

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

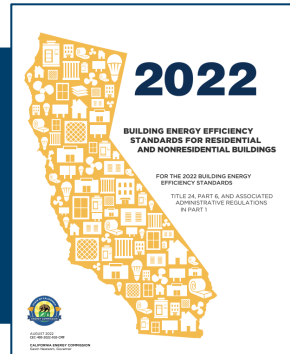
Electric Vehicle Infrastructure (EVI)

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



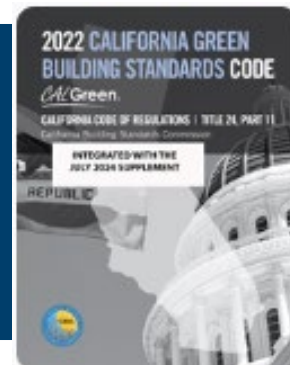
Building Electrification (New Construction & Existing Buildings)

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.



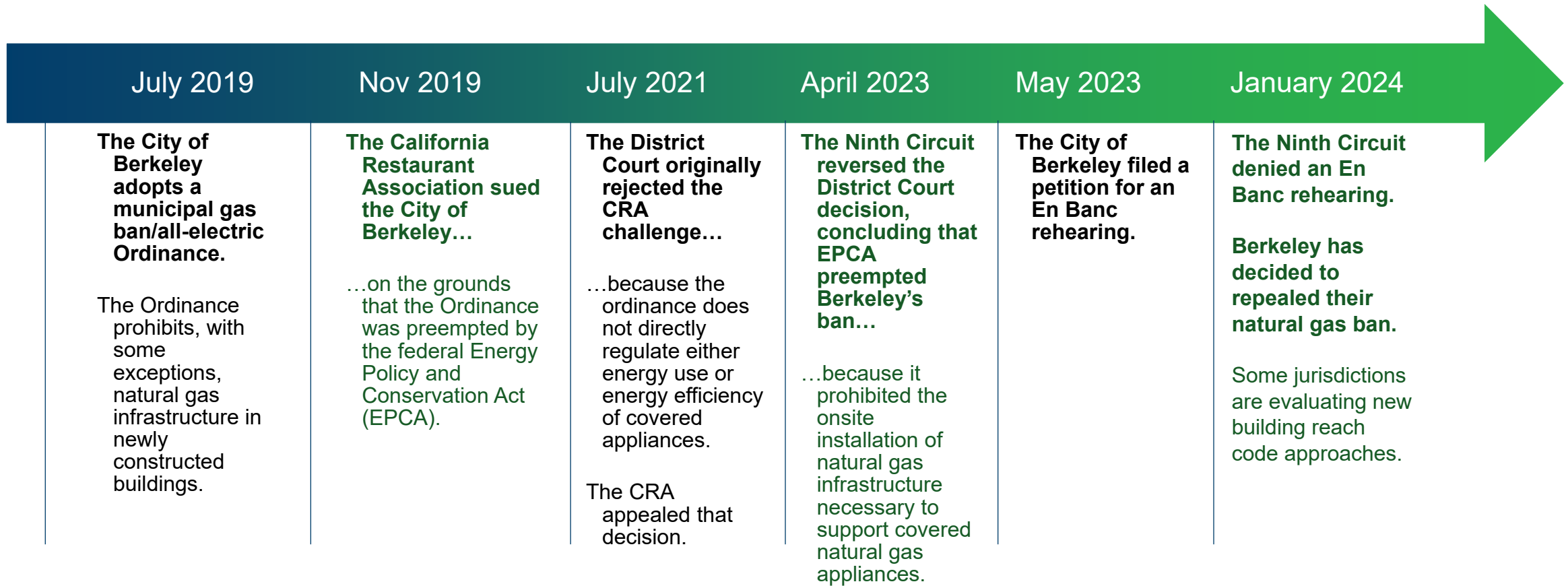
Support Public Health by improving indoor air quality and decreasing air pollution emissions.



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.

