OFFICE OF SUSTAINABILITY

COUNTY OF SAN MATEO

Builders Roundtable
2022 Building Standards Reach Codes

October 13, 2022

Alero Moju (OOS) & Mayra Vega (TRC Companies)

COUNTY OF SAN MATEO

Zoom Functions

Please use the Q&A feature to share thoughts, concerns and your questions with the panelist

Having tech issues? Email Kamille Lang: klang1@smcgov.org

San Mateo County's Office of Sustainability

OFFICE OF SUSTAINABILITY

COUNTY OF SAN MATEO

Building sustainable communities
that fulfill the needs of the present and future

Solving for Today and Tomorrow

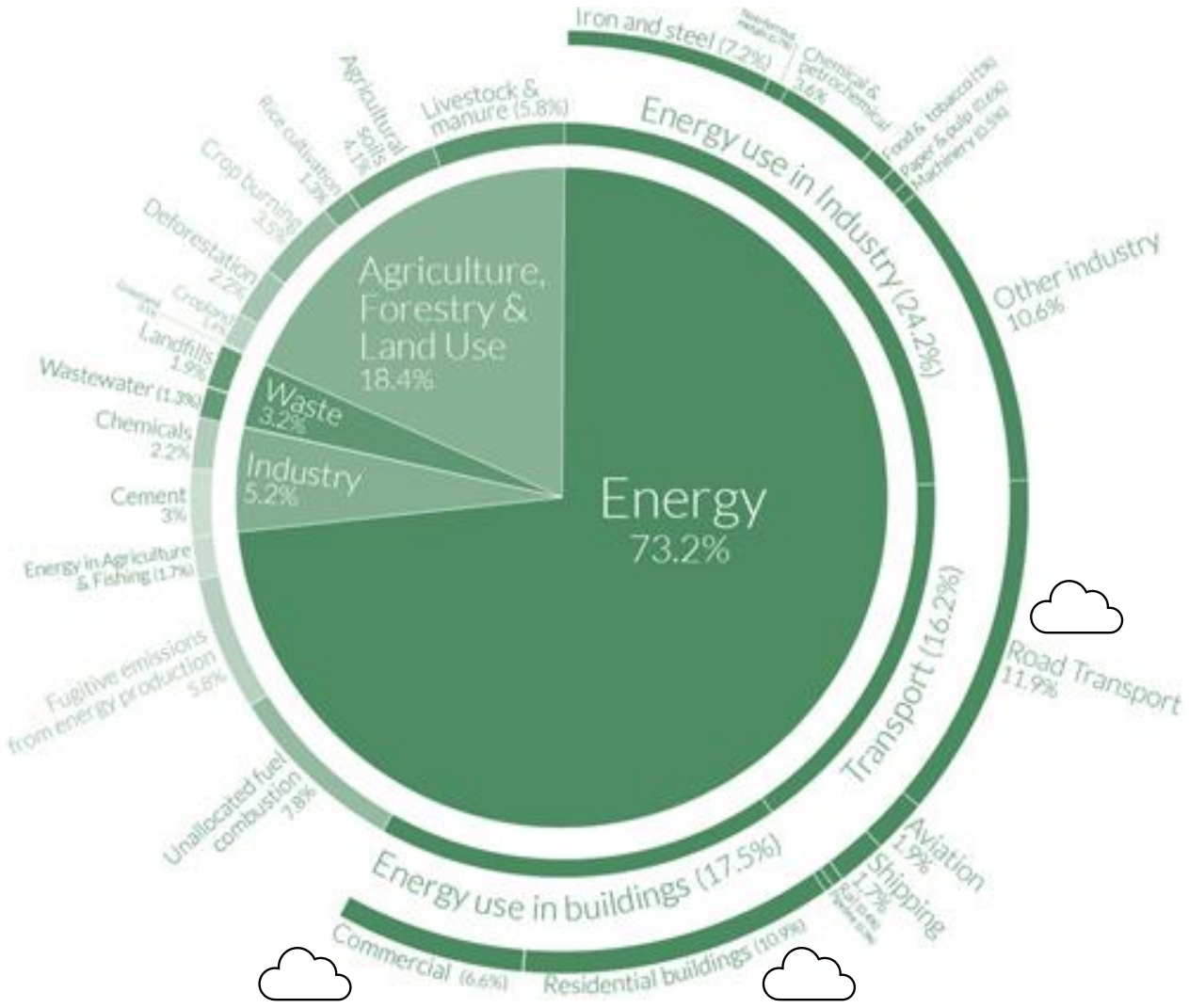
Overview

- What are Reach Codes?
  - Definition
  - Why Reach Codes
  - 2022 Updates to the Building Code
  - Cost
  - Regional Context
  - EV Definitions
- San Mateo County 2019 Reach Code
  - 2019 Building Reach Codes
  - 2019 EV Charging Reach Codes
- 2022 Model Reach Code
  - 2022 Building Reach Codes
  - 2022 EV Charging Reach Codes
  - Highlight of 2019 & 2022 Differences
- Open for Questions

What are “Reach Codes?”

