PENINSULA CLEAN ENERGY

South San Francisco Building Reach Codes

Focus on Research Laboratories and other Nonresidential

September 1, 2021

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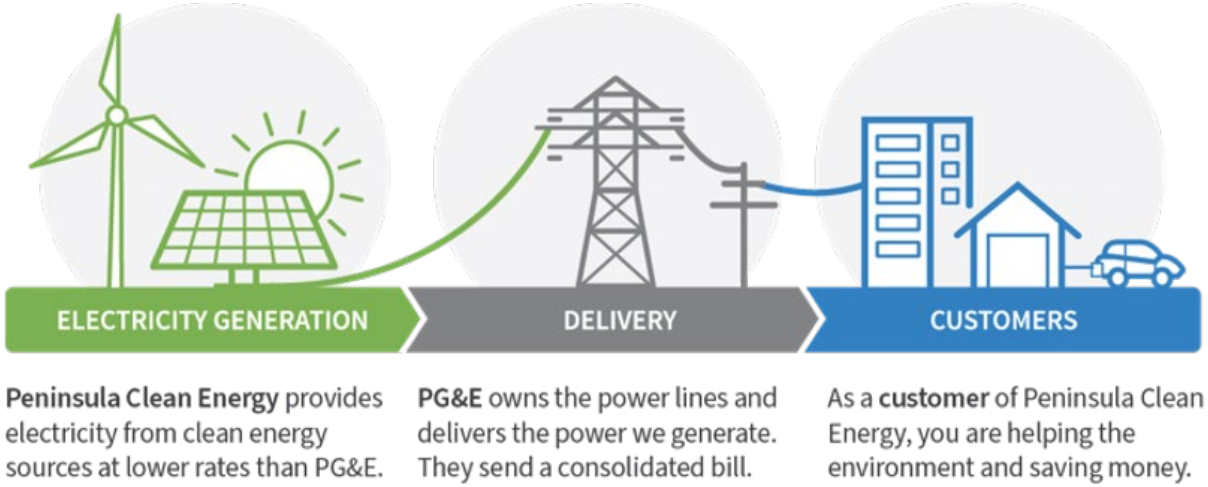
on behalf of Peninsula Clean Energy

Peninsula Clean Energy

Peninsula Clean Energy is San Mateo County's not for profit locally-led electricity provider

Mission: To reduce greenhouse gas emissions by expanding access to sustainable and affordable energy solutions

How it works



SSF City Council Policy Direction

- On May 26, 2021, Council adopted reach codes for NEW residential:
  - Requiring all-electric appliances in buildings
  - Higher standards for EV Charging stations
- Council asked staff to explore similar reach codes for non-residential
- Council wants to ensure businesses can learn about the benefits of reach codes and share feedback, concerns, or logistical issues that may exist for specific types of businesses

What are Reach Codes?

- Local enhancements to state code
- Can be adopted at any time
- Addresses:
  1. Building electrification – reduced use of natural gas
  2. Electric vehicle (EV) charging – increased EV readiness
- Improves economic and energy performance for <u>new</u> construction

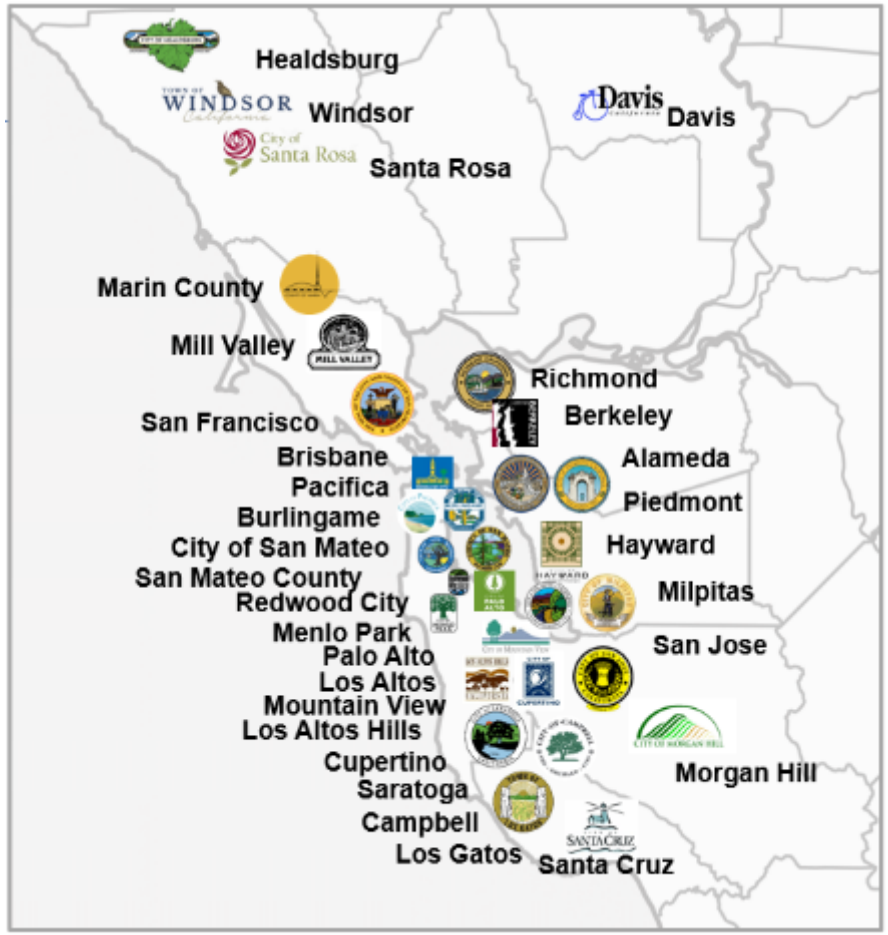
Why Reach Codes?

