

Reach Codes 101

- What are they?
- Why should we implement them?
- What's the process?
- Who else has done it in our region?

What are Reach Codes?



Local ordinances adopted by the local government that exceed and enhance the state's green building standards.

Important Facts:

- Can be adopted at any time
- Improves economic and energy performance of buildings
- Reduces Greenhouse Gas (GHG) emissions, pollutants, and improves indoor air quality
- Helps to reduce energy use and improve grid resiliency
- Allows local governments to be leaders in climate solutions
- Helps to fulfill local Climate Action Plan, Energy Plan, or other policy goals

Building Electrification (New Construction & Existing Buildings)

- **Goal:** To reduce the use of methane gas, ensure buildings are operating efficiently, and to prepare the market for statewide electrification goals

There are two main pathways when amending the energy code:

- **Prescriptive Codes:** Require one or more specific energy efficiency or renewable energy measures
- **Performance Codes:** Require buildings to meet an energy budget/performance score through a custom design, allowing applicants flexibility

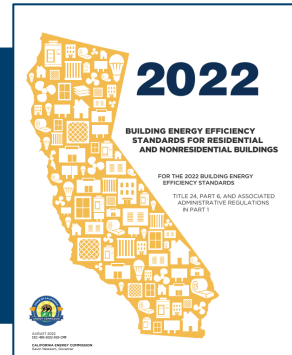
Electric Vehicle Infrastructure (EVI)

- **Goal:** To improve market readiness and increase equitable access to clean transportation EV charging stations



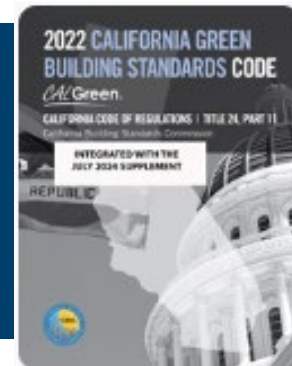
Building Electrification (New Construction & Existing Buildings)

Recent Context: Due to the [latest decision for the CRA v Berkeley Ruling](#), some jurisdictions are re-assessing their approach to building electrification reach codes to mitigate the risk of litigation.



Electric Vehicle Infrastructure (EVI)

Recent Context: The CALGreen EV code goes through triennial updates (2022, 2025, etc.) and intervening updates at the mid point between triennial updates. Currently, the CALGreen EV code has intervening updates to the 2022 code that will be in effect on July 1, 2024. Jurisdictions may want to update their reach code according to the new baselines.



What are the Main Benefits?



Reduce Greenhouse Gas Emission in line with state/agency goals and Climate Action Plans.



Provide Financial Benefits related to lower-cost electric construction.



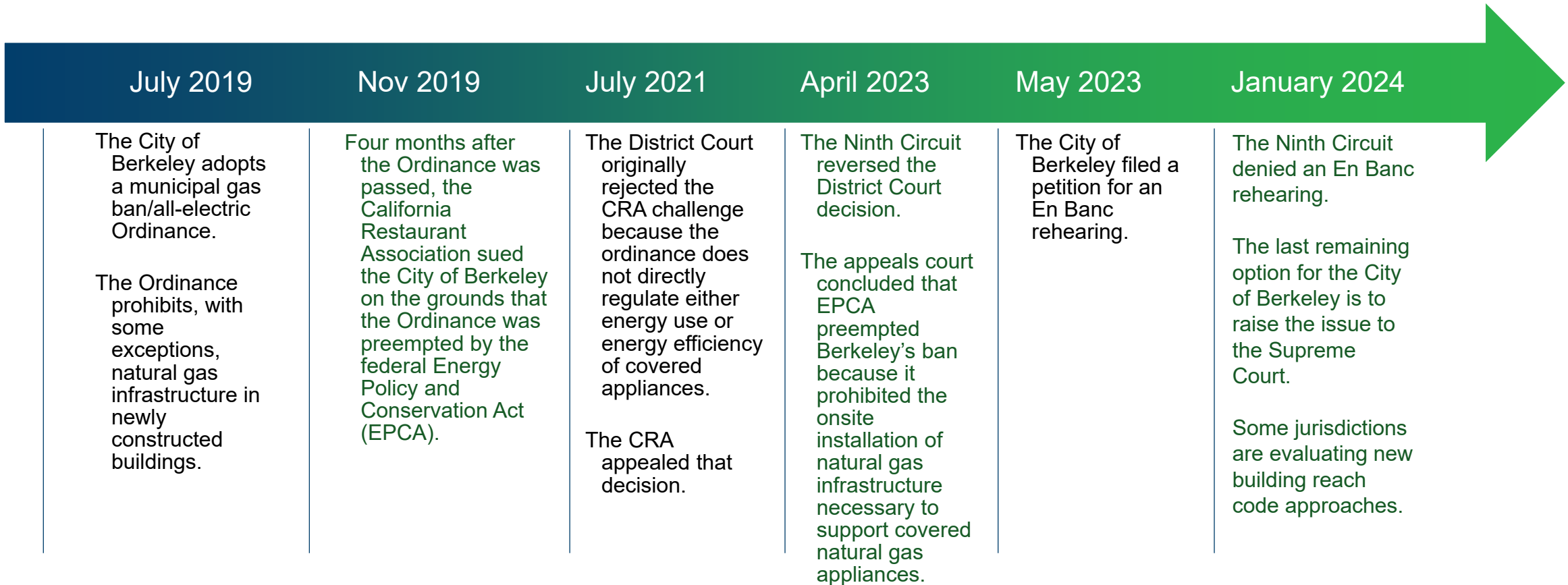
Support Public Health by improving indoor air quality and decreasing air pollution emissions.