- Local Enhancements to State Building Codes and Standards
- Adopted by Individual Jurisdictions to Meet Local Climate and Building Goals
- Next Code Cycle Starts
  January 1, 2023
- Reach Codes Must be Filed with the California Building Standards Commission and the California Energy Commission

Global Carbon Emissions Sources



18% Commercial & Residential Buildings

12% Road transport

Source: *Shayle Kann, Climate Tech VC*

In CA, these emissions are overwhelmingly associated with methane gas equipment that can be electrified

2022 CA Energy Code

New Construction

- Heat pumps are prescriptive baseline
  - Residential
    - Space heating in climate zone 3, 4
    - Water heating in climate zone 12
  - Nonresidential – water- and/or space-heating for most building types
  - Performance credit for all-electric design
- Residential
  - Pre-wiring required for gas appliances
  - Higher ventilation rate for gas stoves
  - Energy storage readiness
- Nonresidential - Solar PV and Battery Storage prescriptive

Existing Buildings

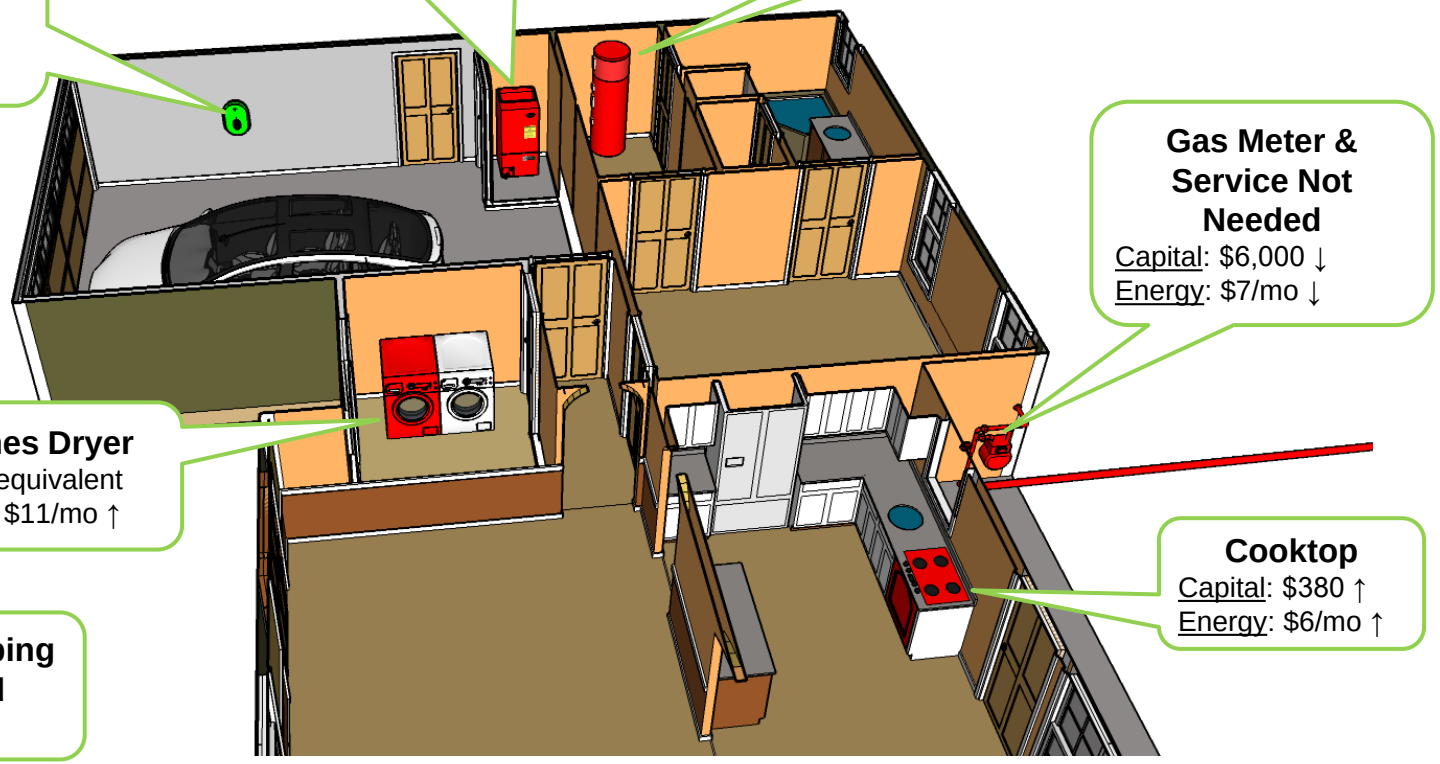
- Restricts newly installed electric resistance heating
- Simplified language for heat pump retrofits

Electrifying New Single-Family Homes in the Bay Area – The Cost Story

Space Heater
Capital: $2000 ↓, assuming air-conditioning also installed
Energy: $10/mo ↓

Water Heater
Capital: $510 ↓
Energy: $7/mo ↑

Electric Vehicle Charger
Capital: Same cost, including incentives
On-going: $138/mo ↓



