIDENTIAL MANDATORY MEASURES

CHAPTER 5 - NONRESIDENTIAL MANDATORY MEASURES

CHAPTER 6 - REFERENCED ORGANIZATIONS AND STANDARDS

CHAPTER 7 - INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS

CHAPTER 8 - COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

APPENDIX A4 - RESIDENTIAL VOLUNTARY MEASURES

APPENDIX A5 - NONRESIDENTIAL VOLUNTARY MEASURES

APPENDIX A6.1 - VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 & 4]

Mandatory
Energy Efficiency Targets
Title 24 Part 6

Voluntary
Energy Efficiency
Title 24 Part 11



Appendix A4

Residential Voluntary Measures

- Section A4.203.1.1.1
Performance Approach for Newly Constructed
– based on **target EDR scores**
(no longer “Percent better than” mandatory Part 6)

Mandatory Title 24 Part 6

**Mandatory
Energy Efficiency Targets
Title 24 Part 6**

Voluntary Part 11

**Voluntary
Energy Efficiency
Title 24 Part 11**



Appendix A4

Residential Voluntary Measures

Required Prerequisites:

- **A4.203.1.1.2 Quality Insulation Installation (QII)**

AND Choose ONE of the Prerequisites below:

- **A4.203.1.2.1 Roof deck insulation, or ducts in conditioned space**
- **A4.203.1.2.2 High Performance Walls (HPW)**
- **A4.203.1.2.3 HERS-Verified Compact Hot Water Distribution System (CHWDS-H)**
- **A4.203.1.2.4 HERS-Verified Drain Water Heat Recovery (DWHR-H)**



Appendix A4

Residential Voluntary Measures

- **A4.203.1.3.1 Tier 1.**

CZ	Mixed Fuel	All-Electric
1	23	36
2	12	16
3	10	14
4	8	12
5	10	16
6	10	12
7	5	7
8	10	10
9	13	13
10	10	11
11	11	12
12	12	13
13	11	13
14	15	16
15	11	8
16	22	39

- **A4.203.1.3.2 Tier 2.**

CZ	Mixed Fuel	All-Electric
1	13	0
2	5	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	5	0
15	0	7
16	14	10

- Section A4.204 Performance Approach for Additions has been struck



Appendix A5

Nonresidential Voluntary Measures

Choose **ONE** of the following Prerequisites for **Tier 1** and **TWO** for **Tier 2**:

- **A5.203.1.1.1 Outdoor lighting**
- **A5.203.1.1.2 Service water heating in restaurants**
- **A5.203.1.1.3 Warehouse Dock Seal Doors**
- **A5.203.1.1.4 Daylight Design**
Power Adjustments Factors (PAFs)
- **A5.203.1.1.5 Exhaust Air Heat Recovery**



Appendix A5

Nonresidential Voluntary Measures

Section A5.203, Performance Approach

- Retain the “**Percent better than**” mandatory language
- Target Percentages continue to vary depending on whether lighting and/or mechanical systems are included for nonresidential building projects
 - **Tier 1:** 5% or 10% **Tier 2:** 10% or 15%
- For **high-rise residential and hotel/motel projects the target percentages were adjusted** to reflect that there is no additional credit available for lighting improvements
 - **Tier 1:** 5% **Tier 2:** 10%

Questions?

Building Energy Efficiency Program 2019 Update

<http://www.energy.ca.gov/title24/2019standards/rulemaking/>

Contact Information

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916-651-1461





2019 Standards

Initial (**DRAFT**) Analysis Results and Opportunities

2019
Standards
Analysis:
First, Some
Important
Terms and
Definitions



Performance and Prescriptive Methods



CEC Compliance Software (CBECC-Res, CBECC-Com)



Time Dependent Valuation (TDV)



Climate Zones

CZ 6 – Long Beach, Torrance, Santa Barbara...
CZ 8 – Lakewood, Anaheim, Irvine...
CZ 9 – Glendale, Pasadena, Diamond Bar...



High-rise residential (Part 6): Four or more habitable stories



Avoiding Preemption: High Efficiency Appliances and Equipment

- ▶ State and local governments may not “preempt” federal appliance standards (includes HVAC and water heaters)
- ▶ State and local building codes must meet seven conditions to avoid preemption (US Code 42, Section 6297)
- ▶ If the code includes one or more options to meet the objective:
 - ▶ for every option which includes a high-efficiency appliance or equipment, at least one option shall include the same equipment which is $\leq 5\%$ more efficient than the minimum,
 - ▶ At least one option which meets but does not exceed the minimum requirement.



DRAFT Analysis: 2019 Cost-effectiveness Studies

- ▶ Identify cost-effective, non-preempted measure packages
- ▶ New construction only (additions and alterations later)
- ▶ Mixed-fuel and all-electric designs and baselines

- ▶ Low-rise residential (single family and low-rise multifamily)
 - ▶ CALGreen Tier 1
- ▶ Nonresidential (office, high-rise residential)
 - ▶ PV only