Climate change is here:

- Increased wildfires
- More severe drought conditions
- Sea level rise/coastal erosion
- More intense storms
- Hotter temperatures

Adopting Cities & Approach

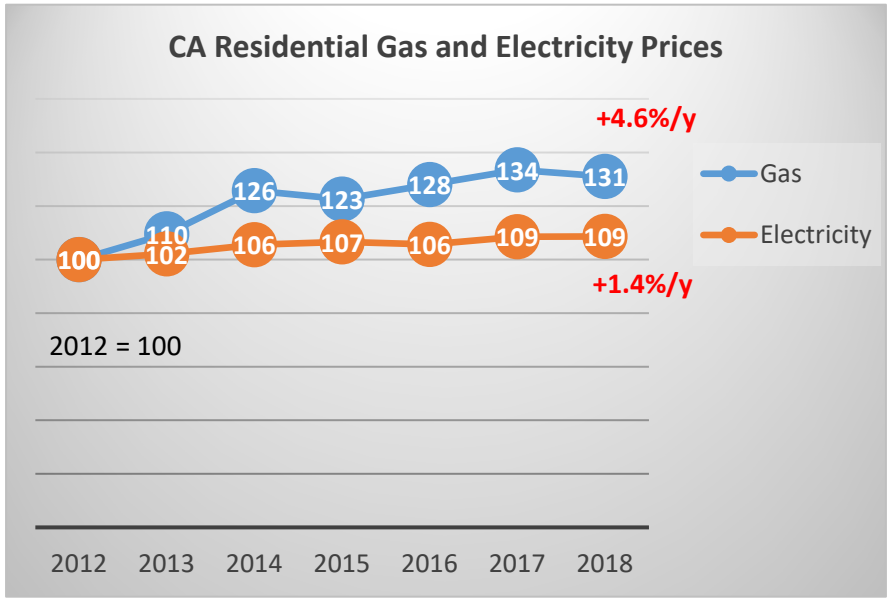
- 49 cities and counties statewide
- 13 in San Mateo County
- Most codes include:
  - All-electric with exceptions
  - Flexible exceptions based on local needs (e.g., commercial kitchens)
- Based on existing cost-effectiveness analyses: https://localenergycodes.com/



Nationally 50-60% of homes are already fully electric (American Community Survey)