Gas Meter & Service Not Needed
Capital: $6,000 ↓
Energy: $7/mo ↓

Clothes Dryer
Capital: equivalent
Energy: $11/mo ↑

Cooktop
Capital: $380 ↑
Energy: $6/mo ↑

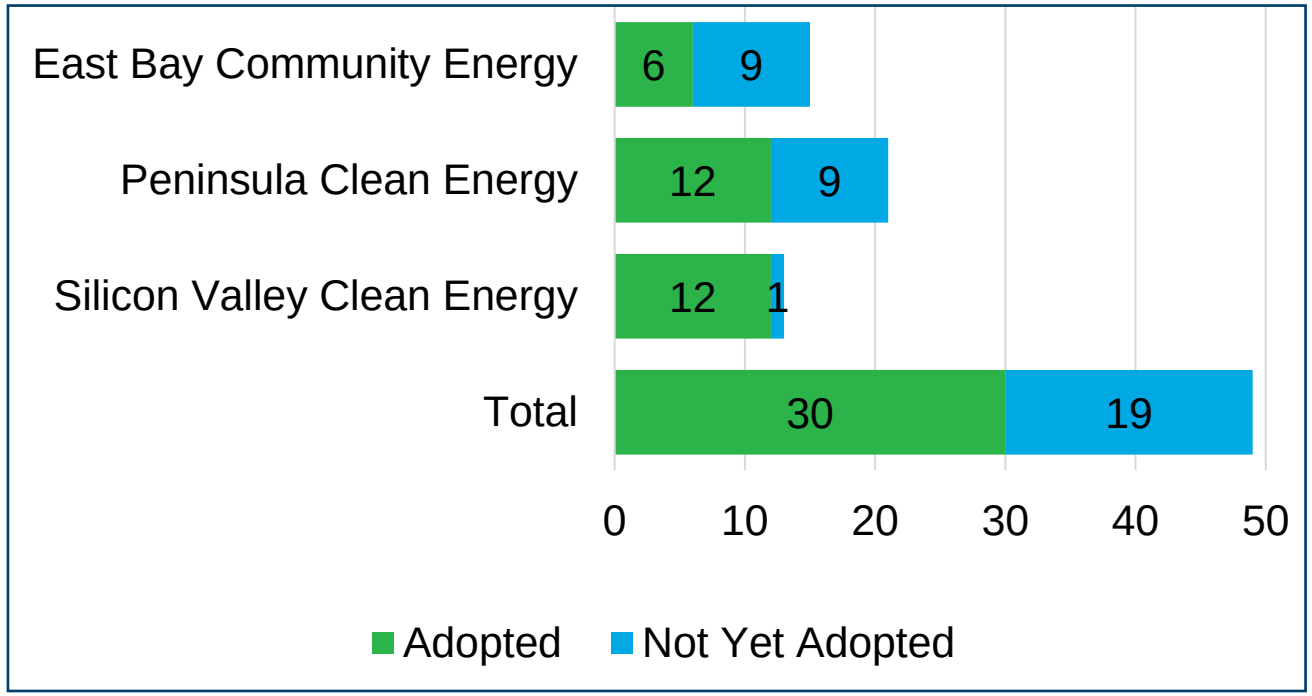
Indoor Gas Piping Not Needed
Capital: $2,450 ↓

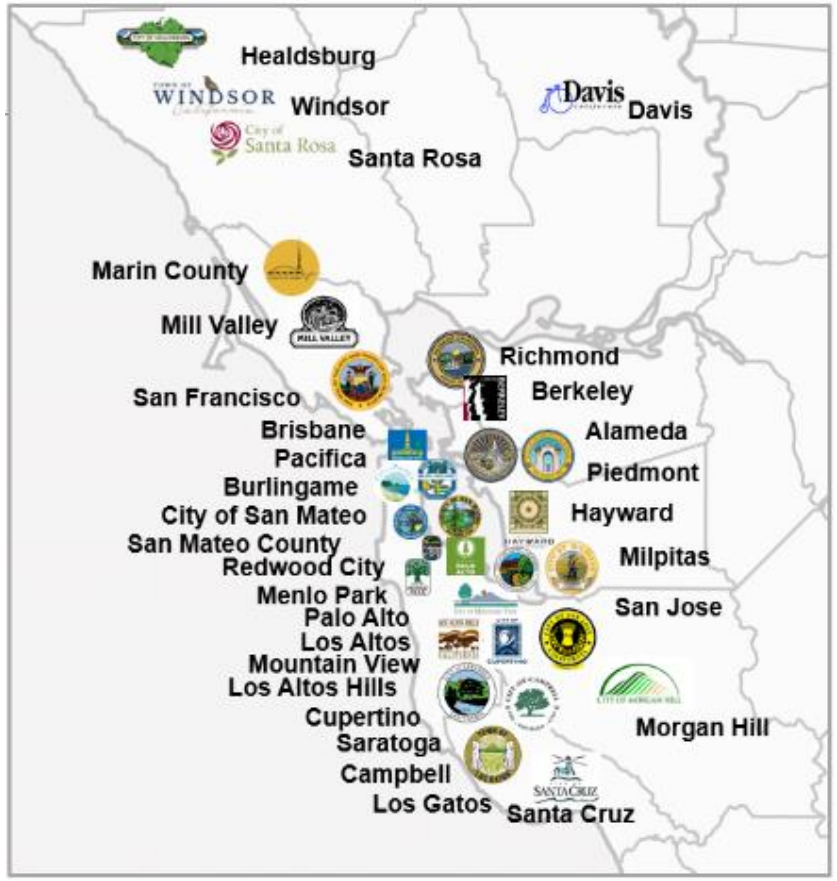
Summary

All-Electric Home
Capital: $10,580 ↓
Energy: $7/mo ↑

All-Electric Home, Increased Solar
Capital: Equivalent
Energy: $5/mo ↓

Regional Context
2019 Adoption of Electrification Reach Codes



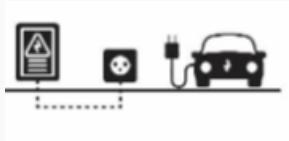


- 61% of member agencies
- 57% of electrification Reach Codes statewide
- 21 of 30 also had EV infrastructure codes

2022 San Mateo County Reach Code Tracker

Jurisdiction	New Construction	Existing Building	EV
Atherton	All electric except cooking		Model Code
Brisbane		Considering	
Burlingame	Re-adoption of 2019		Model Code
Colma	All Electric with less exemptions		
Daly City	Re-adoption of 2019		Minor Changes
Menlo Park	Re-adoption of 2019 with less exemptions		Model Code
Pacifica	All Electric		Model Code
Portola Valley	All Electric	Considering	
Redwood City	Re-adoption of 2019 with less exemptions		
San Bruno	All Electric		Model Code
San Carlos	Re-adoption of 2019	Exploring	
San Mateo	Re-adoption of 2019	Exploring	