Low-rise Residential New Construction: Climate Zone 6 **DRAFT** Results

Energy Efficiency (EE) Package 1

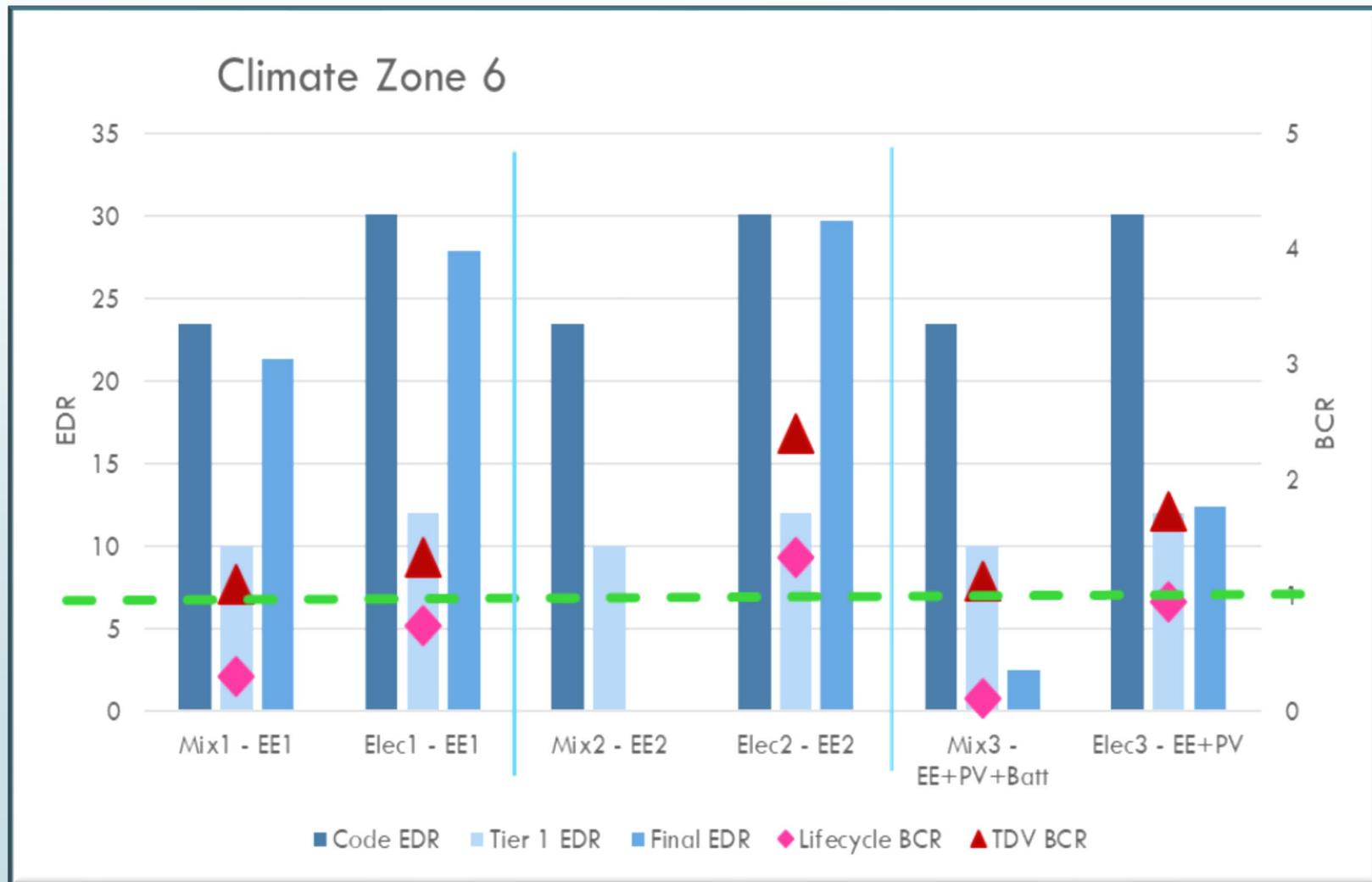
- Mix1 - EE: PV size \leq annual usage (2.5 kW)
- Elec1 - EE: PV size $<$ Standard Design (2.5 kW)

Energy Efficiency (EE) Package 2

- Mix2 - EE: No pkg at this time
- Elec2 - EE: PV size $<$ Standard Design (2.5 kW)

EE + PV / EE + PV + Battery

- Mix3 - EE+PV+Batt:
PV size = 1.2x annual usage (3.2 kW);
7.5 kWh battery
- Elec3 - EE+PV:
PV size = annual usage (4.2 kW)