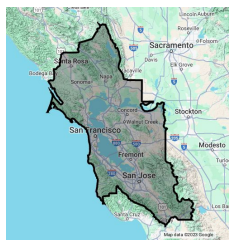
The Bay Area and California's Upcoming Electrification Changes



2027

BAAQMD Low NOx water heater requirements

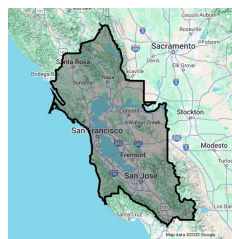
Tank-type gas water heaters no longer sold in Bay Area



2029

BAAQMD Low NOx space heater requirements

Gas furnaces no longer sold in Bay Area



2030

CARB Zero-Emission Appliance Standards

Gas water heaters and space heaters no longer sold, statewide



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

Approach	Description	Advantages	Challenges	Who's done it?
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 Encinitas
Other Strategies				
California Environmental Quality Act (CEQA)	Amending CEQA threshold of significance for CO2 to a lower number. Or a revision to General Plan or Housing Element, which would also trigger CEQA, to zero emission appliances for all new construction or retrofits requiring a permit.	<ul style="list-style-type: none"> Comprehensive – addressing all emitting equipment 	<ul style="list-style-type: none"> Many new developments are not subject to the CEQA process and would not be affected by the regulation. 	N/A
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 Concerns adopting this approach could negatively impact the on-going work with the AQMDs and CARB 	Los Altos Hills New York City

New Construction Approaches

Approach	Description	Advantages	Challenges	Who's done it?
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Other Strategies				
Amend the California Environmental Quality Act (CEQA)	Amend the CEQA threshold of significance for GHGs to a low number OR revise the General Plan or Housing Element, which would also trigger CEQA, to zero emission appliances for all new construction and/or retrofits requiring a permit.	<ul style="list-style-type: none"> Comprehensive way to address all emitting equipment 	<ul style="list-style-type: none"> Many new developments are not subject to the CEQA process and would not be affected by the regulation 	N/A
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Existing Building Approaches

	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

How does this approach meet the Energy Policy and Conservation Act?

EPCA Exemption and the 7-Factor Test

Permit a builder to [...] select items whose combined energy efficiency meet an overall building energy target.

Not specifically require any EPCA-covered appliance to exceed federal standards.

Offer options for compliance, on a 1-for-1 equivalent energy use or equivalent cost basis.



Energy Performance Approach Technical Considerations

Instead of regulating appliance fuel infrastructure, the Energy Performance Approach sets a target energy score using the EDR1/Source Energy margin (used in modeling software for CA building permits).

This approach sets the target energy score assuming federally required minimum equipment efficiencies.

This approach sets a common target energy margin for both mixed-fuel and all-electric buildings.

How Does Compliance Work?