Electric Vehicle Definitions

Charging Speed	Definition
Level 1 	• 110/120V outlet • 4 miles for every hour of charging
Level 2  	• 208/240V outlet or charging station • 25 miles for every hour of charging
Level 3 	• 480V outlet • 170 miles in 30 minutes of charging
Infrastructure	**Definition**
EV Capable 	• Panel capacity and raceways
EV Ready 	• Complete electric circuit at either Level 1 or 2 including electrical panel capacity, overprotection device and raceway
EV Charging Station 	• Installation of EV supply equipment

2019 SAN MATEO COUNTY REACH CODE

Adoption Process

- BOS Study Session: October 22, 2019
- Outreach: 2 Articles Oct. 2019, 2 Community Councils Oct 2019 & Jan 2020, Email, and Builders Roundtable
- BOS First Reading: February 11, 2020
- BOS Second Reading: February 25, 2020

2019 Reach Code - Buildings

An amendment to Title 24 Part 6
California Energy Code

- **ALL ELECTRIC NEW CONSTRUCTION**
  - Required electric fuel source for indoor appliances
  - Natural gas can be used for outdoor appliances
  - Electric prewiring required where natural gas is used

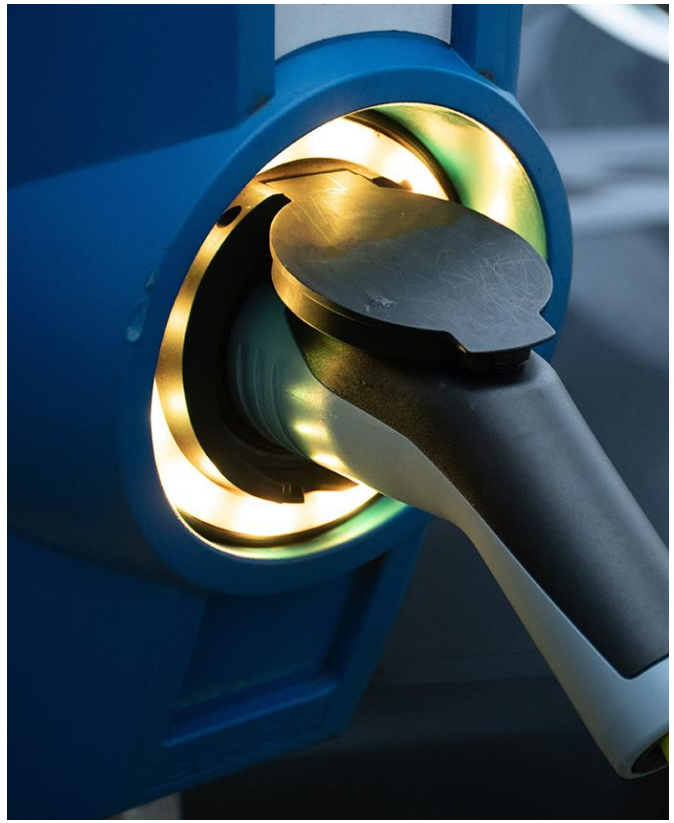
Exceptions - Buildings

- Labs
- Lack of an all-electric compliance pathway
- Restaurant Kitchens
- Public Emergency Centers

2019 Reach Code - EV Charging

An amendment to Title 24 Part 11
California Green Building Standards

- Residential
  - Single-family
  - Multi-family
- Non-residential
  - Office
  - Other commercial



Residential Exceptions – EV Charging

Where there is no commercial power supply

Accessory Dwelling Units (ADUs) and Junior ADUs

Single-Family EV Charging

- **LEVEL 2 EV READY**
- **LEVEL 1 EV READY**
  - Exception: For each dwelling unit with only one parking space install a Level 2 EV Ready space

Multi-Family EV Charging

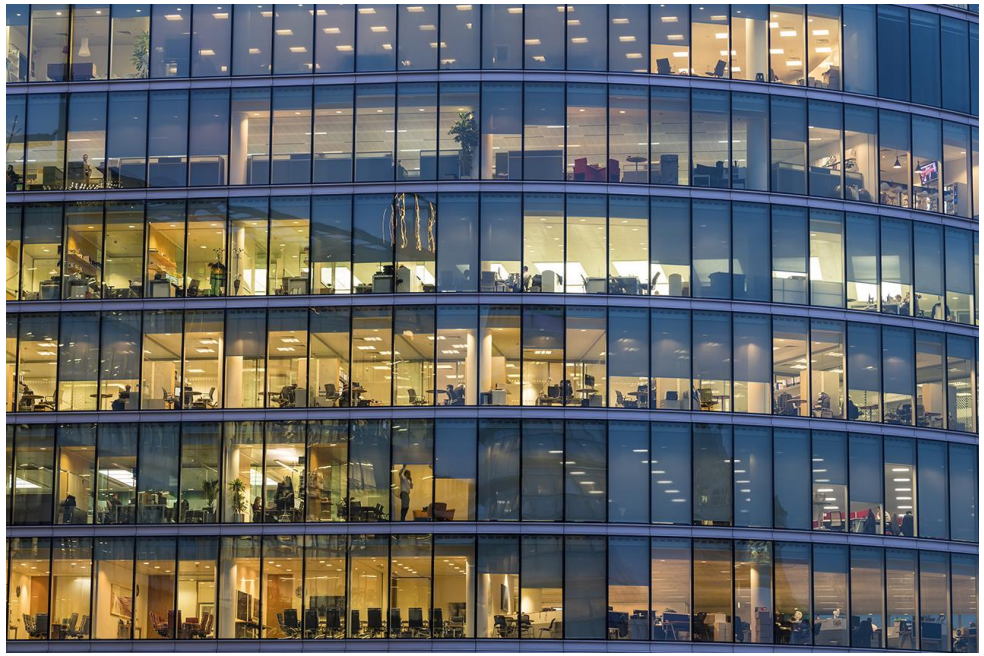
- **10% LEVEL 2 EV READY**
- **40% LEVEL 1 EV READY**