EDR: Energy Design Rating

BCR: Benefit-to-Cost Ratio

Low-rise Residential New Construction: Climate Zone 8 **DRAFT** Results

Energy Efficiency (EE) Package 1

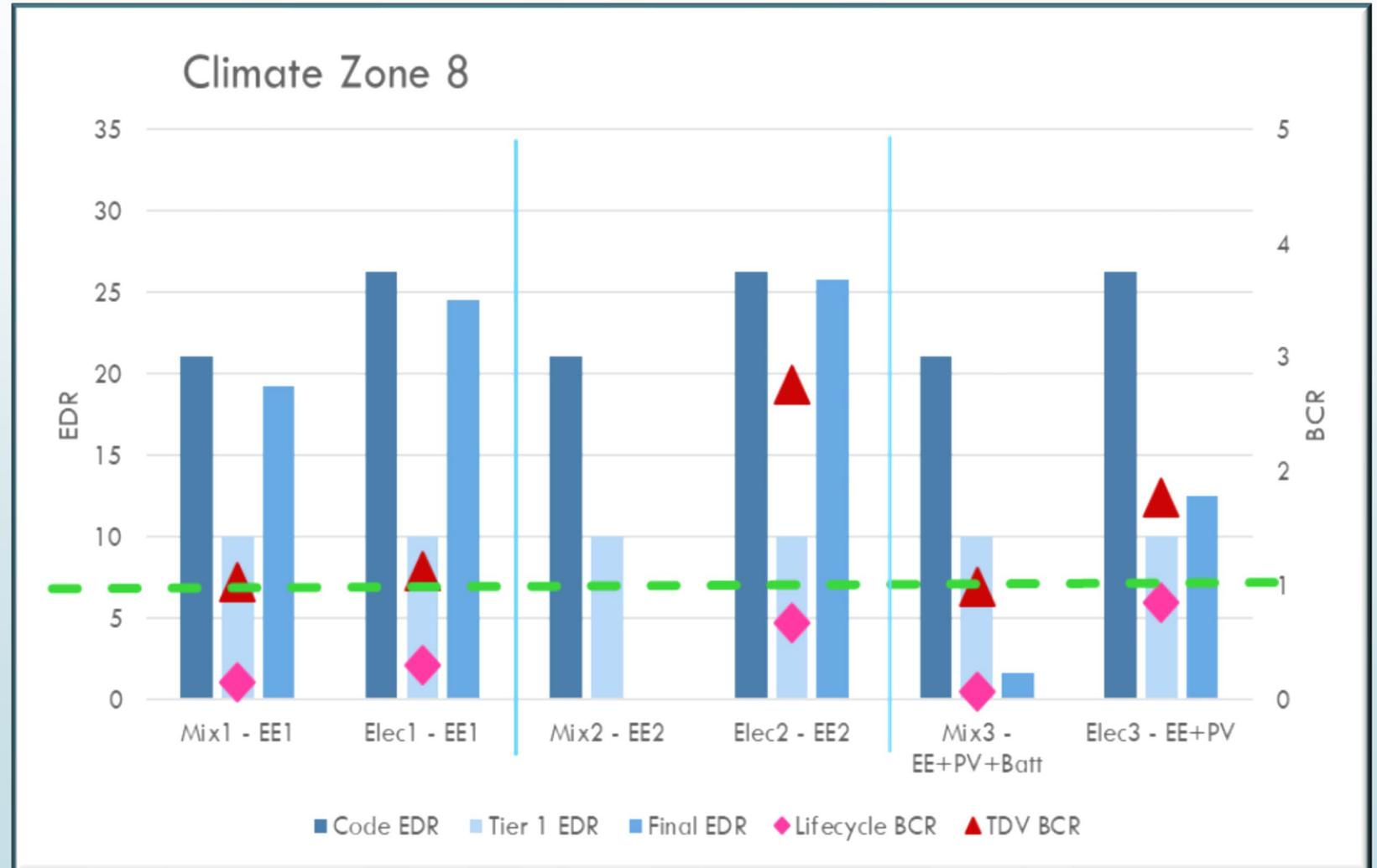
- Mix1 - EE: PV size \leq annual usage (2.6 kW)
- Elec1 - EE: PV size $<$ Standard Design (2.6 kW)

Energy Efficiency (EE) Package 2

- Mix2 - EE: No pkg at this time
- Elec2 - EE: PV size $<$ Standard Design (2.6 kW)

EE + PV / EE + PV + Battery

- Mix3 - EE+PV+Batt:
PV size = 1.2x annual usage (3.3 kW);
7.5 kWh battery
- Elec3 - EE+PV:
PV size = annual usage (4.0 kW)



EDR: Energy Design Rating

BCR: Benefit-to-Cost Ratio

Low-rise Residential New Construction: Climate Zone 9 **DRAFT** Results

Energy Efficiency (EE) Package 1

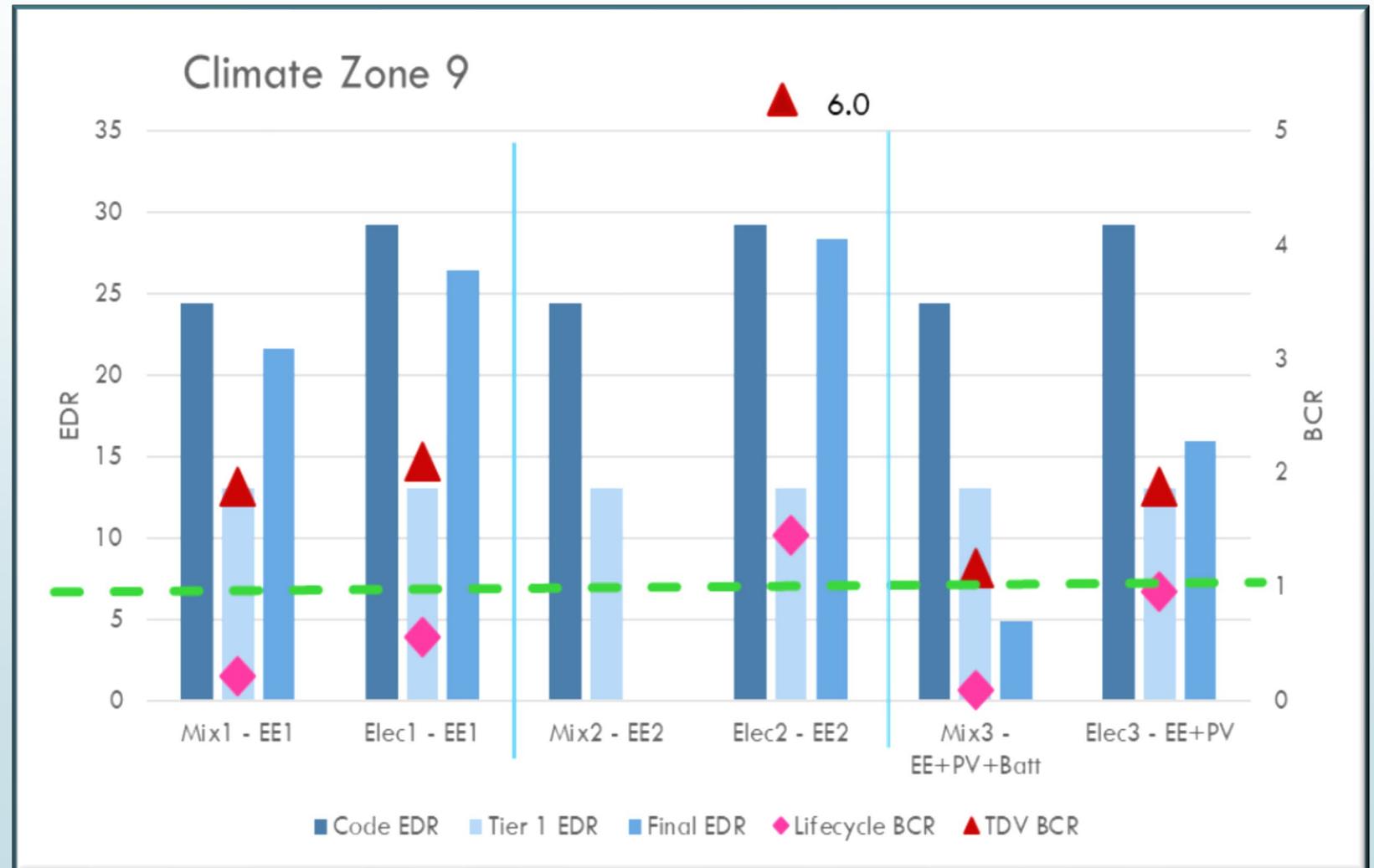
- Mix1 - EE: PV size \leq annual usage (2.7 kW)
- Elec1 - EE: PV size < Standard Design (2.7 kW)