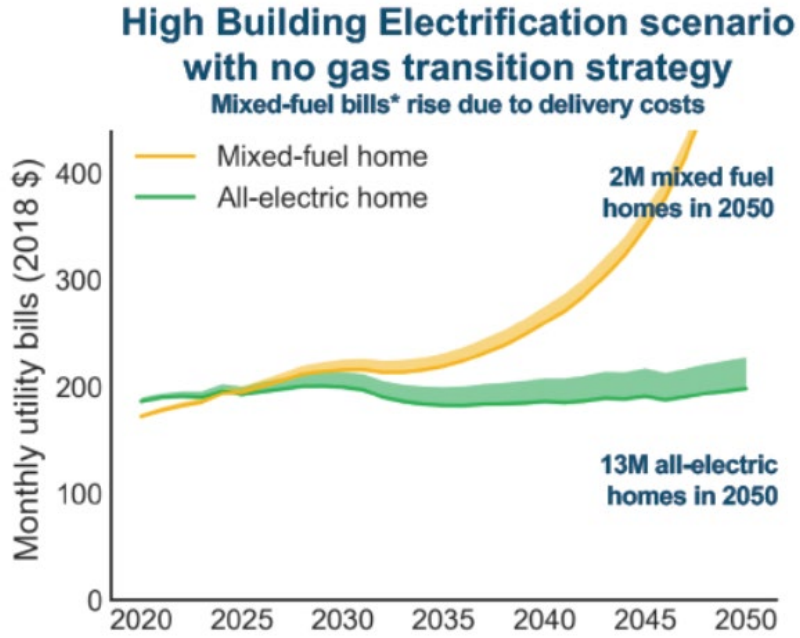
Natural Gas Costs Climbing

CA residential natural gas prices increased 3x faster than electricity prices from 2012 to 2018



Source: EIA
https://www.eia.gov/dnav/ng/hist/n3010ca3m.htm
https://www.eia.gov/electricity/data/browser/#/topic/7?agg=2,0,1&geo=g&freq=M

Trend expected to accelerate:



CEC Workshop June 6, 2019: Draft Results from E3 study on the Future of Natural Gas Distribution in California

The AB3232 Report represents the most current CEC research supporting that *Aggressive Electrification* is the primary pathway to meeting GHG reduction targets.

Focus on Research Laboratories

UC Cost Effectiveness Study – Lab HVAC Design

Table 5. Modeled HVAC Systems for Laboratory Buildings

Laboratory Buildings		
System Type	Gas + Electric	All-Electric
Campuses with Heating and Cooling Loop	- VAVRH System	- VAVRH System
	- District Heating	- Water Source Heat Pump
	- District Cooling	- District Cooling
Campuses with Cooling Loop Only	- Boilers	- Water Source Heat Pump
	- District Cooling	- District Cooling
Notes	*UCB and UCSC are unique. UCB is modeled without loops. UCSC is modeled with a condenser water loop only.	

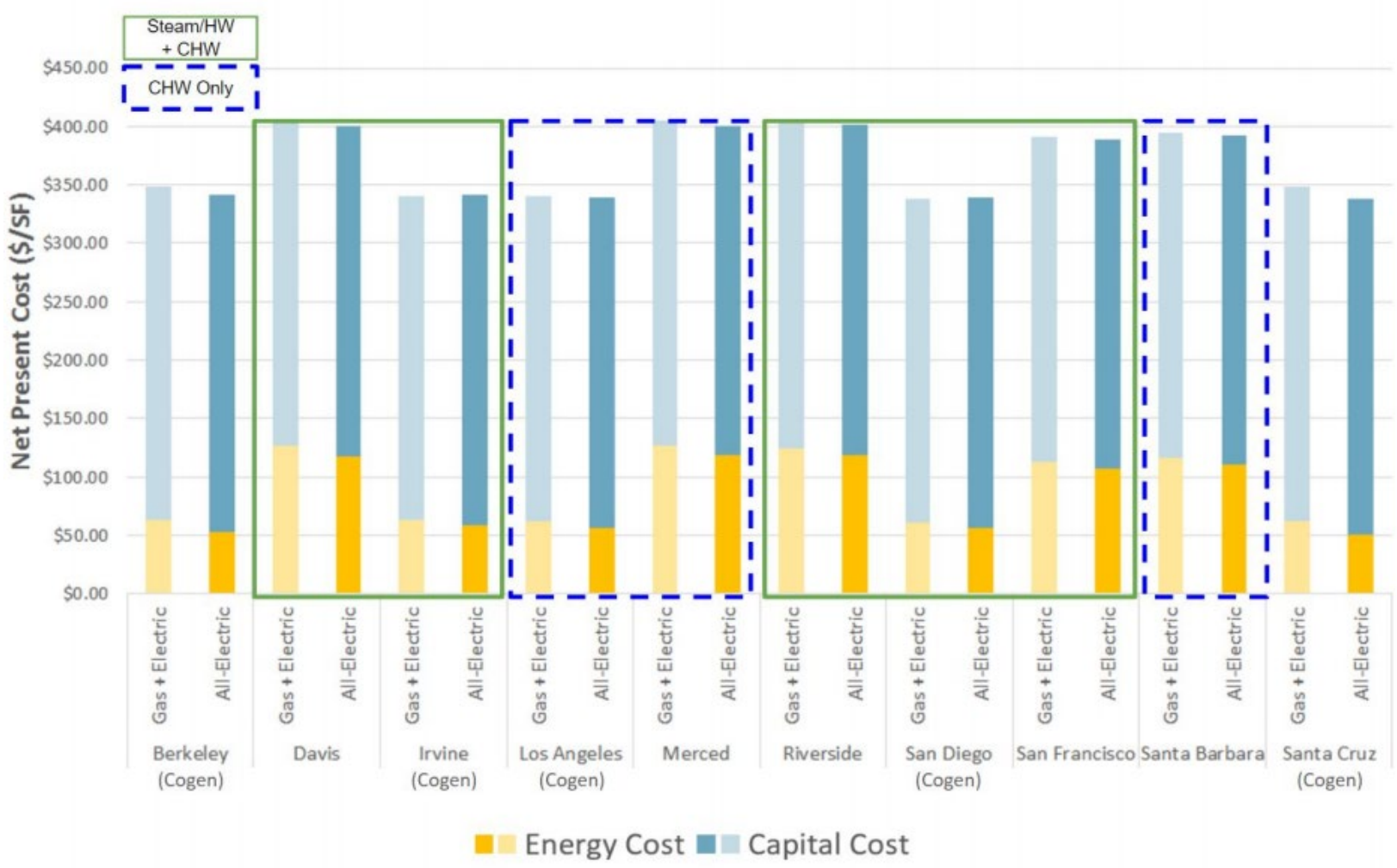
Notes:

1. Source: UC Carbon Neutral Buildings Cost Study (2017)
2. This study led to all-electric policy adoption for the entire UC system.
3. University of California has unique power generation and procurement profiles that may not be representative of private developers.

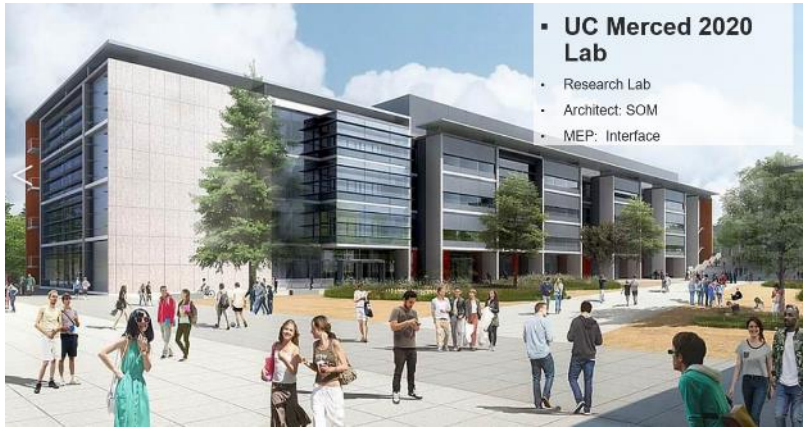
Table 13. Evaluation of Different All-Electric HVAC Heating & Cooling Sources

System Type	Acad	Lab	Res	Pros	Cons
Electric Resistance Heating	N/A	N/A	$	Simple, common, inexpensive	Aesthetics, limited applicability
Ground Source Heat Pump	$$$	$$$	$$$	Highly efficient, predictable performance, localized system that is mostly hidden	Requires trenches or bores, testing of soil conductivity, difficult to fix if ever damaged
Air Source Heat Pump	$	$	$$	Great efficiency, flexible installation locations, does not require additional source equipment	Sizes and system configurations not as numerous as boiler or chiller systems
Water Source Heat Pump connected to CW loop	$$	$$	$$	Same as Air Source but more efficient and predictable performance	Same as Air Source but requires condenser water and more hydronic piping and pumps
Air Source Variable Refrigerant Flow System	$$	$$	$$$	Fully variable modern system growing in popularity, highly efficient at part and full load.	Use of refrigerants within the occupied space, lots of refrigerant piping in the space that must be installed with care and detail.
Ground or Water Source (CW) Variable Refrigerant Flow System	$$$	$$$	$$$	Same as Air Source but more efficient and predictable performance.	Same as Air Source but requires condenser water and more hydronic piping and pumps
Heat Recovery Chiller	$$	$$	N/A	High Efficiency. Chilled and hot water from one piece of equipment.	Non traditional piece of equipment may require training, introduces HW temperature restraints
Central or local Water Cooled Chiller (with Cooling Tower)	$$$	$$$	$$$	Chilled water plants are common and can be made to be very efficient.	Chilled water plants can also be operated inefficiently, require substantial infrastructure and site area.
Central or Local Air Cooled Chiller	$$	N/A	$$	Simple piece of equipment, comes in many sizes and configurations	Much less efficient than a water cooled chilled or a heat pump. Less efficient than a heat pump