Mitigate Legal Risk by providing compliance pathways for all-electric and mixed-fuel buildings.

Reach Code Litigation

California Restaurant Association v. City of Berkeley



Next Steps: For jurisdictions looking for an alternative reach code that could mitigate legal risk, there are several approaches available.

The Bay Area and California's Upcoming Electrification Changes



2026

CA State Energy Code Update

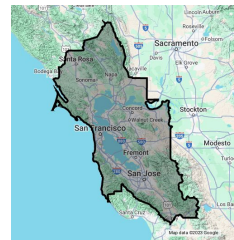
Replacements of air conditioning systems in existing buildings will be heat pumps



2027

BAAQMD Low NOx water heater requirements

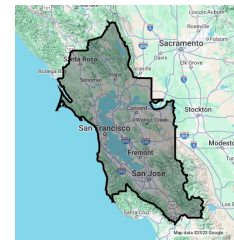
Tank-type gas water heaters no longer sold in Bay Area



2029

BAAQMD Low NOx space heater requirements

Gas furnaces no longer sold in Bay Area



2045

California Achieves Carbon Neutrality

Statewide gas piping projected decommissioning date



Why We Need Reach Codes



Continuous Signal to the Market

- Avoid a progress gap for new construction from 2024-2026
- Send clear, continuous message to market
- Avoid stranded asset cost of continued gas investment

Local Control

- Enables innovative approaches for cost-effective decarbonization policy
- Ability to design customized exemptions
- Jurisdictions with more progressive climate targets can pass more progressive reach codes

State and BAAQMD Codes are Limited

- Lacks specific existing building measures
- Cannot regulate remodels or other types of triggers for cost-effective building electrification
- Ignores many methane appliances

Local Reach Codes Influence the State

- Statewide electrification codes incorporate elements from local reach codes
- Statewide EV charging codes have been inspired by San Mateo's EV Reach Codes
- Smoother implementation of BAAQMD ruling if similar requirements are adopted before 2027



Allows More Action, Sooner

- Greenhouse gas emissions are cumulative, so earlier actions have exponential savings
- Existing building policy is needed immediately to meet 2030, 2035, and 2040 climate goals

Reach Code Options





- What choices are there for new construction?
- What choices are there for existing construction?
- What are the pros and cons?

New Construction Policy Comparison

Approach	Description	Advantages	Challenges	Who's done it?
Air Quality 	Regulates building or appliance emissions through CALGreen, Part 11.	<ul style="list-style-type: none"> • Uses Clean Air Act authority rather than Energy Policy and Conservation Act • Regulates all emitting equipment (cooking, fireplaces, dryers, etc.) • Likely to result in all-electric construction, which includes construction cost savings • Direct benefit to air quality / health • High impact on emissions reduction 	<ul style="list-style-type: none"> • Legally untested • Potentially new enforcement approach 	Los Altos Hills New York City
Energy Performance 	Requires a higher <i>Source Energy</i> compliance margin than what the state requires through the performance path of the Energy Code, Part 6.	<ul style="list-style-type: none"> • Mitigates legal risk by allowing methane gas pathways • Can provide an all-electric cost-effective pathway • Enforcement process is already in place, the compliance margin is increased 	<ul style="list-style-type: none"> • Limited to regulating space heating/cooling and water heating • Likely lower carbon savings compared to all-electric only pathways 	Santa Cruz San Jose San Luis Obispo