Non-Residential Exceptions – EV Charging

Where there is no commercial power supply

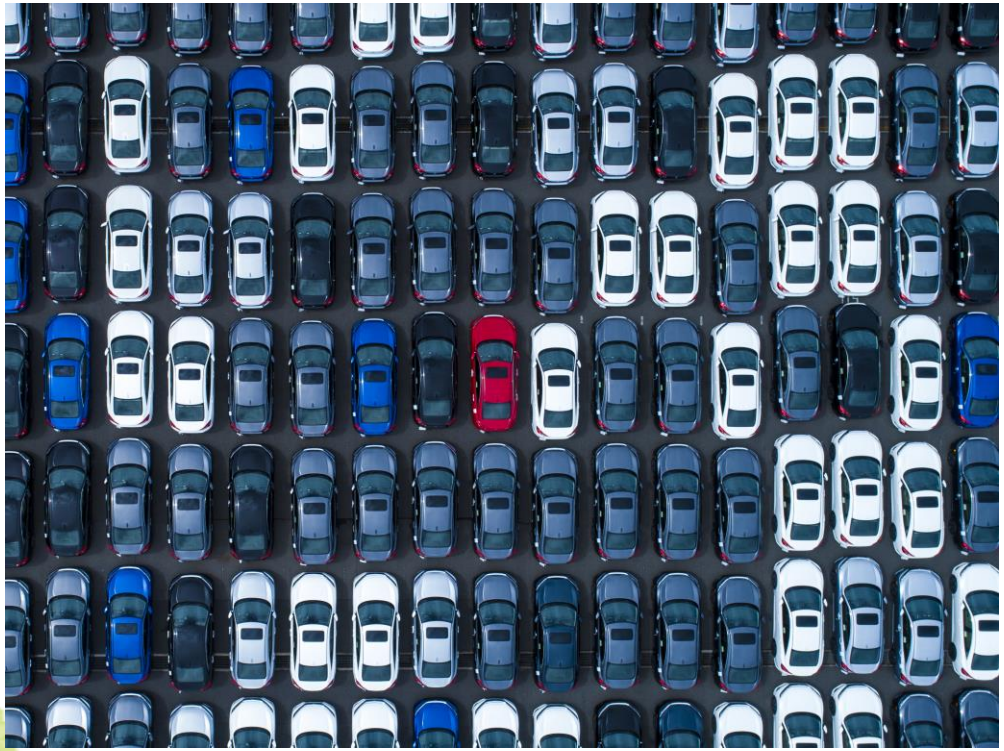
Spaces accessible only by automated mechanical car parking systems

Office EV Charging



- **10% LEVEL 2 CHARGERS,**
- **10% LEVEL 1 CHARGERS,**
- **30% EV CAPABLE**

Other Commercial EV Charging



- **6% LEVEL 2 Chargers**
- **5% LEVEL 1 Chargers**
  - Exception: Installation of each Direct Current Fast Charger with the capacity to provide at least 80 kW output may substitute for 6 Level 2 EVCS and 5 EV Ready spaces after a minimum of 6 Level 2 EVCS and 5 Level 1 EV Ready spaces are installed.

2022 MODEL REACH CODE LANGUAGE

2022 Model Reach Code - Buildings

An amendment to Title 24 Part 11
California Green Building Code

- **ALL ELECTRIC NEW CONSTRUCTION**
  - Extension of any existing gas infrastructure restricted
  - Definition of new construction: if either 50% of above-sill framing or 50% of foundation are replaced over 3 years for purposes other than repair or reinforcement

Find our codes on:
BayAreaReachCodes.org

Exceptions - Buildings

- “Public interest”
- Infeasible to construct according to CA Energy Code
- Electric readiness required: pre-wiring, physical space
- Technology-specific exceptions expiring in 2025

Building Reach Code Comparison

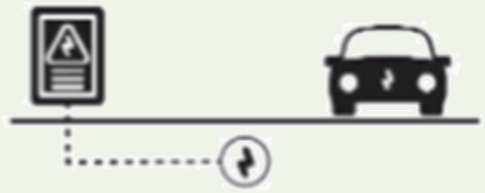
	2019	2022
Housed	Title 24 Part 6 California Energy Code	Title 24 Part 11 California Green Building Standards (CalGreen)
Reach Code	ALL ELECTRIC	
	▶ Required electric fuel source for indoor appliances ▶ Natural gas can be used for outdoor appliances ▶ Electric prewiring required where natural gas is used	Required electric fuel source for indoor and outdoor appliances
Exceptions	▶ Labs ▶ Lack of an all-electric compliance pathway ▶ Restaurant kitchens ▶ Public emergency centers	Prewiring is encouraged for any exempted appliances

2022 Model Reach Code – EV Charging

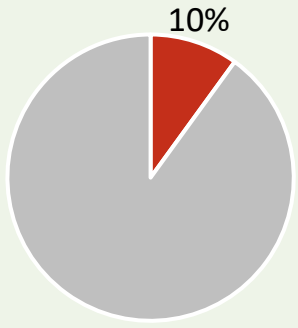
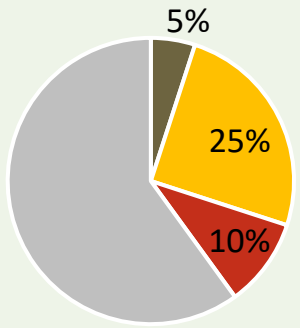
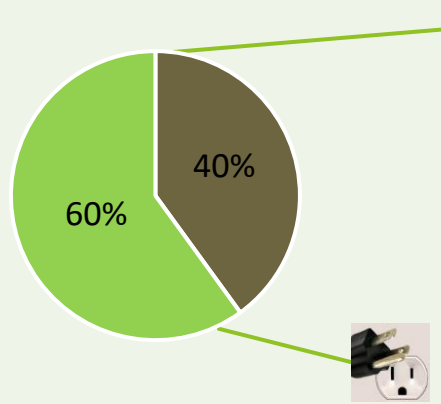
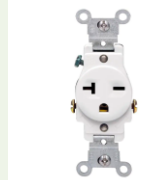
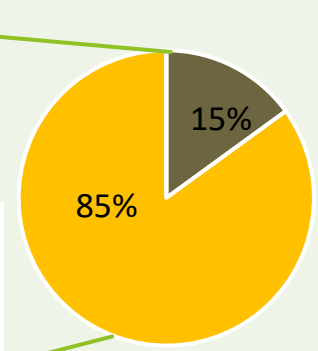
An amendment to Title 24 Part 11
California Green Building Code