Energy Efficiency (EE) Package 2

- Mix2 - EE: No pkg at this time
- Elec2 - EE: PV size < Standard Design (2.7 kW)

EE + PV / EE + PV + Battery

- Mix3 - EE+PV+Batt:
PV size = 1.2x annual usage (3.3 kW);
7.5 kWh battery
- Elec3 - EE+PV:
PV size = annual usage (4.1 kW)



EDR: Energy Design Rating

BCR: Benefit-to-Cost Ratio



Low-Rise Residential: Additional Measures and Options Requested To-Date

Measures that require cost-effectiveness analysis

- ▶ CALGreen Tiers 1 and 2
- ▶ Storage
 - ▶ Including EV load
- ▶ Multifamily

Measures that do not require cost-effectiveness analysis

- ▶ Electric-ready measures: CBSC
 - ▶ Electrical Panel, Clothes Drying, Cooking
- ▶ EV-Ready (SF, MF)



Nonresidential and High-Rise Residential New Construction

- ▶ Compliance Plus PV scenarios only now
- ▶ PV System Sizing:
 - ▶ 80% of estimated load
 - ▶ 15W/sqft of solar zone (\geq 15% of roof area)
- ▶ Nonresidential Next Steps:
 - ▶ Analyze CALGreen Tiers
- ▶ High-Rise Residential
 - ▶ Continue work with CEC to develop new, more representative prototypes

Nonresidential and High-Rise Multi-Family: Climate Zone 6 **DRAFT** Results

Bldg. Type	PV Sizing Method	PV Size (kW)	Lifecycle Costs (\$)	Lifecycle Bill Savings (\$)	Bill Net Savings (\$)	Discounted Payback (years)	Approx. Area Required (sf)
Medium Office	80% Elec. Load	230	552,000	1,072,842	520,842	16	15,300
	15W/sf solar zone	40	96,480	340,723	244,243	7	2,700
High-Rise Multi-Family	80% Elec. Load	227	559,455	2,184,715	1,625,260	9	14,500
	15W/sf solar zone	19	47,424	293,498	246,074	5	1,300



Nonresidential Occupancies: Additional Measures and Options Requested To-Date

- ▶ CALGreen Tiers 1 and 2
- ▶ Efficiency plus PV packages
- ▶ Mid- and high-rise residential
- ▶ PV on Parking Garages
- ▶ Electric-Ready Construction (no c/e study required)
 - ▶ 240V for space heater, clothes dryer, cooktop, panel upgrade
 - ▶ Increased EV requirements in Parking Garages
 - ▶ EV-capable and EV-ready



Energy Plus Water Nexus

Some potential measures include:

- ▶ Preplumb for graywater
 - ▶ New construction and retrofits that affect relevant plumbing
- ▶ Drain water heat recovery
- ▶ Alternate / Dual plumbing for indoor use
- ▶ On-demand recirculation pump, thermostatic shutoff valve
- ▶ Controls for multifamily central water heating system retrofits
- ▶ Recycled water in nonresidential, common areas of multifamily or landscaping controlled by a Homeowner Association (HOA)
 - ▶ If available, or if planned within 5-10 years.

Summary of Initial **DRAFT** Analyses

Residential New Construction

- All CZ: Can likely achieve 5-10% reduction in EDR with efficiency-only package
- Generally cost-effective using TDV, not always from consumer perspective
- Tier 1 or near-Tier 1 may require additional efficiency and will require:
 - PV to offset load in All-Electric design
 - PV to offset load plus Battery in Mixed-Fuel Design

Nonresidential New Construction

- PV appears cost-effective across range of occupancies, building and system sizes
- Tier 1 analysis next

Energy Plus Water

- No cost-effectiveness study required for most measures.
- Supporting analysis available



Break



How do the analyses translate to a reach code?

- ▶ Study does not establish ordinance requirements
 - ▶ Analysis measure packages establish performance requirements
 - ▶ Measures used in analysis are representative only. “It can be done.”
- ▶ Performance levels in study can adopt less stringent than report

- ▶ Energy Efficiency only
 - ▶ Can achieve approximately 5-10% reduction in EDR score
- ▶ Efficiency Plus Renewables Plus Storage
 - ▶ Can achieve Tier 1 or near-Tier 1

Reach Code Adoption Process

**Acquire
Cost-
Effectiveness
Study**

**Conduct
Outreach
and Refine
Scope**

**Prepare
Staff Report
and
Supporting
Documents**

**Introduce
Ordinance:
First
Reading**

**Adopt
Ordinance:
Second
Reading**

**Obtain
CEC
Approval**

**File with
CBSC and
Prepare to
Implement**



Reach Code Process: Hearing from the Experts (you!)

- ▶ What has worked well?
- ▶ What has not worked well?
- ▶ What do you wish you had known?