UC Cost Effectiveness Study – Findings for Laboratories



UC Carbon Neutral Buildings Cost Study (2017)
https://www.ucop.edu/sustainability/_files/Carbon%20Neutral%20New%20Building%20Cost%20Study%20FinalReport.pdf

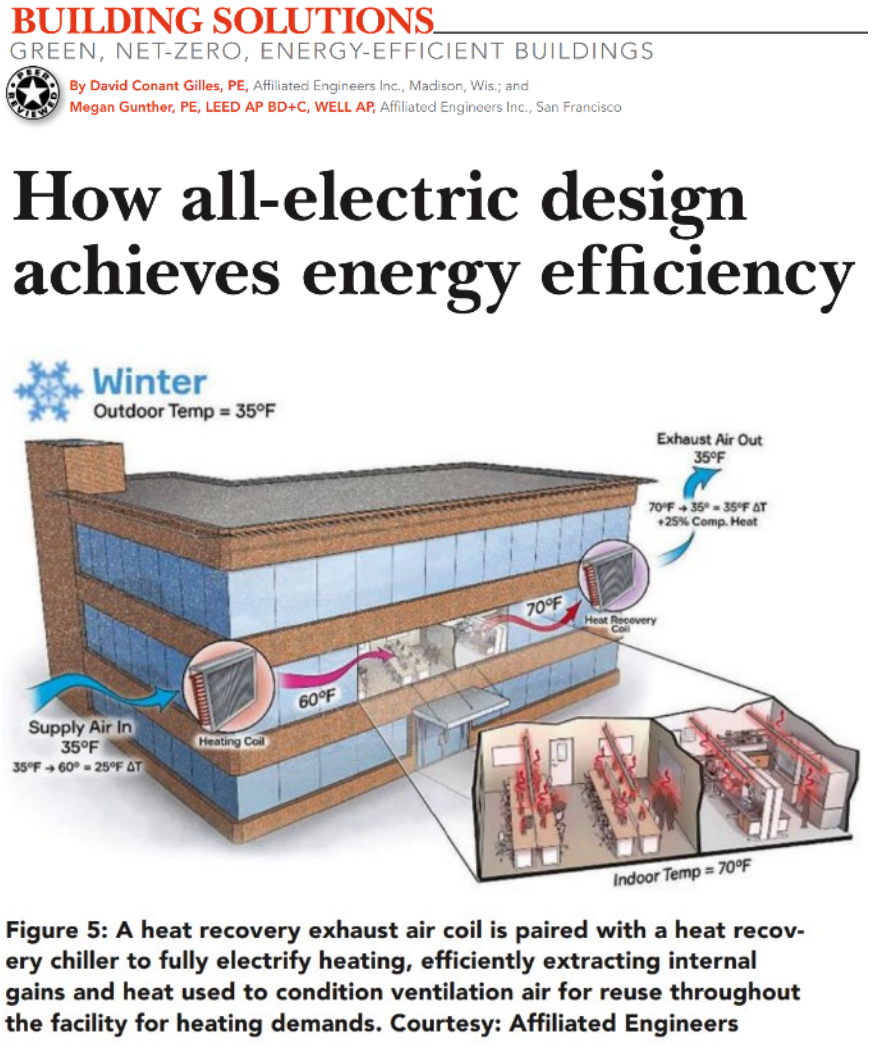


University of California – Berkeley, Bakar BioEnginuity Lab | BERKELEY, C

Pursuing LEED Silver

Examples of All-Electric Labs

Overview of Design Methods, by AEI



BUILDING SOLUTIONS
GREEN, NET-ZERO, ENERGY-EFFICIENT BUILDINGS

By David Conant Gilles, PE, Affiliated Engineers Inc., Madison, Wis.; and Megan Gunther, PE, LEED AP BD+C, WELL AP, Affiliated Engineers Inc., San Francisco

How all-electric design achieves energy efficiency

Figure 5: A heat recovery exhaust air coil is paired with a heat recovery chiller to fully electrify heating, efficiently extracting internal gains and heat used to condition ventilation air for reuse throughout the facility for heating demands. Courtesy: Affiliated Engineers

Affiliated Engineers outlined their approach for all-electric laboratory spaces in a journal article:

- Efficiency is crucial
  - High-performance envelope
  - Decoupled ventilation and space conditioning in office spaces
  - Auto sash closures on fume hoods
  - Variable-flow, wind-monitoring exhaust fans
- Exhaust air heat recovery, with the recovered heat going to the central heat pump (or heat recovery chiller).
- Balance supply water temp, efficiency, and storage size

CONSULTING-SPECIFYING ENGINEER (ISSN 0892-5046, Vol. 58, No. 5, GST #12339745. **How all-electric design achieves energy efficiency.** Affiliated Engineers. Available at: https://bt.e-ditionsbyfry.com/publication/?m=27298&i=711040&p=26&ver=html5

Can the Grid Handle the Load Increase?

- AB3232 Analysis indicates that aggressive electrification will result **15 percent additional summer peak load** by 2030. Winter load will match summer peak load.*
- "**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
- The electricity suppliers have a **service obligation** to meet your needs

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

Resources for Developers

AllElectricDesign.org

- Free technical assistance to architects, builders, developers, design engineers, contractors, and energy consultants
- Portfolio of leading experts for every building type
- Technical roundtables
- Design guidelines
- In-depth 1-on-1 assistance

Next Steps


Sept/Oct 2021
Solicit feedback from businesses
Oct 2021
City Council Study Session
Nov/Dec 2021
Draft ordinance for Council consideration