Existing Building Decarbonization Policy Comparison



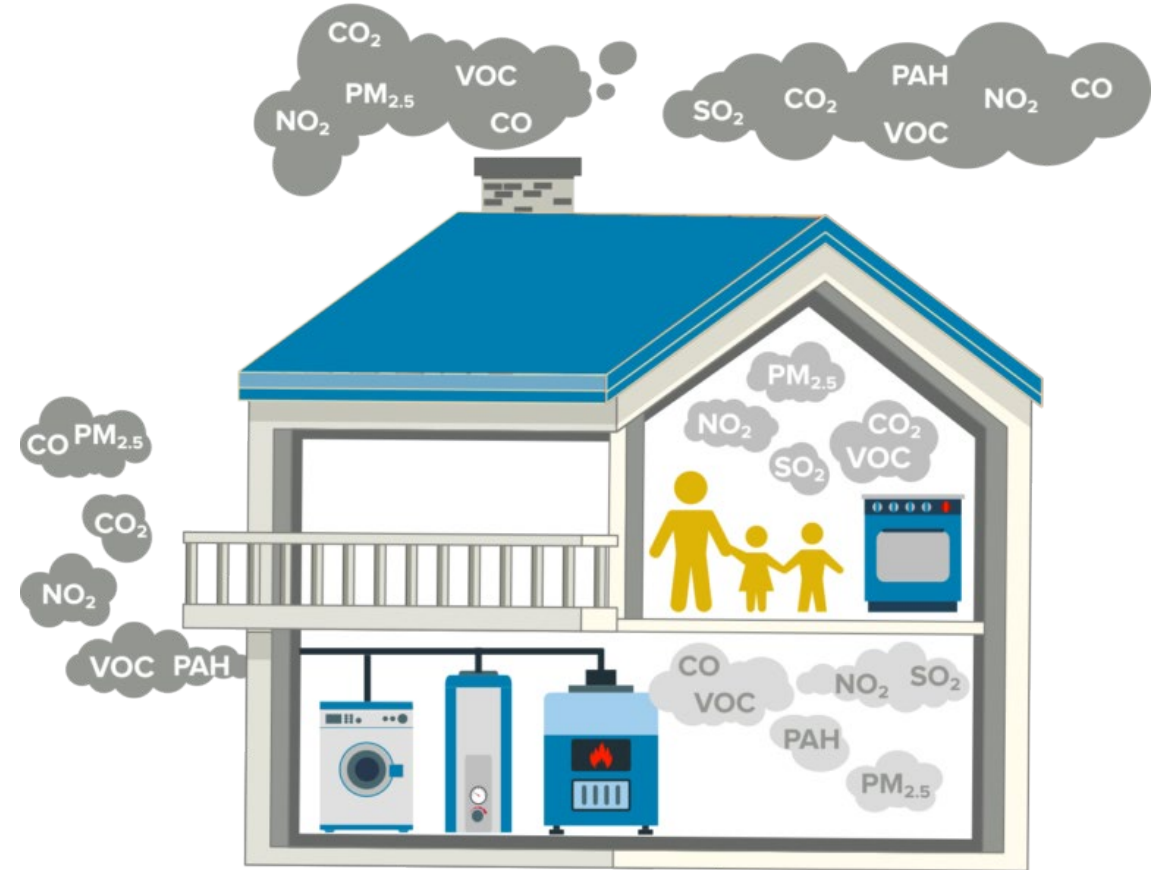
	Description	Advantages	Challenges	Who's done it?
Time of Replacement 	Require that property owners at the time of equipment replacement (upgrades or burnouts) abide by zero-NOx requirements and/or electric readiness requirements.	<ul style="list-style-type: none"> • Simple policy • Replacements occur more frequently than major renovations 	<ul style="list-style-type: none"> • Emergency replacements • May result in some bypassing the permit process 	San Mateo, Portola Valley, Marin County, Palo Alto
Time of Renovation 	Require applicants that are already pulling a permit for a renovation project to abide by certain energy efficiency measures and/or electric readiness requirements.	<ul style="list-style-type: none"> • Customizable triggers • Unlikely to impact small or low-cost renovation projects • Unlikely to bypass the permit process 	<ul style="list-style-type: none"> • More complex policy • Clarity of permit data • Low permit/renovation rates can increase time to make impact 	San Mateo, Portola Valley, Piedmont, Marin County
BPS 	Require property owners to regularly report energy- or emissions- use intensity (EUI). In addition, the policies require incremental reductions in EUI over a set time horizon.	<ul style="list-style-type: none"> • Monitor building stock • Customizable triggers • Regular enforcement cycles 	<ul style="list-style-type: none"> • Large administrative burden (cost/time) 	Cities: Denver, Reno, Chula Vista, St. Louis, etc. States: Oregon, Washington, Maryland, Colorado
Time of Property Transfer 	Leverage real estate transactions to disclose relevant information on, incentivize, or require, certain home improvements. <i>We do not recommend policies which inhibit or delay the sale of a property.</i>	<ul style="list-style-type: none"> • Leverages major financial transaction • Allows responsibility to be shared between buyer and seller 	<ul style="list-style-type: none"> • Limited precedence for jurisdictional authority • Jurisdiction regulation of property transfer process • Low transfer rates can increase time to make impact 	Piedmont, Berkeley, Davis

Air Quality Reach Code

- What is it?
- How do we implement Air Quality Codes?
- What are the benefits?

What is an Air Quality Reach Code?

- The Air Quality Approach focuses on regulating **building or appliance emissions** rather than the type of fuel used.
- Specifies the emissions limit of nitrogen oxides (NO_x) or greenhouse gases (GHG).
- Air Quality codes are being pursued by:
 - California Air Resources Board (CARB)
 - Bay Area Air Quality Management District (BAAQMD)
 - South Coast Air Quality Management District (SCAQMD).
- Los Altos Hills and NYC implemented air quality-based policies.



Example Ordinance: Los Altos Hills

ZERO-NOX EMISSION BUILDING. A building with zero NOx emissions that utilizes zero NOx equipment or appliances.

ZERO-NOX EMITTING EQUIPMENT. Any equipment or appliance that emits no more than 0.0 nanograms of nitrogen oxides (expressed as NOx) per joule of heat and/or light output. Equipment and appliance uses include, but are not limited to, space heating, water heating, cooking, clothes drying, and lighting.

(b) Chapter 4, **Residential Mandatory Measures**, is amended by amending the following sections to read:

DIVISION 4.1 PLANNING AND DESIGNSECTION

4.106 SITE DEVELOPMENT

4.106.5.1. New construction. All newly constructed buildings, newly constructed detached accessory dwelling units, and other newly constructed detached habitable structures shall be Zero-NOx Emission Buildings.

Exemptions:

1. Outdoor cooking equipment, outdoor fireplaces, portable space heaters, generators, and pool/spa heaters for residential building projects are exempt from the requirements of 4.106.5.1, or
2. Indoor cooking equipment for residential building projects is exempt from the requirements of 4.106.5.1. The applicant shall comply with Section 4.106.5.3.