2019 Potential Reach Codes Opportunities

Scope / Measure		C/E Study Required?	Timing of Reach Code			Project Types				
			At Construction / Entitlement		Other Trigger (Time of Sale, Date-Certain...)	Single Family	Multifamily			Non-Residential
			New	Addition / Remodel / Renovation	Existing Building		Low-Rise (<3)	Mid-Rise	High-Rise (4+)	
Efficiency and/or Renewables	Whole Building (mixed-fuel and all-electric)	Yes	X		X	X	X	X	X	
	Solar PV	Yes	X	X	X			X	X	X
	Single Measures	Yes	X	X	X	X	X	X	X	X
	Rental Property	Yes		X	X		X	X	X	
Energy Plus Water Efficiency	Hot Water Distribution	Yes	X	X		X	X	X	X	Some
	Indoor Water	No	X	X	X	X	X	X	X	X
	Outdoor Water	No	X	X	X	X	X	X	X	X
Process Loads (Equipment)	Commercial Kitchens	Maybe	X	X						X
	Elevators	Maybe	X	X				X	X	X
	Escalators	Maybe	X	X						X
Electric-Ready	240 V Pre-wiring	No	X	X		X	X	X	X	
	Panel Upgrade	No	X	X		X	X	X	X	X
	EV Readiness	No	X	X		X	X	X	X	X
	EV Charging	No	X	X		X	X	X	X	X
Information Disclosure	Audits	No		X	X	X	X	X	X	X
	Benchmarking	No		X	X		X	X	X	X

NOTE: Items shown in bold indicate types of reach codes that one or more jurisdictions adopted during the 2016 Code Cycle.

2019 Reach Code Opportunities:

Efficiency and/or Renewables

Whole Building (Performance Basis)

- Energy efficiency only or efficiency plus renewables
- Well suited to New Construction
- Establish performance criteria; allow flexibility

Solar PV Systems

- High-rise residential and nonresidential occupancies

Single Measures

- Wide applicability
- New, additions, major remodels

Rental Property

- Mostly multifamily



CA Local Governments' Request for 2019 Reach Code Cost- Effectiveness Study

California Local Governments' Request for T24 2019 Reach Code Cost-Effectiveness Study

For a representative sample of building scales and occupancies under T24 2019 in all CEC climate zones statewide, what is the:

- Maximum cost-effective efficiency for mixed-fuel new construction,
- Maximum cost-effective efficiency for all-electric new construction, and
- Cost-effectiveness of code-minimum all-electric new construction.

Details: http://bit.ly/T242019_reach_request_Sept28

Survey: http://bit.ly/T24_survey

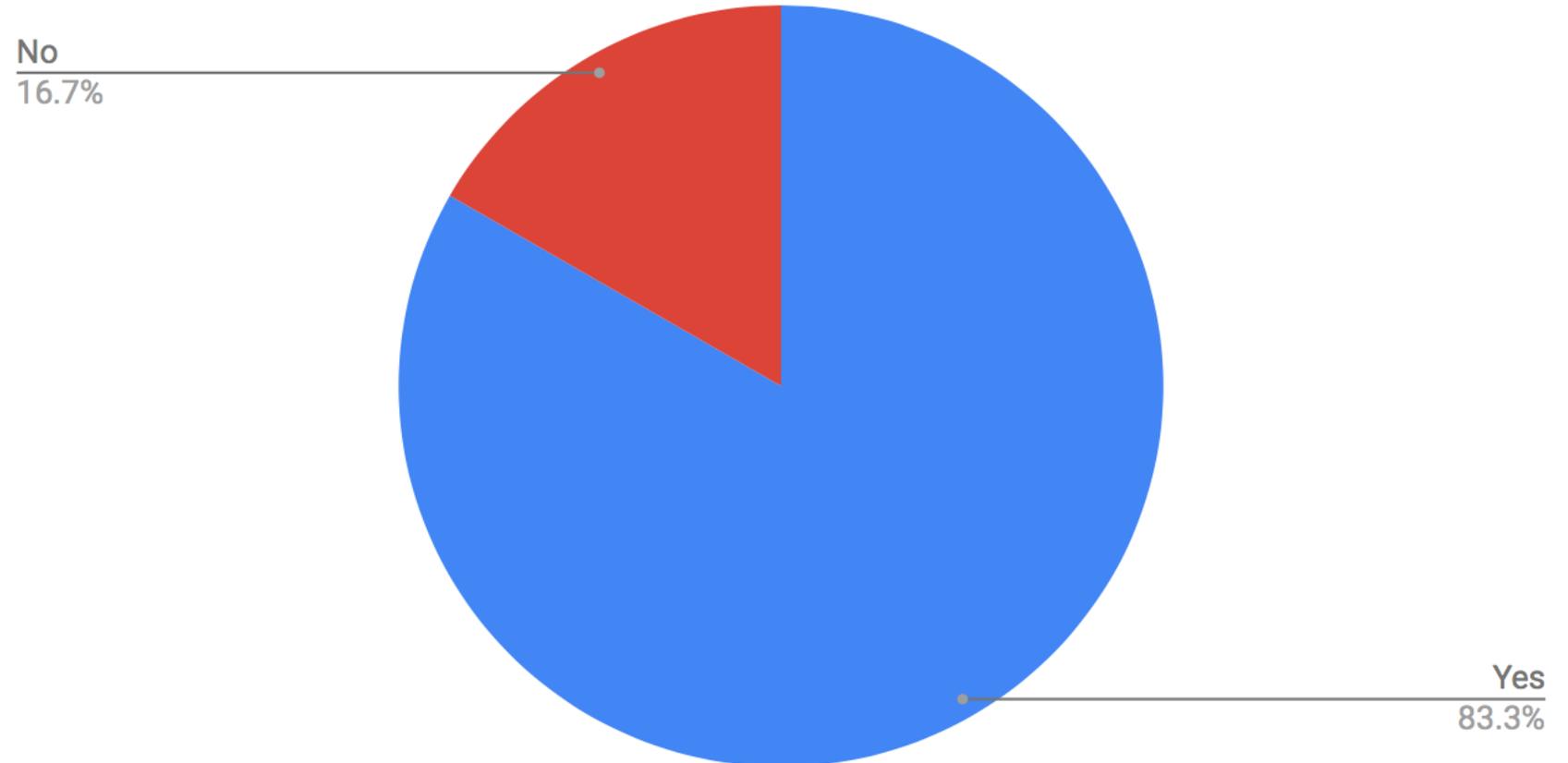
Bells and Whistles Requested

- PV
- Range of building scales & uses
 - Use existing prototypes
 - Develop prototype for hi-rise multifamily if possible within timeline
- Metrics:
 - TDV
 - EDR for low-rise res
 - Customer cost
 - GHG