- Residential
  - Single-family
  - Multi-family
- Non-residential

Single-Family EV Charging

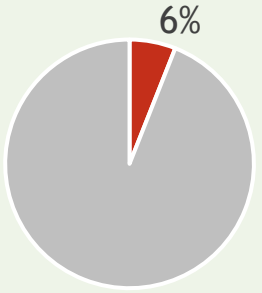
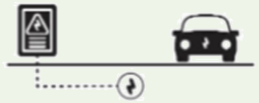
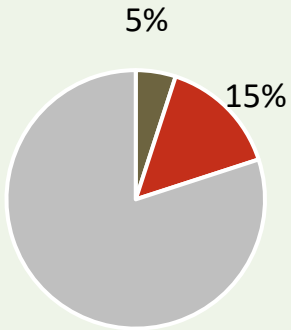
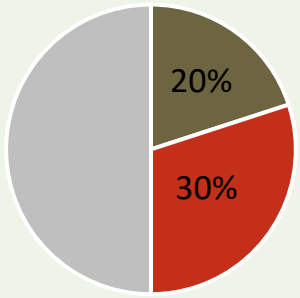
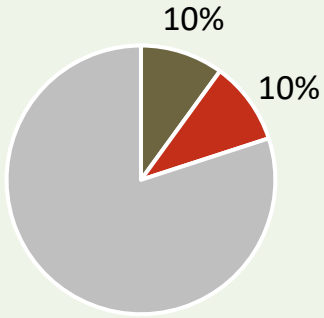
	2019 CALGreen	2022 CALGreen	Model Code
	Mandatory	Mandatory	
Single-Family Homes and Two-family Townhomes	(1) Level 2 EV Capable for one parking space per dwelling unit 		2 EV spaces total: • 1 Level 2 EV Ready circuit • 1 Level 1 EV Ready circuit    

Multi-Family EV Charging

	2019 CALGreen Mandatory	2022 CALGreen Mandatory	Model code
Multi-family	% of Parking Spaces  **10%** Level 2 EV Capable	% of Parking Spaces  **5%** Level 2 EVCS **25%** Level 2 EV Ready (low-power) **10%** Level 2 EV Capable	% of *Dwelling Units with* Parking Spaces   <u>Low Power Option</u> **40%** Level 2 EVCS **60%** L1 EV Ready	% of *Dwelling Units with* Parking Spaces   <u>High Power Option</u> **15%** Level 2 EVCS **85%** L2 EV Ready (low-power)

AUTOMATIC LOAD MANAGEMENT ENCOURAGED

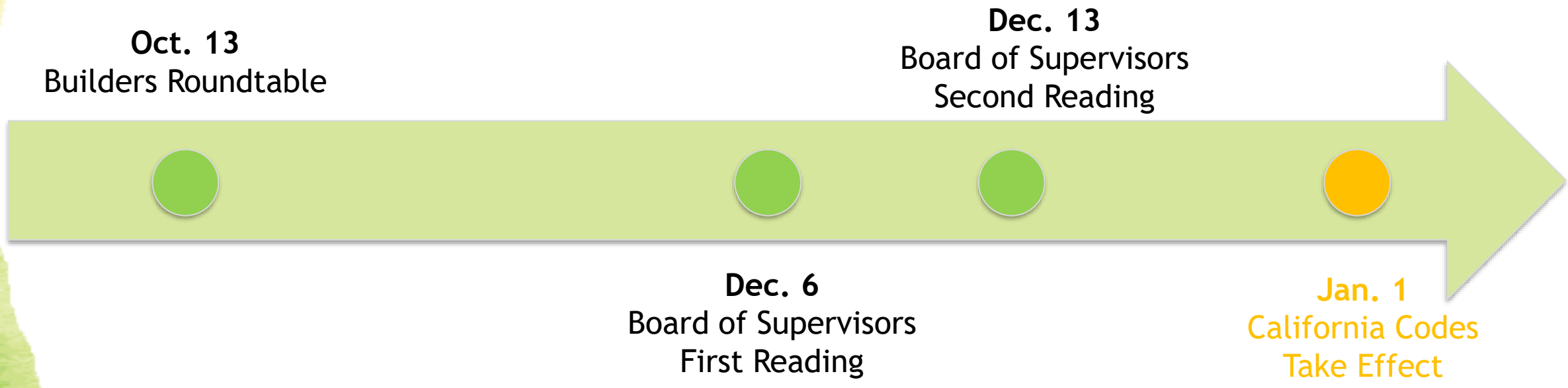
Non-Residential EV Charging

	2019 CALGreen	2022 CALGreen	Model Code	
	Mandatory	Mandatory		
Non-Residential	  **6%** Level 2 EV Capable	 **5%** Level 2 EVCS **15%** Level 2 EV Capable	 Offices: **20%** Level 2 EVCS **30%** Level 2 EV Capable	 All other: **10%** Level 2 EVCS **10%** Level 2 EV Capable