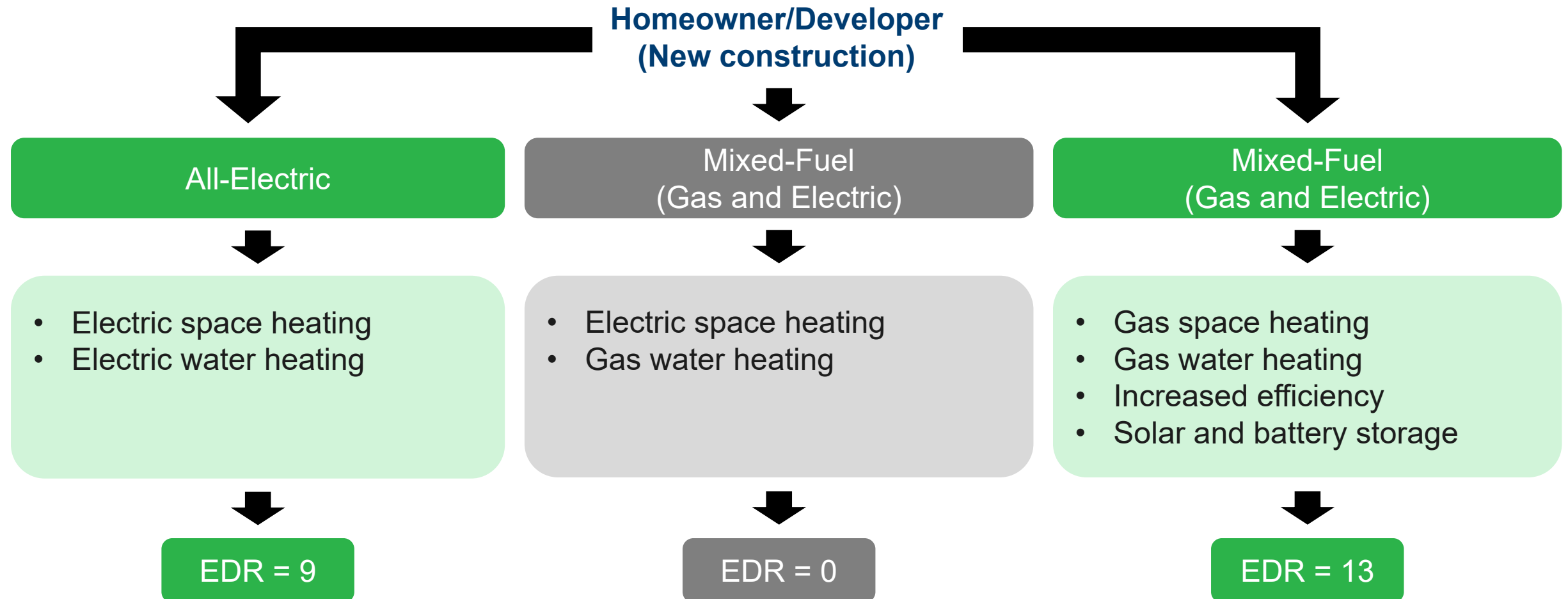


A compliance margin of “x” or higher is required for Single Family, Multifamily (low & high rise) and Nonresidential buildings.

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

What is the Energy Performance Approach?



Which Appliances are Relevant?

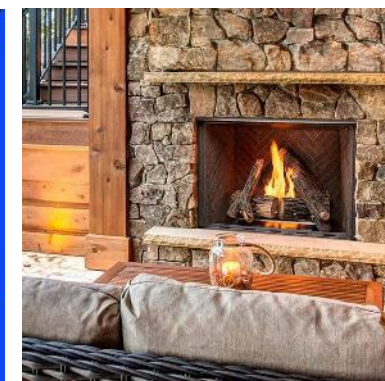
What's included?

- Space heating/cooling
- Water heating



What's not included?

- Stoves
- Laundry
- Pools
- Fireplace/pit



What is the Energy Performance Approach?



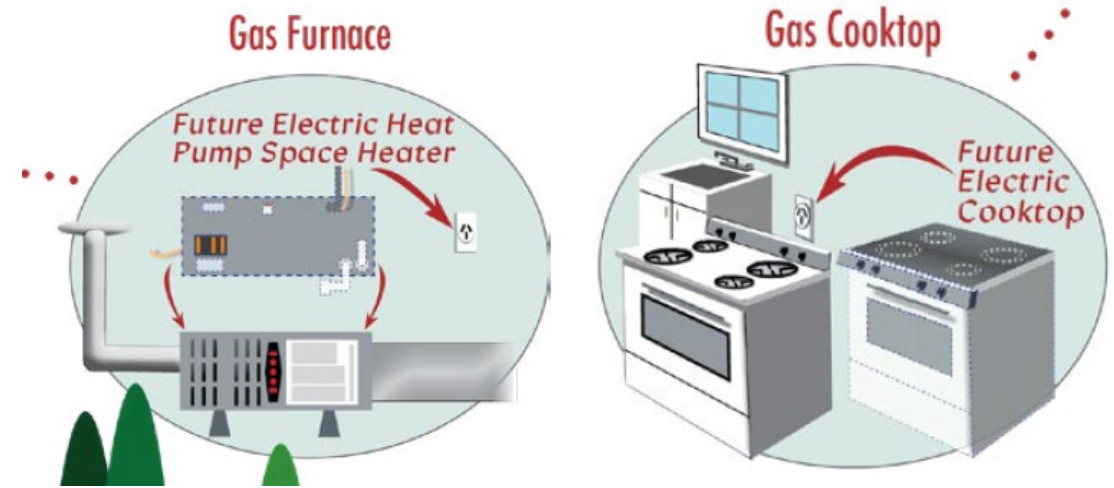
Multifamily Residential:

- Gas fueled space heater
- Water heater, clothes dryer
- Cooktop
- Centralized water-heating systems
- Individual dwelling unit water-heating systems



Nonresidential:

- Systems using gas or propane
- HVAC hot water temperature design temperature
- Commercial kitchens