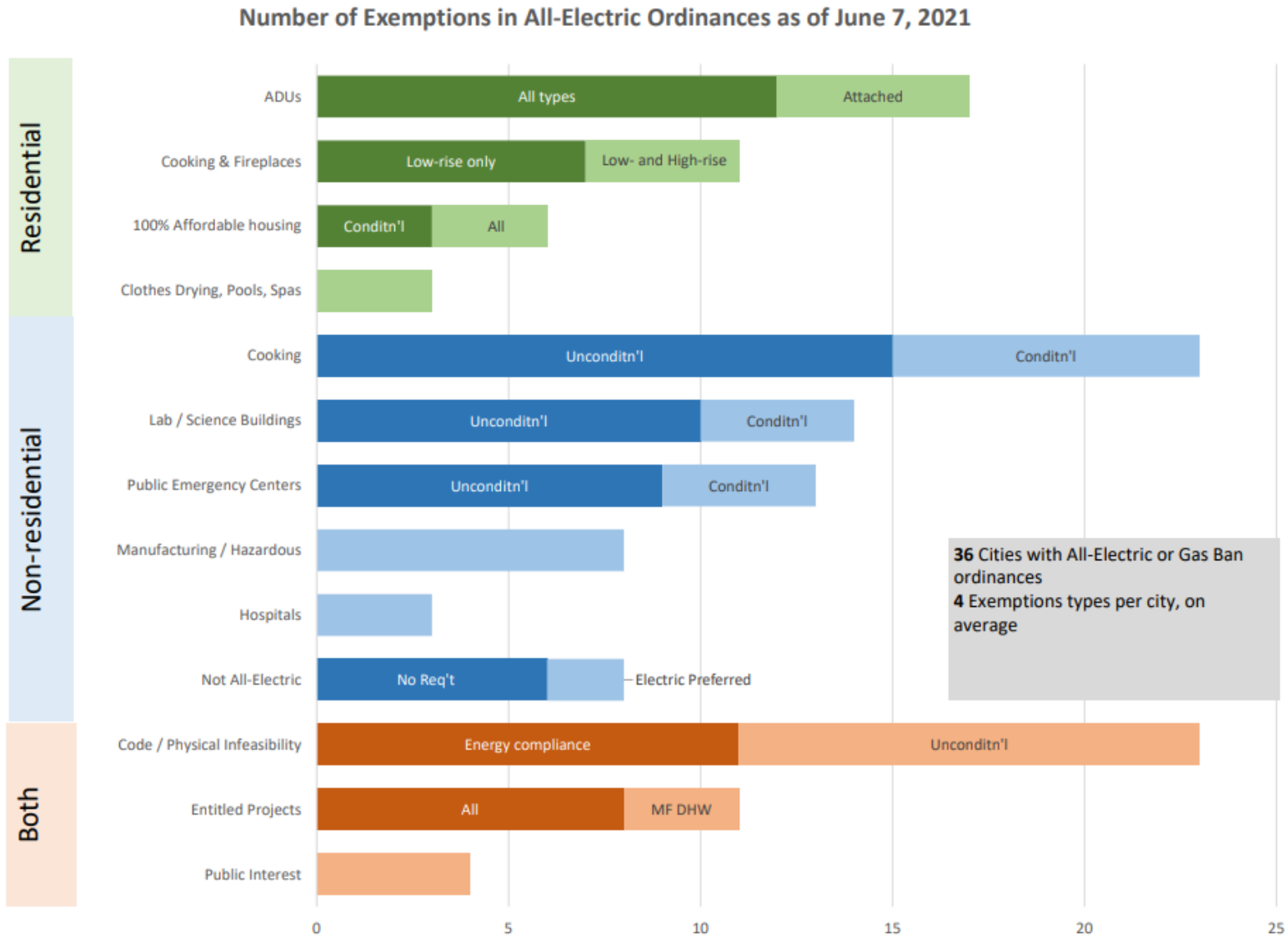
PENINSULA CLEAN ENERGY

Thank you!
Please share your feedback.

Alex Greenwood: Alex.Greenwood@ssf.net
Director, Economic & Community Development Department
Direct (650) 829-6622

Online survey for feedback: https://www.ssf.net/departments/economic-community-development

All-Electric Ordinance Exemptions



Electric Vehicle Code Options

Speed

Level 1
3-4 miles per charging hour

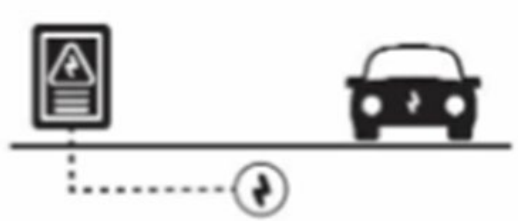
Level 2
10-20 miles per charging hour

Level 3
150+ miles per charging hour

Peninsula Clean Energy

Readiness

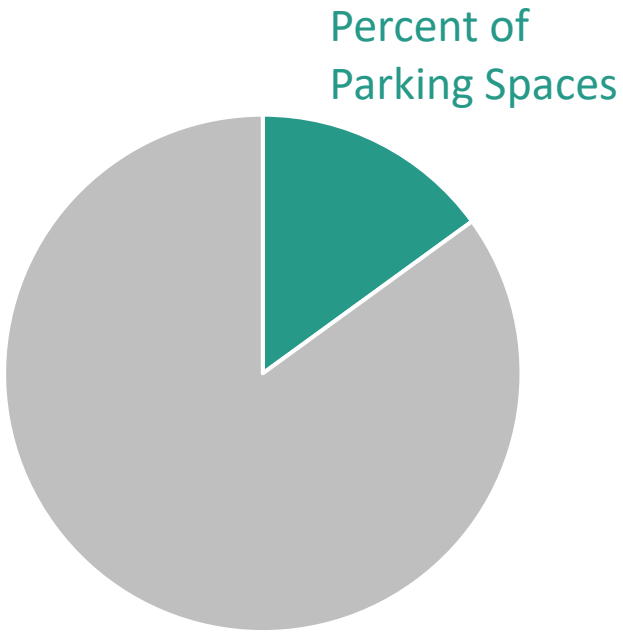
EV **Capable**



EV **Ready**

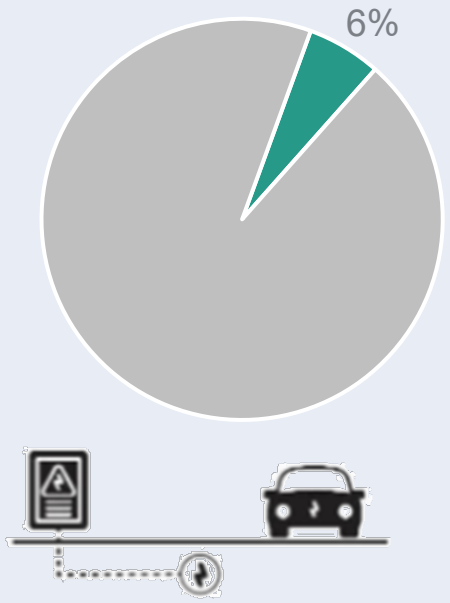
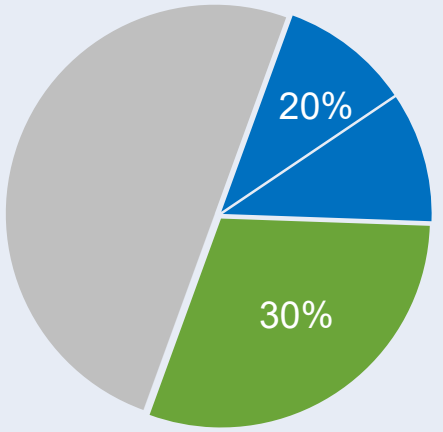
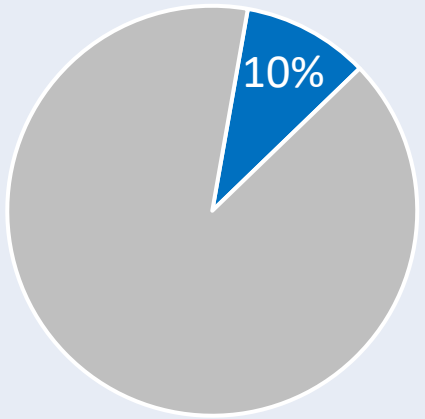
EV **Charging Station**