Takes effect through amendments to CALGreen Title 24, Part 11.



Building applicants specify equipment that meets emissions criteria.

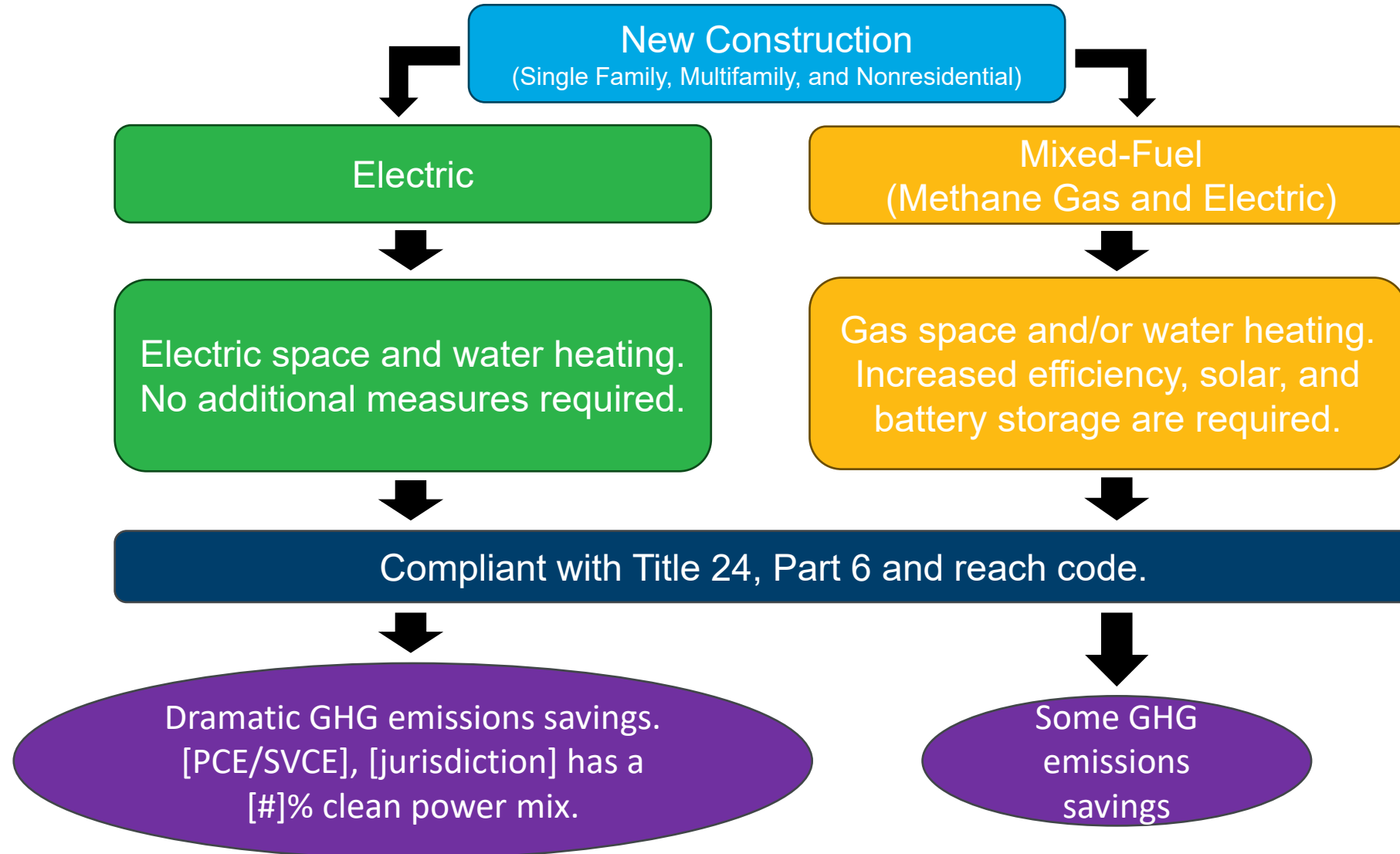


Can select a low or zero emissions compliance margin.

Energy Performance Approach Reach Code

- What is it?
- How do we implement Energy Performance Reach Codes?
- What are the benefits?

What is the Energy Performance Approach?



Which Appliances are Regulated?

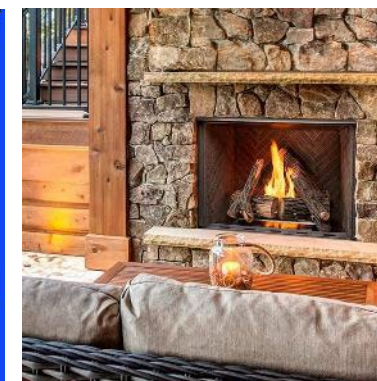
What's included?

- Space heating/cooling
- Water heating



What's not included?

- Stoves
- Laundry
- Pools
- Fireplace/pit



How Does Compliance Work?



A compliance margin of “x” or higher is required for Single Family, Multifamily (low & high rise) and Nonresidential buildings.