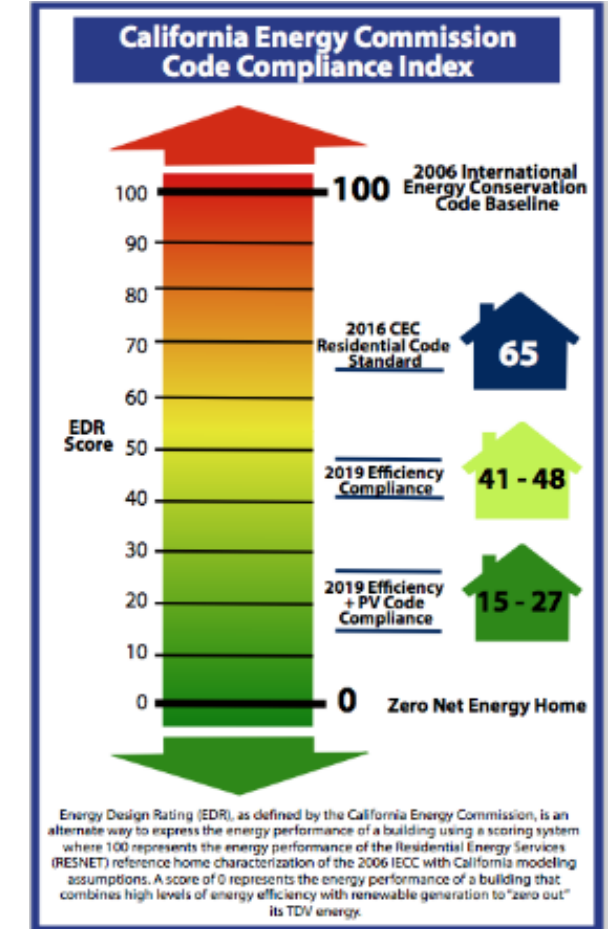
Typical requirements:

- **Dedicated wiring** installed within 3 ft of the gas-fired appliance.
- **Reserved electrical breaker space** provided for the future installation of these systems and appliances.
- A heat pump water heater also requires:
 - **Space** large enough to install it
 - **Plumbing** for a condensate drain and hot and cold water.

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 						



Energy Performance Approach: Single Family Cost Effectiveness

- What packages are evaluated for cost impacts?
- What is the difference in construction cost?

Package Definitions

All-Electric Standard:



All-Electric

Minimal efficiency

Minimal solar

No battery

All-Electric Efficient:



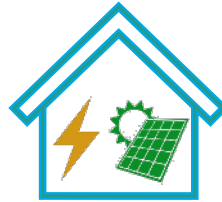
All-Electric

Expanded efficiency

Minimal solar

No battery

All-Electric Eff w/ PV:



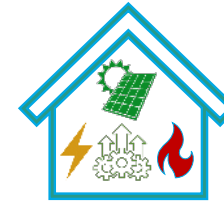
All-Electric

Expanded efficiency

Optimal solar

No battery

Mixed-Fuel Eff w/ PV:



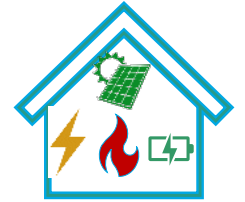
Mixed Fuel

Expanded efficiency

Optimal solar

No battery

Mixed-Fuel Eff w/ PV & Battery:



Mixed Fuel

Expanded efficiency

Optimal solar

Battery

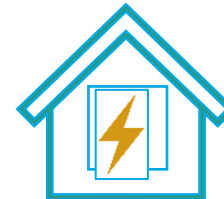
Package Details



Mixed-Fuel Home



All-Electric Standard



All-Electric Efficient



Space Heating/Cooling:

⚡ Heat Pump



High-Efficiency Heat Pump ⚡

Water Heating:

Natural Gas Tankless 🔥

HPWH ⚡

NEEA HPWH ⚡

Cooking:

Natural Gas 🔥

⚡ Electric Resistance

Ceiling / Window Insulation:

R-30 / U=0.3



R-49 / U=0.24

Ductwork Pressure:

Standard (0.45 W/CFM)



Low (0.30 W/CFM)

PV System:

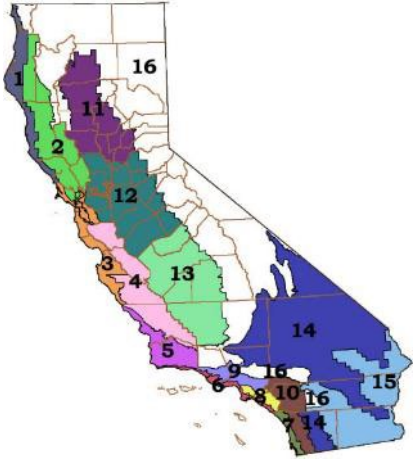
2.9 kW



5.7 kW

Energy Performance Approach

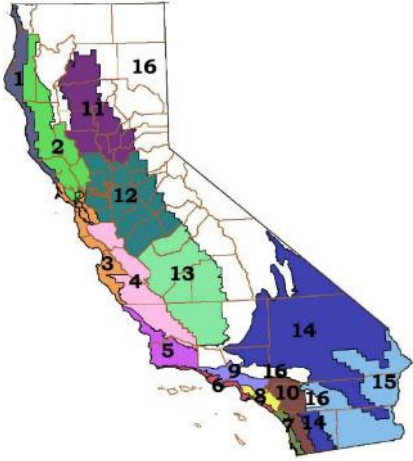
Impacts: CZ3



	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:					

Energy Performance Approach: Low-Rise Multifamily Cost Effectiveness

- What packages are evaluated for cost impacts?
- What is the difference in construction cost?

Package Definitions

All-Electric Standard:



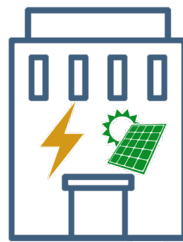
All-Electric

Minimal efficiency

Minimal solar

No battery

All-Electric 100% PV:



All-Electric

Minimal efficiency

100% solar offset

No battery

Mixed-Fuel Eff:



Mixed Fuel

Expanded efficiency

Minimal solar

No battery

Mixed-Fuel Eff w/ PV & Battery:



Mixed Fuel

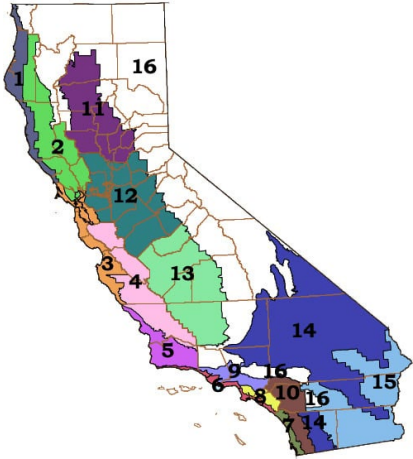
Expanded efficiency

100% solar offset

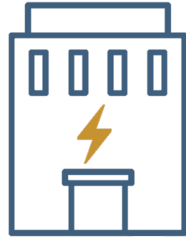
Battery

Energy Performance Approach

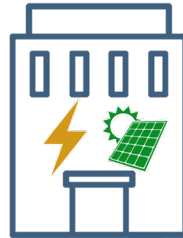
Impacts: CZ3



All-Electric
Standard:



All-Electric
100% PV:



Mixed-Fuel Eff:



Mixed-Fuel Eff w/ PV
& Battery:



Construction Cost:*

(per Dwelling Unit)

\$700
cost

\$3,100
cost

\$130
cost

\$3,700
cost

Source Energy

10%

20%

0%

17%

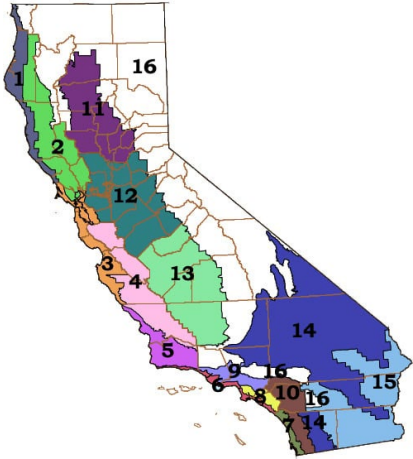
% CO2 Savings:



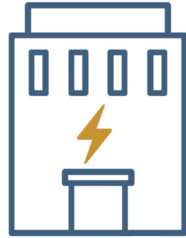
*Compared to mixed-fuel baseline
Source: [2022 Multifamily NewCon Cost-eff Study](#)

Energy Performance Approach

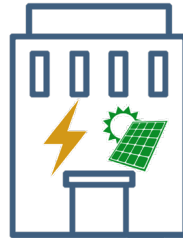
Impacts: CZ4



All-Electric
Standard:



All-Electric
100% PV:



Mixed-Fuel Eff:



Mixed-Fuel Eff w/ PV
& Battery:



Construction Cost:*(
per Dwelling Unit)

\$700
cost

\$2,800
cost

\$130
cost

\$3,500
cost

Source Energy

9%

18%

0%

17%

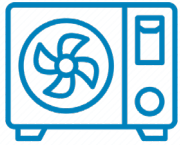
% CO2 Savings:



*Compared to mixed-fuel baseline
Source: [2022 Multifamily NewCon Cost-eff Study](#)

Existing Buildings

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



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.

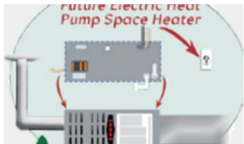






Building Performance Standards are policies that require property owners to regularly report energy- or emissions- use intensity (EUI). In addition, the policies require incremental reductions in EUI over a set time horizon.



Time of 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.

	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:

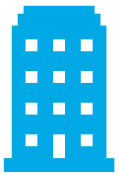
- Capacity upgrade for an electrical panel
- Feeder upgrade
- Transformer upgrade
- Electrical service upgrade

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

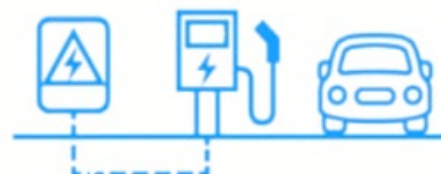
EV Capable



EV Ready

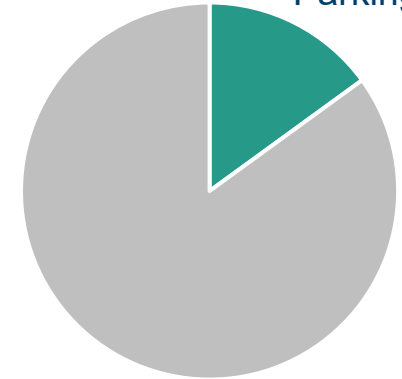


EV Charging Station Installed



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

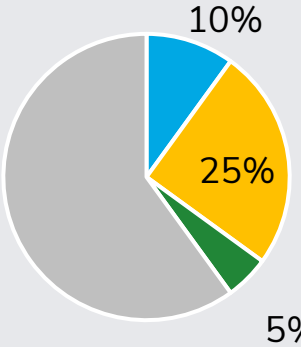
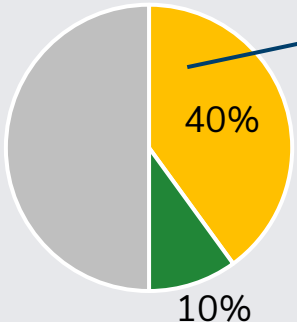
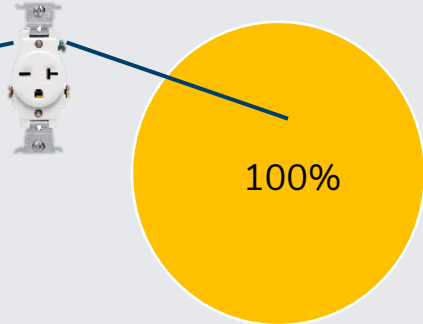
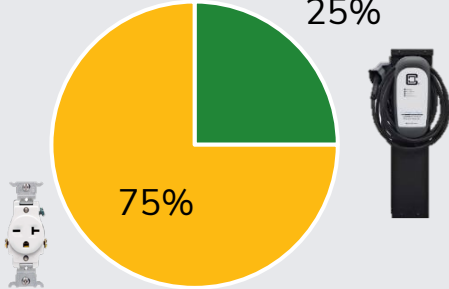
Source: [Cleanenergy.org](https://www.cleaneconomy.org/) EV Readiness