Number



Non-Residential, Office & Commercial – Peninsula Clean Energy Recommendation

ELECTRIC VEHICLE OUTLET

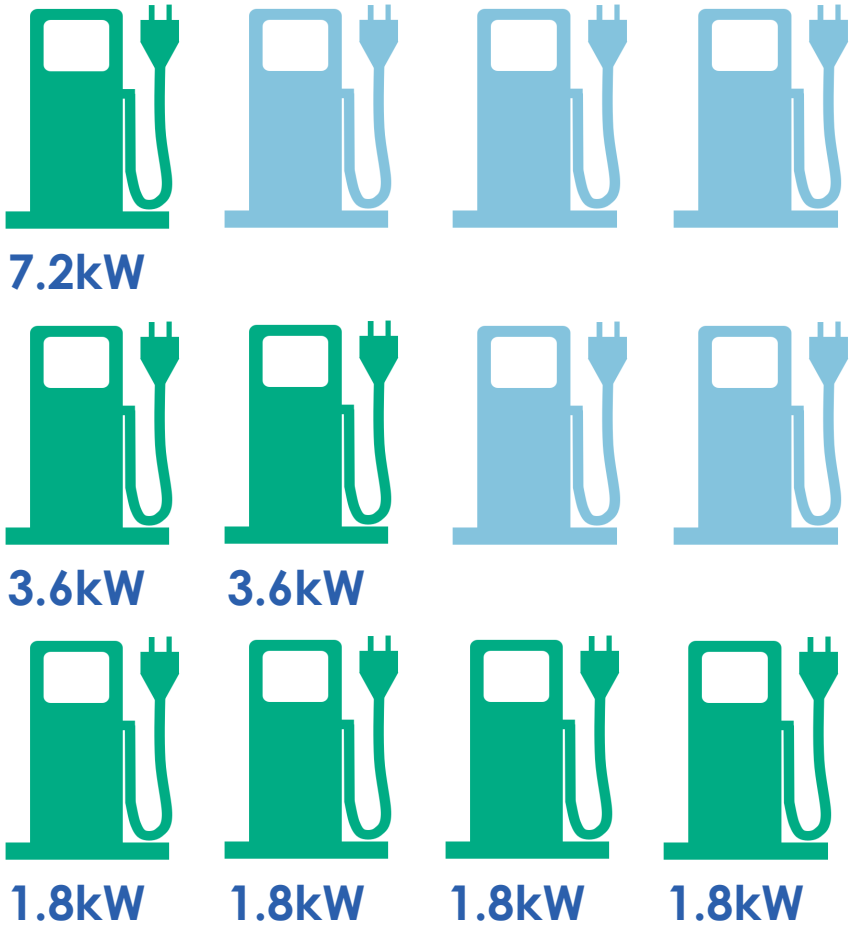
	2019 CALGreen	PCE/SVCE Proposed	
	Mandatory		
Non-Residential	 **~6%** Level 2 EV Capable (for buildings with at least 10 parking spaces)	 Office building: • **20%** Level 2 EVSE • **30%** EV Capable or EV Ready	 Commercial: Of all parking spaces, • **10%** Level 2 EVSE

Encouraged to include Automatic Load Management

>100 spaces: option for 80kW DC Fast Charger per 100 spaces

Automatic Load Management

- *“A control system which allows multiple EV chargers or EV-Ready electric vehicle outlets to share a circuit or panel and automatically reduce power at each charger…"*
- *"Designed to deliver a minimum of 8-amperes and not less than 1.4-kiloWatts… to each EV space.”*



SILICON VALLEY CLEAN ENERGY