Single Family Example:

ENERGY DESIGN RATINGS						
	Energy Design Ratings			Compliance Margins		
	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)
Standard Design	35.6	45.8	31.3			
Proposed Design	26.5	39.6	28.4	x	6.2	2.9
RESULT ³ : PASS						

¹Efficiency EDR includes improvements like a better building envelope and more efficient equipment

²Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries

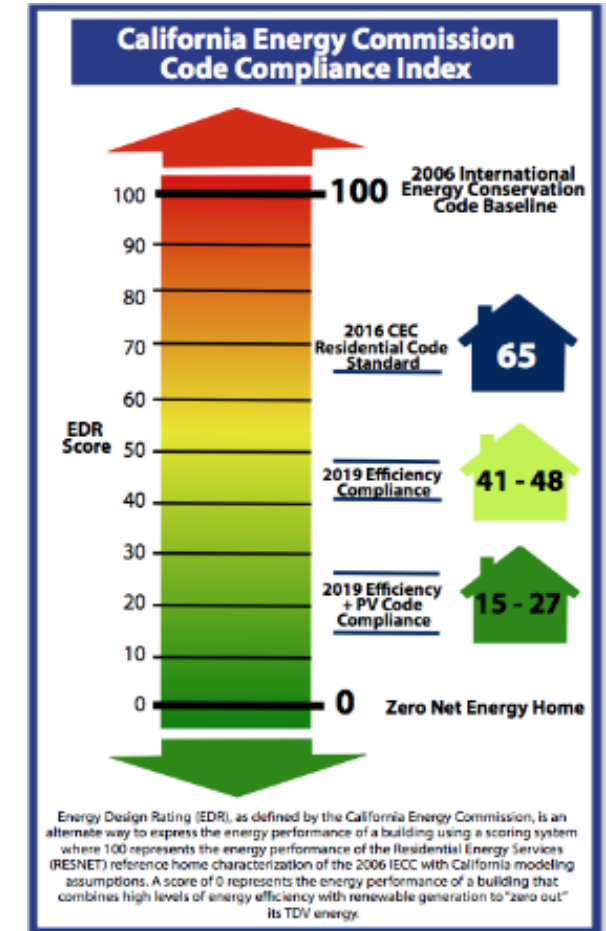
³Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded

- EDR2efficiency & EDR2total must achieve a score of “0” or higher to pass (per 2022 Title 24, Part 6).

What is Source Energy?

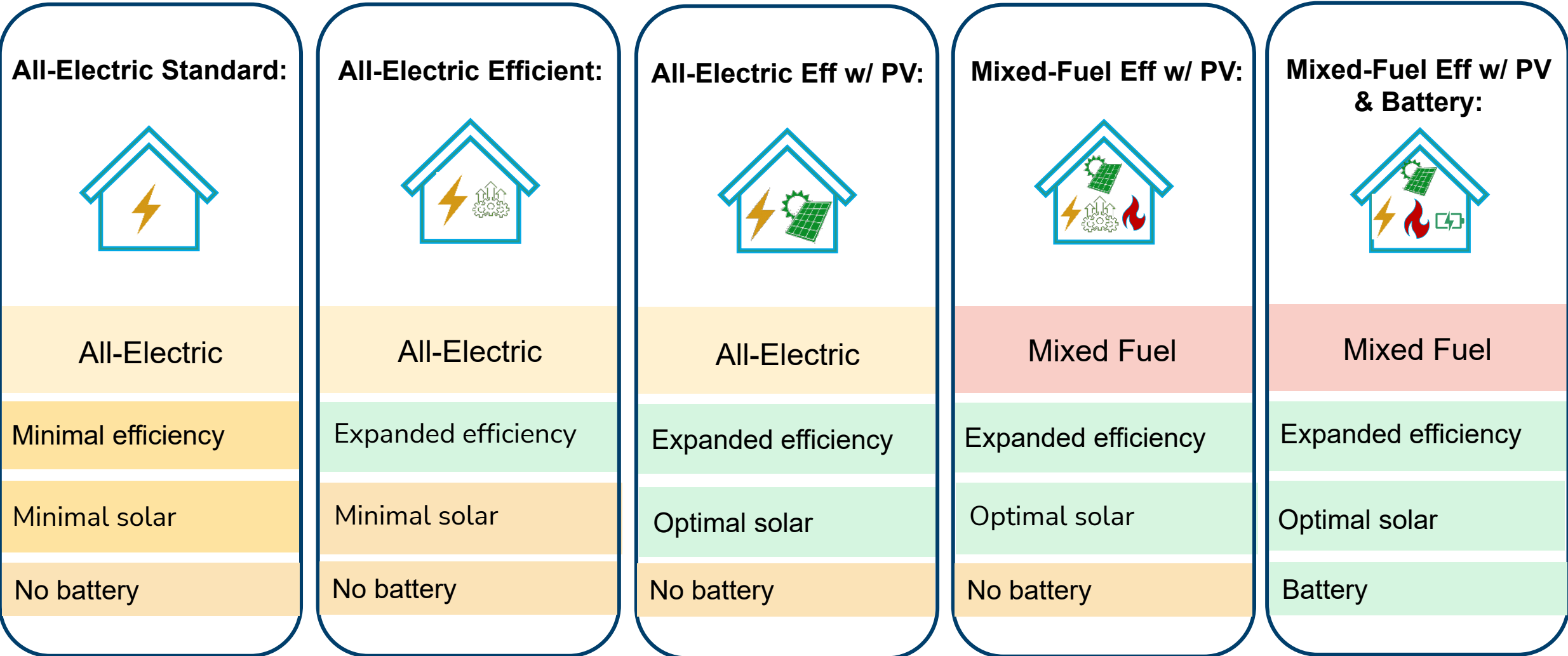
- A rating system within the performance path that is used to regulate energy performance.
- Based on hourly source energy which establishes a carbon-based performance metric.
- For single family homes, Source Energy is 1 of 3 Energy Design Rating (EDR) metrics.