Single Family Homes and Two-Family Townhomes

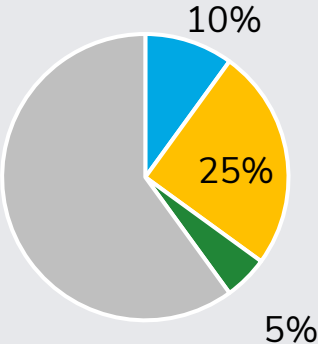
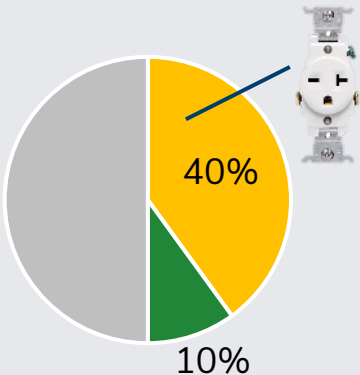
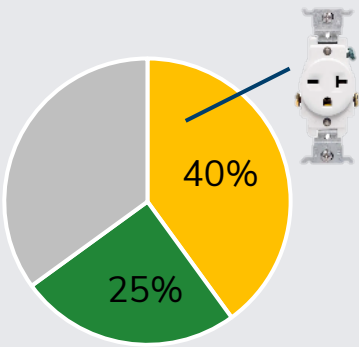


2022 CALGreen	2022 CALGreen Intervening (July 1st 2024)	Model Code
Mandatory	Mandatory	
(1) Level 2 EV Capable for one parking space per dwelling unit		<div>2 EV spaces total:</div> <div>ELECTRIC VEHICLE OUTLET</div> <ul style="list-style-type: none">1 Level 2 EV Ready circuit <div></div> <ul style="list-style-type: none">1 Level 1 EV Ready circuit <div></div>

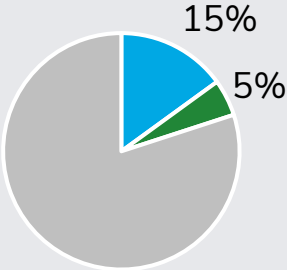
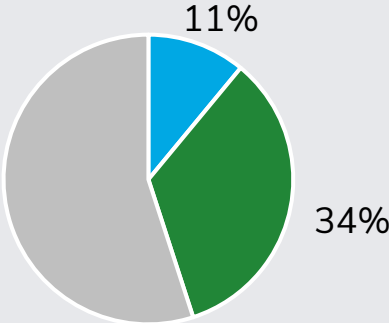
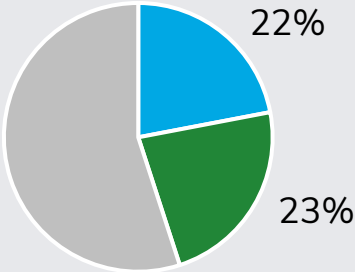
Takeaway: The model code modifies the L2 EV Capable requirement to be a L2 EV Ready circuit and adds 1 L1 EV Ready circuit (if there is a second parking space).

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> <div>% of Parking Spaces</div>	 <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> <div>% of Spaces for Residents</div>	 <p>25% Level 2 EVCS 75% Level 2 (low-power)</p> <div>% of Spaces for Common Use Parking</div>

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

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

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

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

EVI Requirements for Alterations & Additions



CURRENT CODE	1 to 2 FAMILY	Meet new construction requirements for parking additions or electrical panel upgrades.
	MULTIFAMILY	When new parking facilities are added, or electrical systems or lighting of existing parking facilities are added/alterd and the work requires a permit: <ol style="list-style-type: none">1. 10% of the total number of parking spaces added or altered shall be L2 EV Capable.2. Identify reserved panel space for overcurrent device as "EV Capable"
	NON-RESIDENTIAL	Meet the new construction requirements under the following situations: <ol style="list-style-type: none">1. Increasing power supply as part of a parking facility addition or alteration.2. Adding new PV added over existing parking.3. Increasing power supply to an electric service panel.
MODEL	MODEL CODE CHANGES	<ul style="list-style-type: none">• Increases percentages/EV requirements for new construction for all building types.• Utilizes the 3 triggers from non-residential alterations for multifamily.• Adds a breaking ground alteration/addition trigger.• Amends exception 1(c) to include maximum utility service cost of \$4500/space.