Results as of October 9

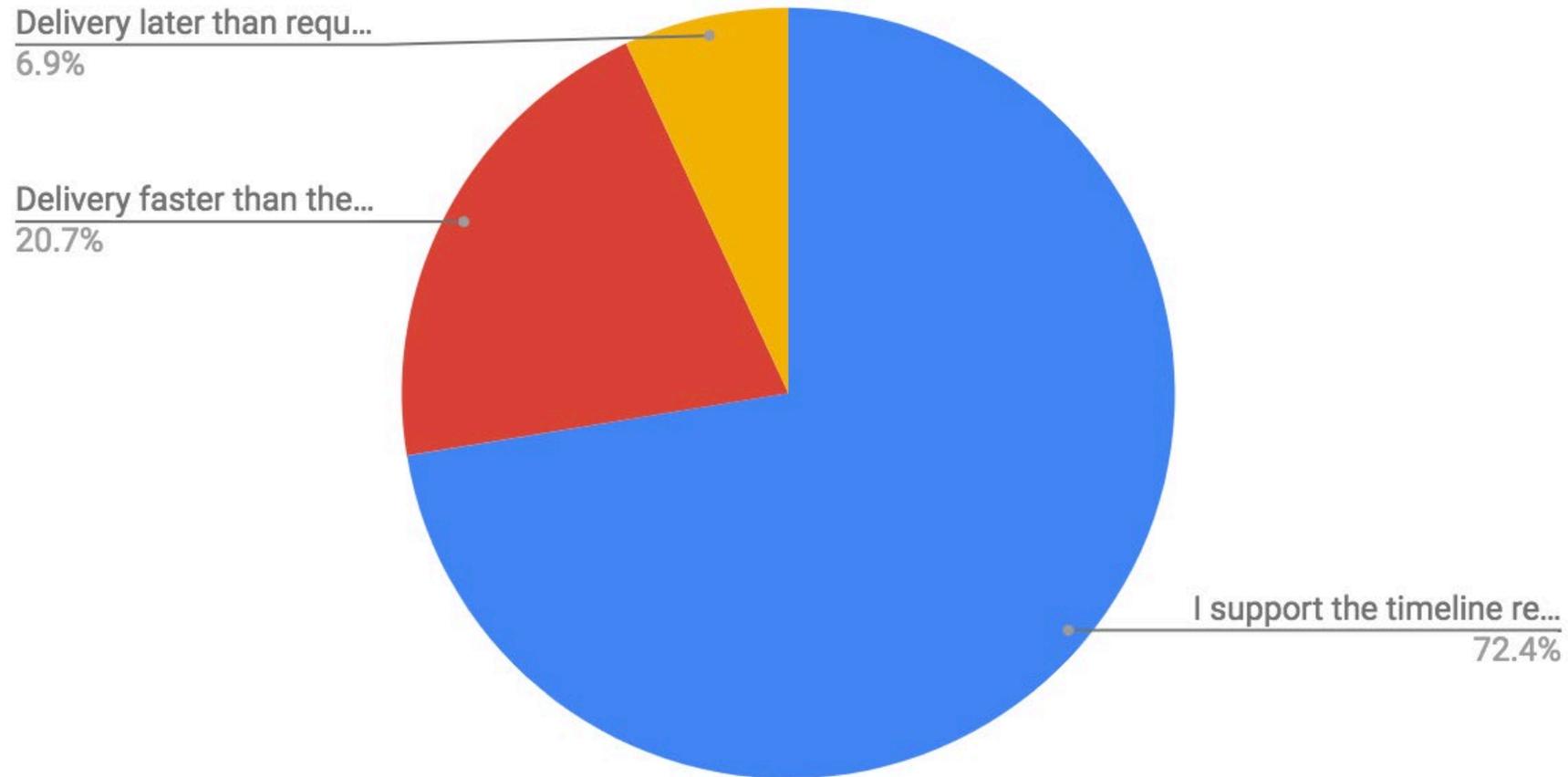
- 30 unique responses

My local government is researching options for a 2019 Reach Code



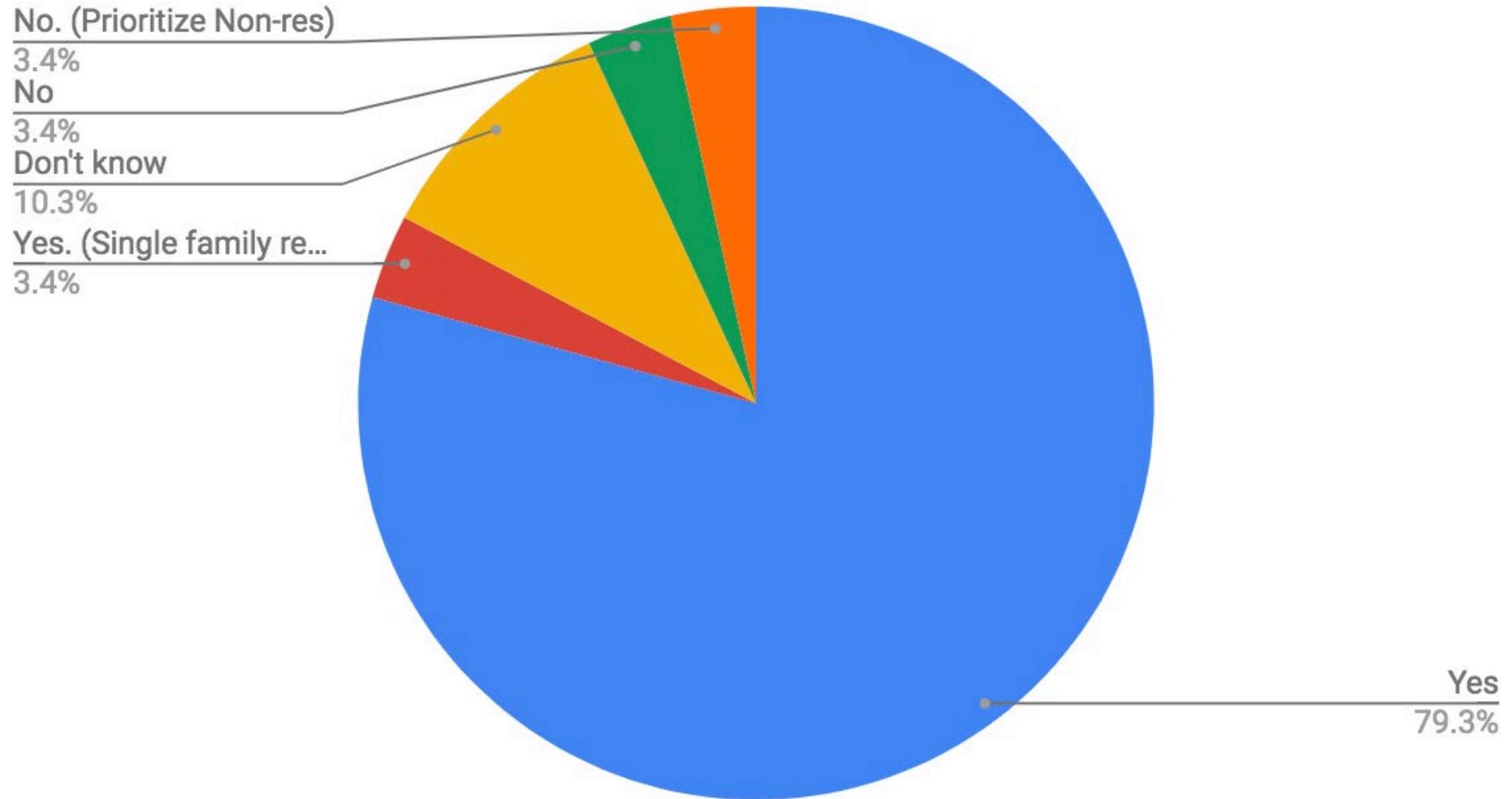
Results as of October 9

Is the Timeline Appropriate?
(Public draft Jan 31, 2019; Final ~June 30, 2019)



Results as of October 9

Scope Appropriate?





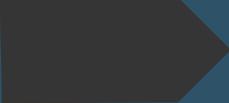
Reach Code Options: Interests and Priorities

- ▶ What is your jurisdiction interested in exploring?
- ▶ What are your jurisdiction's priorities?



Three Ways to Start Reach Code Work

- ▶ Begin Internal Research
 - ▶ Existing policy documents
 - ▶ Construction Types and Volumes
- ▶ Develop Initial Ordinance Scope
- ▶ Begin Informal Outreach
 - ▶ Within Jurisdiction
 - ▶ Within Community
 - ▶ Neighboring Jurisdictions



Wrapping Up

Takeaways

- Start now to have a reach code in effect January 1, 2020
- Options to consider

Next Steps

- Provide all information from today to you electronically
- Complete cost-effectiveness studies
- Best Practices Guide: Early 2019
- Re-Convene First Quarter, 2019



Thank you!

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	EV Charging	No	X	X		X	X	X	X	X
Information Disclosure	Audits	No		X	X	X	X	X	X	X
	Benchmarking	No		X	X		X	X	X	X

NOTE: Items shown in bold indicate types of reach codes that one or more jurisdictions adopted during the 2016 Code Cycle.

Local Reach Code Process

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Ordinance:
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**Adopt
Ordinance:
Second
Reading**

**Obtain
CEC