ENERGY DESIGN RATINGS						
	Energy Design Ratings			Compliance Margins		
	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)
Standard Design	35.6	45.8	31.3			
Proposed Design	26.5	39.6	28.4	9.1	6.2	2.9
RESULT ³ : PASS						
¹ Efficiency EDR includes improvements like a better building envelope and more efficient equipment ² Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries ³ Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded						
<ul style="list-style-type: none"> • Standard Design PV Capacity: 3.46 kWdc • PV System resized to 3.46 kWdc (a factor of 3.459) to achieve 'Standard Design PV' PV scaling 						


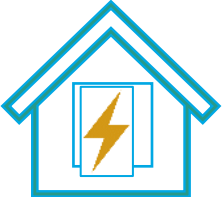
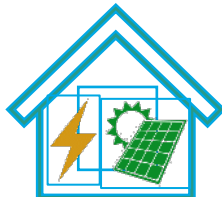


Source: [EnergyCodeAce](https://www.energycodeace.com)

Package Definitions

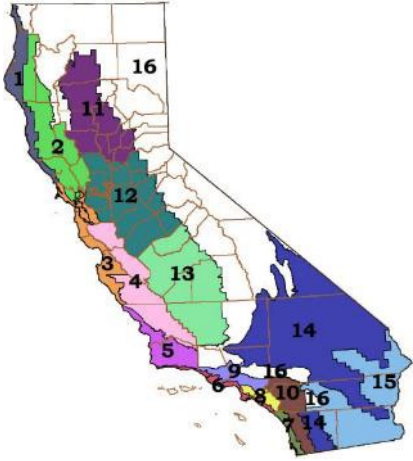


Package Details

	 Mixed-Fuel Home	 All-Electric Standard	 All-Electric Efficient
Space Heating/Cooling:	Heat Pump ⚡	Heat Pump ⚡	High-Efficiency Heat Pump ⚡
Water Heating:	Natural Gas Tankless 🔥	HPWH ⚡	NEEA HPWH ⚡
Cooking:	Natural Gas 🔥	Electric Resistance ⚡	Electric Resistance ⚡
Ceiling / Window Insulation:	R-30 / U=0.3	R-49 / U=0.24	R-49 / U=0.24
Ductwork Pressure:	Standard (0.45 W/CFM)	Low (0.30 W/CFM)	Low (0.30 W/CFM)
PV System:	2.9 kW	5.7 kW	5.7 kW

Energy Performance Approach

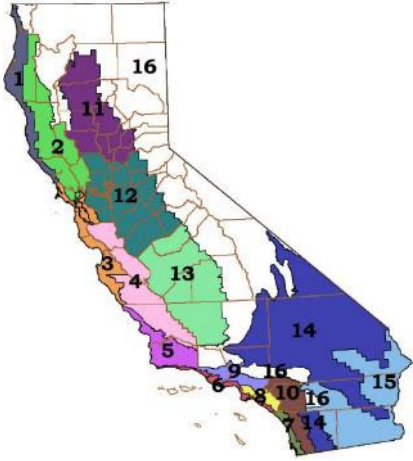
Impacts: CZ3



	All-Electric Standard:	All-Electric Efficient:	All-Electric Eff w/ PV:	Mixed-Fuel Eff w/ PV:	Mixed-Fuel Eff w/ PV & Battery:
Construction Cost: (compared to mixed-fuel baseline)	\$5,100 savings	\$3,500 savings	\$2,200 cost	\$3,500 cost	\$7,700 cost
EDR1	8	11	13	3	14
% CO2 Savings:					

Energy Performance Approach

Impacts: CZ4



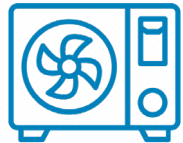
	All-Electric Standard:	All-Electric Efficient:	All-Electric Eff w/ PV:	Mixed-Fuel Eff w/ PV:	Mixed-Fuel Eff w/ PV & Battery:
Construction Cost: (compared to mixed-fuel baseline)	\$5,100 savings	\$3,400 savings	\$1,600 cost	\$3,400 cost	\$8,100 cost
EDR1	8	11	12	3	13
% CO2 Savings:					

Existing Buildings

- What are the options?
- What are the benefits?
- What are the challenges?



Building Performance Standards are policies that require property owners to regularly report energy- or emissions- use intensity (EUI). In addition, the policies require incremental reductions in EUI over a set time horizon.



Time of Replacement policies require that property owners at the time of equipment replacement (upgrades or burnouts) abide by zero-NOx requirements and/or electric readiness requirements.



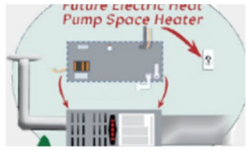




Time of Renovation policies require applicants that are already pulling a permit for a renovation project to abide by certain energy efficiency measures and/or electric readiness requirements.



Time of Property Transfer policies leverage real estate transactions to disclose relevant information on, incentivize, or require, certain home improvements.
We do not recommend policies which inhibit or delay the sale of a property.