EV Charging Reach Code Comparison

	2019	2022
Housed	Title 24 Part 11 California Green Building Standards (CalGreen)	
RESIDENTIAL		
Exceptions	▶ Where there is no commercial power supply ▶ ADUs and Junior ADUs	TBD
Single-family	Level 2 EV Ready and Level 1 EV Ready	
	Exception: For each dwelling unit with only one parking space, install a Level 2 EV Ready space	TBD
Multi-family	10% Level 2 EV Ready and 40% Level 1 EV Ready	15% Level 2 EV Charger and 85% Low Power Level 2 EV Ready
NON-RESIDENTIAL		
Exceptions	▶ Where there is no commercial power supply ▶ Spaces accessible only by automated mechanical car parking systems	TBD
Office	10% Level 2, 10% Level 1, and 30% EV Capable	20% Level 2, and 30% of spaces to be Level 2 EV Capable
Other Commercial	6% Level 2 installed and 5% Level 1 installed Exception: Installation of each Direct Current Fast Charger with the capacity to provide at least 80 kW output may substitute for 6 Level 2 EVCS and 5 EV Ready spaces after a minimum of 6 Level 2 EVCS and 5 Level 1 EV Ready spaces are installed	10% Level 2 EV installed and 10% of spaces to be Level 2 EV Ready

Pathway to Reach Code Adoption



QUESTIONS?

ADDITIONAL INFORMATION

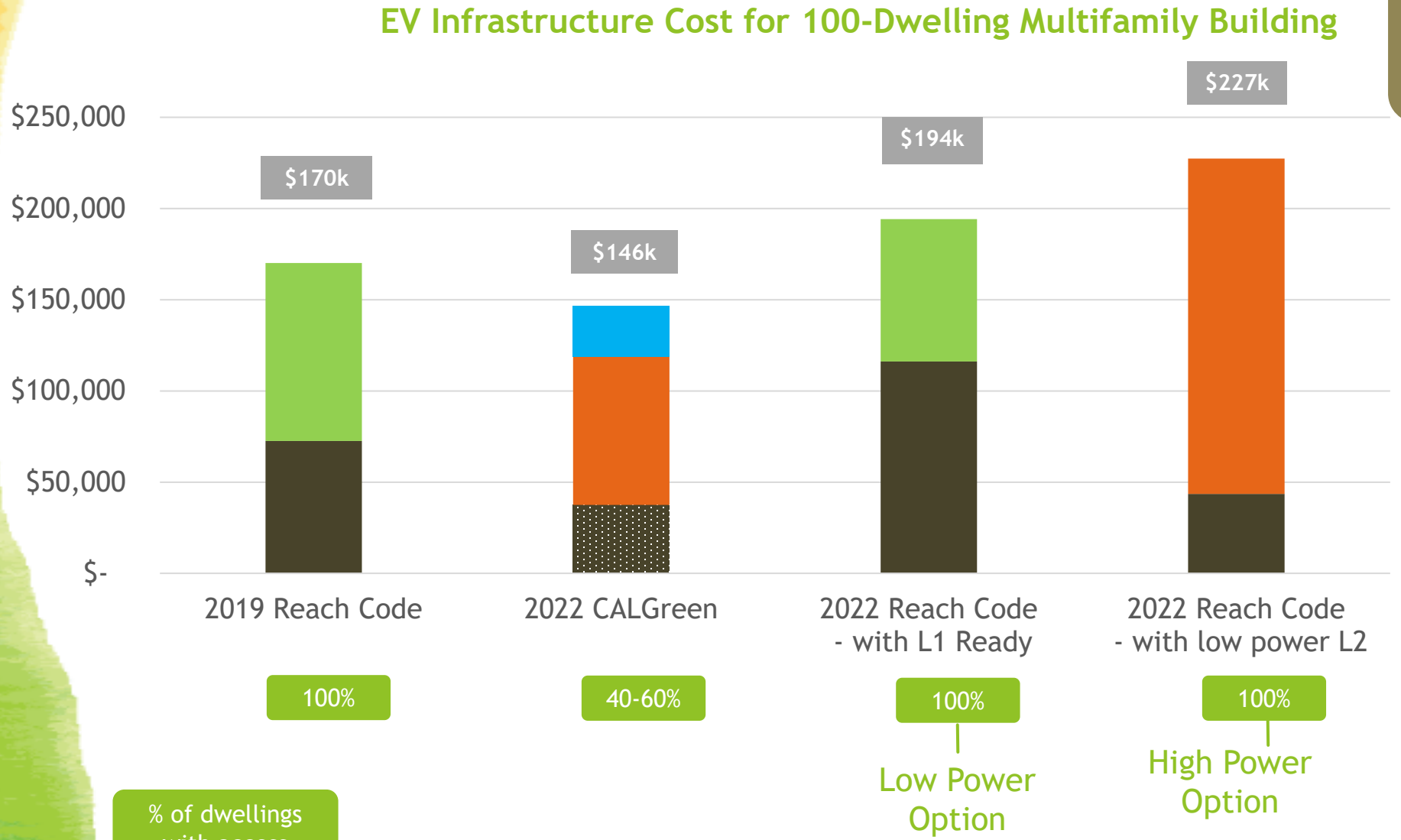
Common Concerns (1 of 2)

Concern	Response
Distribution grid upgrades are expensive	**Sometimes true**. Costs are offset by savings of all-electric construction.
Resilience, power-shutoffs	**Real problem, but gas does not help**. Gas appliance ignition is electric. In emergencies gas is also shut-off. State policy for grid hardening is key.
Uniformity	**Fair Concern, but all-electric is simpler & not adopting ensures future risk**. PCE and regional partners are encouraging consistency. All-electric is simple and inaction locks in future cost (retrofits, rates) and risk (fire).
In multifamily, central heat pump water heating requires more design expertise and space than gas boilers.	**True, training needed.** There are scores of working systems, but best practice guidance is available.