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**File with
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Sample Timeline for January 1, 2020 Effective Date

Task	2018				2019												2020
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Develop idea for draft ordinance	█	█															
Compliance software completed	█	█	█	█													
Develop cost-effectiveness study			█	█	█	█											
Work with stakeholders			█	█	█	█	█	█	█	█	█	█	█	█			
Develop & draft ordinance						█	█	█	█	█	█	█					
Review by local committees									█	█	█	█					
Public process & revisions									█	█	█	█	█				
First reading of ordinance (introduction)												█	█				
Second reading of ordinance (adoption)													█	█			
Application to CEC (submit by 9/30)																	★
CEC public comment period															█	█	
Approval from CEC (December meeting)																	█
File with BSC																	█
Reach code takes effect (1/1/20)																	★



California Local Governments' Request for T24 2019 Reach Code Cost-Effectiveness Study

Overall Request:

For a representative sample of building scales and occupancies under T24 2019 in all CEC climate zones statewide, what is the:

- Maximum cost-effective efficiency for mixed-fuel new construction,
- Maximum cost-effective efficiency for all-electric new construction, and
- Cost-effectiveness of code-minimum all-electric new construction.

We respectfully request that mixed-fuel and all-electric are addressed in the same study – for consistency, and because all of the above are key to most or all jurisdictions' reach code considerations.