Existing Building Electric-Readiness Reach Code



	Retrofit Category	Details
	Heating, Ventilation and Air Conditioning	For alterations and additions that include an HVAC system, the jurisdiction could require an outlet for a future electric heat pump.
	Water heating	For alterations and additions that include a water heating system, the jurisdiction could require an outlet for a future water heater heat pump.
	Pool and Spas	For alterations and additions that include pool or spa equipment, the jurisdiction could require an outlet for a future electric pool heater.
	Installing 240V outlet when renovating the following areas:	Laundry room (an outlet for a future electric clothes dryer) Kitchen (an outlet for future electric oven/stove)
	Panel	When planning an electrical panel replacement and electrical panel upgrade, the jurisdiction could require the electrical panel to include panel capacity and breaker space for future electrification of building systems.

An **exception** can be offered if, as a result of these requirements, an increase in any of the following (that is not part of the appliance upgrade scope) is needed:

- Capacity upgrade for an electrical panel
- Feeder upgrade
- Transformer upgrade
- Electrical service upgrade

What Changed for EVI in the 2022 Intervening CALGreen Code?



Code Context

- The [2022 Intervening CALGreen Code](#) was adopted in January. It will be effective on 7/1/2024.
- There will also be a 2025 CALGreen Triennial Cycle Update in 2025 (effective Jan. 1, 2026), which has proposed language (subject to change).



Increased Percentage Requirements

- Multifamily
- Hotel & Motel



Technical Requirement Changes

- “Direct Billing” in Multifamily projects requires EV charging circuits to be tied directly to each dwelling unit’s meter
- “Power Allocation Method” in non-residential projects adds flexibility for different levels of charging stations installed
- New requirements for medium/heavy duty charging capacity in Manufacturing and Office buildings
- New requirements for specific Nonresidential Alterations and Additions (LP L2 Receptacle)
- Receptacle type updates
- Other minor clarifications

EVI Model Code

- What EV code terminology do I need to know?
- For each building type, what are the CALGreen new construction requirements?
- For each building type, what is the new construction model code?
- What is the alterations & additions model code?

EVI Code Terminology

Speed

Level 1

3-4 miles per charging hour



Level 2

10-20 miles per charging hour



Level 3

150+ miles per charging hour



Readiness

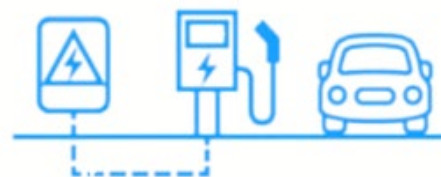
EV Capable



EV Ready

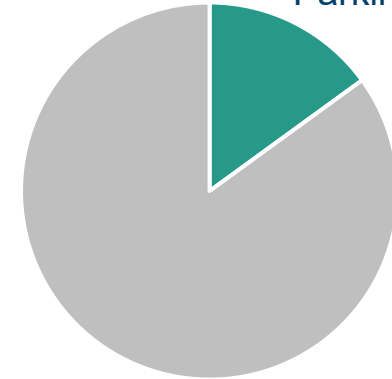


EV Charging Station Installed



Number

Percent of Parking Spaces







kVA Calculation

kVA = Voltage * Amperage / 1000

Total kVA =
L2 EV Capable +
LP L2 EV Ready +
L2 EV Ready +
L2 EVCS

Single Family Homes and Two-Family Townhomes

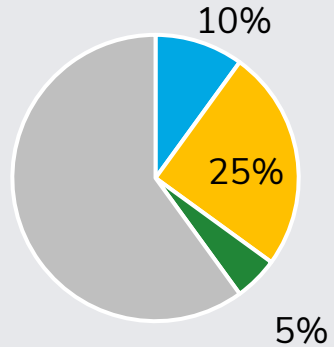
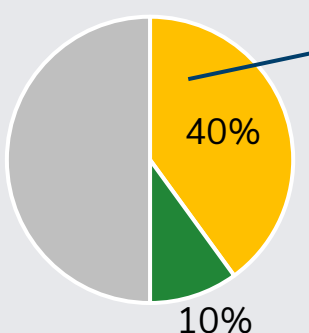
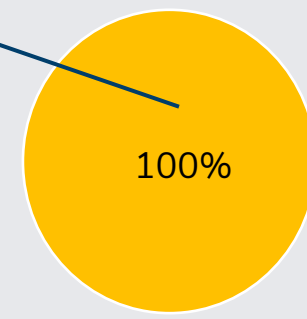
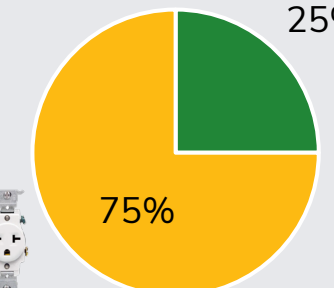


2022 CALGreen	2022 CALGreen Intervening (July 1st 2024)	Model Code
Mandatory	Mandatory	<p>2 EV spaces total:</p> <div data-bbox="1610 505 1819 674" style="border: 1px solid gray; padding: 5px; text-align: center;">ELECTRIC VEHICLE OUTLET</div> <ul style="list-style-type: none"> • 1 Level 2 EV Ready circuit <div data-bbox="1314 772 1658 876">   </div> <ul style="list-style-type: none"> • 1 Level 1 EV Ready circuit <div data-bbox="1368 986 1651 1076">   </div>

Takeaway: The model code modifies the L2 EV Capable requirement to be a L2 EV Ready circuit and adds 1 L1 EV Ready circuit (if there is a second parking space).