Common Concerns (2 of 2)

Concern	Response
All-Electric heating uses too much energy or can't work in our cool climate	**False. All-electric heat pumps are highly efficient and effective** in weather far colder than ours. DOE studies show heat pump space heaters as highly efficient at as little as 5 degrees Fahrenheit.
Energy is not clean	**False**. PCE base service is 100% GHG free today
Equipment is not available	**Mostly false**. Some scenarios for high-volume or steam applications are more challenging to address. Heat pumps and induction stoves have a long-established history, are widely adopted in other states, but market awareness needs to grow. PCE is addressing training needs.

100% Access is Cost Comparable

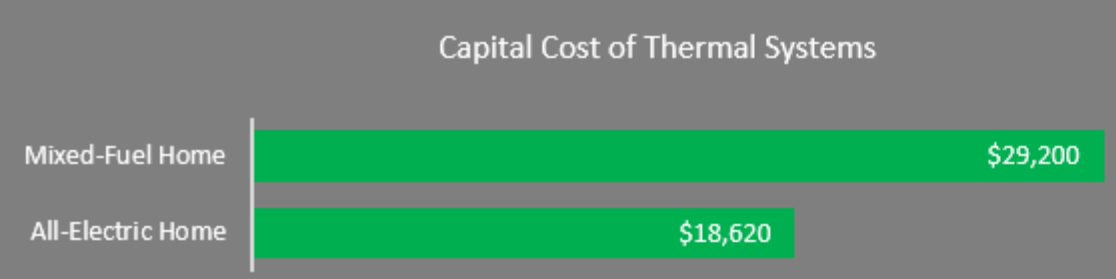


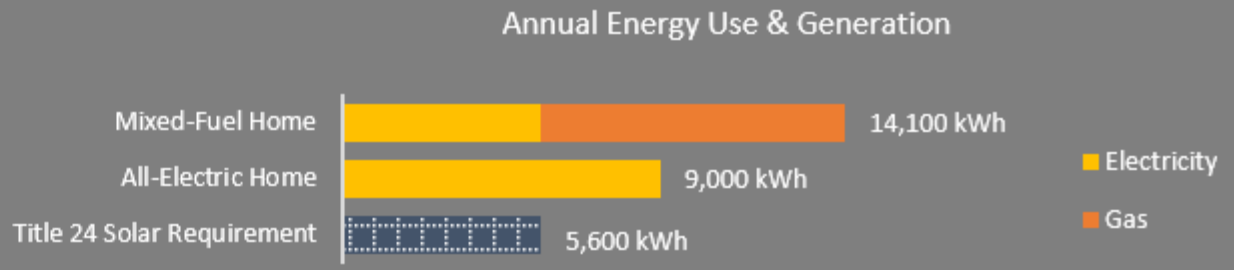
Each scenario is 0.3 - 0.5% of construction cost

Assumes $392/ft2 to build per : Turner and Townsend, 2021

Affordable Housing new construction is eligible for PCE incentives

Electrifying New Single-Family Homes in the Bay Area – The Cost Story





$191 Net Lifecycle Cost Savings per year for an all-electric home versus the mixed-fuel equivalent

3 MT CO2e Carbon Emissions Savings per home, per year based on 2030 grid mix

Capital and energy costs of thermal systems are based on Residential Building Electrification in California by E3 (April 2019); electricity costs assume CCA generation discount All-Electric Home, Increased Solar bill impacts are based on Low-Rise Residential New Construction 2019 Cost Effectiveness Study by Frontier Energy (August 2019) Version 8 10/21/2019

Can the Grid Handle the Load Increase?

- California Energy Commission's AB3232 analysis indicates that *aggressive* electrification will result in **20 percent additional summer peak load** through 2030. Winter load expected match summer peak load.*
- The electricity suppliers have a **service obligation** to meet your needs. "**PG&E fully expects to meet the needs** that all-electric buildings will require" -Robert S. Kenney, Vice President, PG&E
- CEC has noted **electrification as the lower cost, lower risk approach** to decarbonization
- CA-ISO has performed a 20-year study and has recommended **over $30B in transmission investments** to account for increased renewables and decommissioned gas power plants

**Represents PG&E territory. Assumes all-electric for 100% new construction, 90% replace on burnout, and 70% early retirement for remaining existing buildings.*

Sources: 1) AB3232 Decarbonization Assessment 2021 2) CA Energy Commission 2018 3) CA-ISO 4) CPUC 2021

2022 New Exemption Language

Exception 5: Parcels or sites currently served by the electrical supplying agency, and where at least one building intended for human occupancy and constructed prior to the existence of this ordinance (February 25, 2020) currently exists:

Where, due to local site conditions, an applicant establishes that it is infeasible to construct an all-electric building, the Building Official shall have the authority to grant an exception provided he or she finds that one of the following conditions apply:

1. That for undergrounded utilities, the distance from the point-of-connection at the proposed building to the location of the supplying agency exceeds 150 linear feet, and that any existing underground electrical conduits are not of adequate size or in such condition as to permit the installation of adequately sized conductors for the proposed new construction. Other factors, such as the point-of-connection location specified by the supplying agency being located on the opposite side of a street and trenching across a street would be required to complete the installation, may also be considered by the Building Official for this exception.
2. That for overhead utilities, the cost of installing new or upgraded conductors and equipment required for such conductors would exceed 10% of the total project cost and, thereby, present a financial hardship to the applicant.

Equipment

	Space Heating	Water Heating	Cooking	Clothes Drying
Residential				
Commercial