Requested details:

- Include onsite PV for all scenarios, except if found problematic for encouraging efficiency, or not cost-effective.
- From Title 24 Prototype models, analyze a representative sample of building sizes and uses:
 - *Include:*
 - Single family 2-story (2,700 sq ft prototype)
 - Low-rise multifamily (8-unit; 2-story; 6,960 ft² building with individual water heaters)
 - Retail – Medium
 - Office – Large [Medium would be acceptable if necessary]
 - Hotel – Small
 - *Desired – if possible within timeline:*
 - Utilize existing prototypes to improve thoroughness of analysis:
 - Single family 1-story (2,100 sq ft prototype)
 - Office – Lab
 - Restaurant – Small
 - Requires development of a new “prototype”:
 - High-rise multifamily
- Efficiency ECM selection is left to the analyst. However, for all-electric scenarios, consistency is encouraged with electric efficiency measures studied by TRC in [City of Palo Alto 2019 Title 24 Energy Reach Code Cost Effectiveness Analysis](#) (Sept 13, 2018 Draft).
- For all-electric new construction, document cost savings from omitted gas piping and meter. Be explicit whether gas Service Infrastructure (utility infrastructure specific to the customer such as meter and piping from main to meter) is included or omitted.
- Key metrics:
 - Cost Effectiveness: Customer cost (“On-bill”) and TDV
 - Expected operational carbon emissions
- Include all climate zones, and rates for all investor owned utilities. Include any POU upon request.

Requested Project Timeline

The following schedule is requested in order to provide reasonable possibility for local governments to adopt T24 2019 Reach Codes effective the same day as the 2019 Energy Standards in January 2020. Setting a consistent reach code for an entire code cycle reduces marketplace confusion and simplifies administration; this is important to local governments.

Phase 1: Develop “Public Discussion Draft to inform draft reach codes”*

- Working draft submitted to Statewide Codes and Standards staff no later than January 31, 2019. C&S staff may share a draft with BayREN staff for comment, or similar partners by region.
- Distribute public discussion draft to requesting cities no later than February 28, 2019. Cities may refer to this draft in discussion with stakeholders to inform draft reach codes, but expect the document to be labeled “Draft” and have appropriate caveats relating to timing of finalization of 2019 ACMs and Compliance Software.

Phase 2: Update and finalize analysis*

- Final draft no later than June 30, 2019 or 60 days after CEC distribution of 15-day version of 2019 ACMs and Compliance Software, whichever is later.*

* While it is necessary to complete a cost-effectiveness study on the timeline above in order to enable reach code enforceability to coincide with T24 2019’s effective date (application for permit on January 2, 2020), it is *not necessary* for a cost effectiveness study to rely on final commission-approved software. We expect that “Phase 1” above would be completed with Research Versions of compliance software, supplemented by spreadsheets as required to compensate for the limitations of Research Versions, similar [City of Palo Alto 2019 Title 24 Energy Reach Code Cost Effectiveness Analysis](#). For example, T24 Reach codes adopted by Palo Alto and San Francisco (under T24 2008/2011, T24 2013, and T24 2016) utilized “research versions”, spreadsheet analysis, and software customized for: [The Technical Feasibility of Zero Net Energy Buildings In California](#).

Significant Considerations

There is tension between the comprehensiveness of the Overall Request and the Requested Timeline. If it is necessary to choose, the timeline is the more critical priority to several of the requesting local governments – particularly the local governments that have demonstrated success in proposing, adopting, and administering reach codes. Therefore, we provide the following suggestions for approaches to simplify analysis within the Requested Timeline:

Options to Simplify a Timely T24 2019 Cost-Effectiveness Analysis

The analysis requested above would be very useful to inform public debate and policy adoption. However, we acknowledge some tradeoffs may be necessary. Here are suggestions (in rough order of preference):

- *Separate non-residential from low-rise residential. Prioritize non-residential cost-effectiveness analysis over low-rise residential.* T24 2019 low-rise residential requirements are similar to most T24 2016 reach code requirements in terms of both PV and efficiency, and T24 2019 provides an all-electric prescriptive compliance path for new low-rise residential. There is remaining relatively low-hanging efficiency and PV opportunities in non-residential, and more than 50% of California new housing units are multifamily.
- *Omit “Nice to have” building prototypes.*

Contextual Considerations

Below is a sample of the additional considerations beyond the scope of the request above that were raised by staff of some jurisdictions. The following are excluded from the reach code cost-effectiveness study request above, but some may be considered during reach code drafting, or may result in separate requests for additional study and technical support.

Concept	Concept is in Parking Lot Because
<i>Maximize PV</i> Expand PV capacity to better support ZNE (Building Integrated PV, carport, etc)	Omitted for simplicity, in the interest of supporting delivery on the timeline above. Form likely to vary by jurisdiction. BIPV options likely to vary by situation.
<i>Electrification Readiness:</i> Ensure mixed fuel buildings are electrification-ready. Ensure all buildings are EV-ready (beyond CalGreen 2019 minimum)	Omitted for simplicity, in the interest of supporting delivery on the timeline above Jurisdictions are not required to seek CEC approval for local amendments to electrical code that do not directly affect energy use.
<i>Battery Storage</i> Include battery storage, including high-rise multifamily and non-residential.	Omitted for simplicity, in the interest of supporting delivery on the timeline above. Development of consensus base design or rules will require time.
<i>Zero Code</i> Utilize either “Zero Code for California” or the Time Dependent Source Carbon metric in Zero Code for California Technical Support Document as means of aligning efficiency and carbon reduction.	Omitted for simplicity. Cities are not yet aligned on opinion of Zero Code for CA, or likely amendments/revisions necessary for adoption. The concept will require time.
<i>All-Electric Only</i> Limit study to all-electric for all building uses.	Contributing jurisdictions requested comprehensive approach that does not narrow options for local government reach codes.
<i>Existing Buildings</i> Reach code improving efficiency, electrification-readiness, or electrification in existing buildings.	Omitted for simplicity. Cost-effective codes for existing buildings could be supported by a separate study, with more lead time.