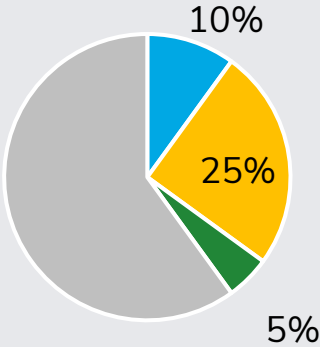
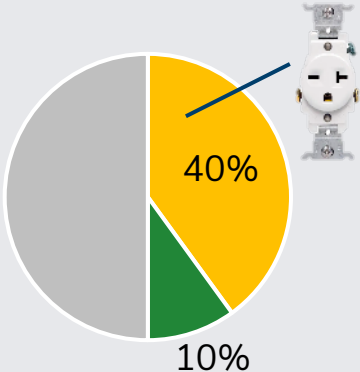
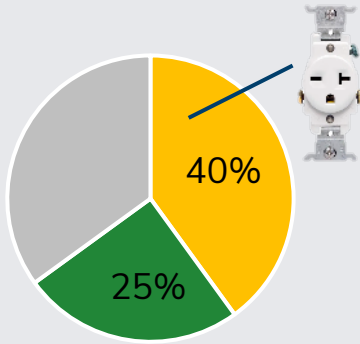
Multifamily



2022 CALGreen	2022 CALGreen Intervening (July 1 st 2024)	Model Code (Proposed 2025 CALGreen)	
Mandatory	Mandatory		
 <p>10% Level 2 EV Capable 25% Level 2 EV Ready (low-power) 5% Level 2 EVCS</p> <p>% of Parking Spaces</p>	 <p>40% Level 2 EV Ready (low-power) + Direct Wiring 10% Level 2 EVCS</p>	 <p>100% Level 2 (low-power) EV Ready + Direct Metering</p> <p>% of Spaces for Residents</p>	 <p>25% Level 2 EVCS 75% Level 2 (low-power)</p> <p>% of Spaces for Common Use Parking</p>

Takeaway: The model code increases the amount of LP L2 EV Ready (for resident spaces). The model code aligns with proposed 2025 CALGreen code.

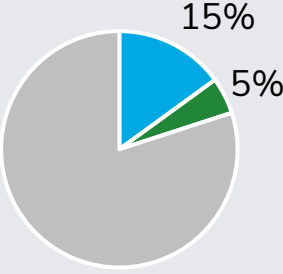
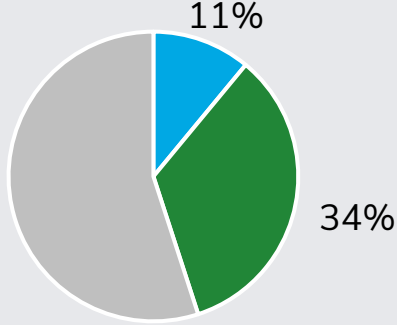
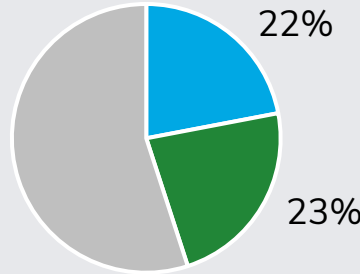
Hotels & Motels

2022 CALGreen	2022 CALGreen Intervening (July 1 st 2024)	Model Code (Proposed 2025 CALGreen)
Mandatory	Mandatory	
 <p>10% Level 2 EV Capable 25% Level 2 EV Ready (low-power) 5% Level 2 EVCS</p> <p>% of Parking Spaces</p>	 <p>40% Level 2 EV Ready (low-power) 10% Level 2 EVCS</p> <p>% of Parking Spaces</p>	 <p>40% Level 2 EV Ready (low-power) 25% Level 2 EVCS</p> <p>% of Parking Spaces</p>

Takeaway: The model code increases the amount of EVCS, in alignment with the proposed 2025 CALGreen Mandatory code.

Non-residential



2022 CALGreen	2022 CALGreen Intervening (July 1st 2024)	Model Code (Proposed 2025 CALGreen Tier 2)	
Mandatory	Mandatory		
 <p>15% Level 2 EV Capable 5% Level 2 EVCS</p>	 <p>Offices & Retail (45%): 11% Level 2 EV Capable 34% Level 2 EVCS</p>	 <p>All Other (45%): 22% Level 2 EV Capable 23% Level 2 EVCS</p>	
% of Parking Spaces			

Takeaway: The model code splits nonres into two categories with distinct requirements based on the proposed 2025 CALGreen code, Tier 2. Both of these categories reflect increases compared to the 2022 CALGreen Intervening code.

Alterations & Additions



- Add New Requirement for Multifamily and Hotel & Motel
 - Mimics Nonresidential Alterations/Additions that are in Section 5.106.5.4.
 - Requires each added or altered space to have at least a low power Level 2 EV receptacle.
 - Specifies treatment for buildings with and without existing EV capable spaces.
- Existing buildings or parking facilities being modified by one of the following shall comply with Section 4.106.4.3.
 - Increase/alteration to parking facility power supply or panel
 - Addition of PV solar system over parking
 - Increase in building's conditioned area, volume, or size
 - Breaking ground on existing parking surfaces (does not include resurfacing)

