

 **PENINSULA**
CLEAN ENERGY

 **SILICON VALLEY**
CLEAN ENERGY

 **OFFICE OF SUSTAINABILITY**
COUNTY OF SAN MATEO

Local Amendment to Code ("Reach Code")

Los Altos Environmental Commission

July 8, 2019

 **TRC**
the results you can rely on

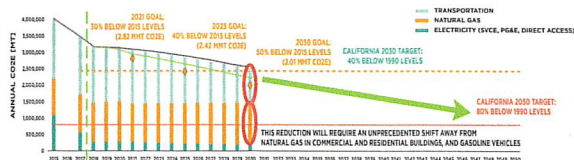
 **DNV-GL**

Today's Objectives

- State has ambitious goals for carbon reduction
- Cities need to take actions to meet those goals
- Cities can amend Building Codes to support meeting those goals
- Model Code Language developed to accomplish the above

Goal - Increase Electrification of Buildings

- **Emissions reductions** and decarbonization
 - CA Executive Order B-55-18 for Carbon Neutrality by 2045
 - Sourcing clean electricity has never been easier
 - **Natural Gas and Transportation contributions must reduce**



Summary about Code

Title 24 provides the following for three years until the next code cycle:

Building Pathways (Energy Code)

1. Dual-Fueled (electricity + natural gas) – a cost effective model or list
2. All-Electric – a cost effective model or list

EV Charging (CalGreen)

A minimum Quantity, Readiness, and Recharging Rate for electric vehicle charging stations per building type – single family, multifamily, commercial

What about Building Codes

- All New Construction must meet Title 24 Building Codes
 - Code governs both the building and the EV charging infrastructure (*among other things*)
 - Natural Gas: Many buildings use fossil fuels for heating (space and water)
 - Transportation: Some vehicles (EV's for example) pollute less than their fossil fuel peers
- Cities can make local amendments to those Codes to meet local conditions or values
 - A Local Amendment (or Reach Code) must include at least one cost-effective pathway
- A building code, based on what it contains, can encourage the selection of the Pathway based on what is required within the Pathways.

Reach Codes – What & Why

Why

- Maintaining the **lowest cost construction option (all-electric)** **encourages** developers to build cleaner, **healthier**, lower cost buildings fueled by pollution free electricity.
- Santa Clara county leads the state in EV adoption rate. The base recommendation is too low to meet local need. **Installing charging stations later cost 2-4x as much.**

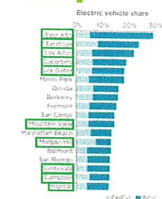


Figure 2. New electric vehicle market share of

What can we do with Code

Introduce change (a local amendment) within one pathway that encourages the selection of the other pathway. Here's an example for Single Family homes...

	Base Title 24 Code		Proposed Reach Code		CalGreen Reach Code	
	Dual Fueled	All Electric	Dual Fueled	All Electric	Dual Fueled	All Electric
Required Code	Base Code	Base Code	Reach Code	Base Code	Reach Code	Base Code
Incremental Cost ¹	\$0	\$0	\$5,500	\$0	\$15,000	\$0
Cost Effective	Yes	Yes	Yes	Yes	No	Yes
Incremental Equipment ²	None	None	Solar Thermal or Batteries	None	Solar Thermal or Batteries + Green Constr.	None
Carbon Emissions	Tons	Pounds	Tons	Pounds	Tons	Pounds
Frequency of Use	Most	Least				

¹ To meet Code

A ban on gas would result in only All-Electric buildings but cannot be accomplished within the Building Code.

Reach Code – EV Charging

CalGreen (Part 11) provides minimum requirements for each aspect of EV Charging per building type

Building Type	Quantity	Readiness	Charging Speed	Readiness
Residential	1 per dwelling unit	Capable	Level 2	Installed
Multi-Unit Dwelling	10% of total spaces	Capable	Level 2	Ready
Commercial	6% of total spaces	Capable	Level 2	Capable

To enact a reach code for EV charging, increase the Quantity, Readiness and/or Charging Speed.

Building Type	Quantity	Readiness	Charging Speed	Speed
Residential	1 per dwelling unit 1 per dwelling unit	Capable Ready Ready	Level 2 Level 1	Level 3 Level 2 Level 1
Multi-Unit Dwelling	10% 75% of total spaces 75% of total spaces	Capable Ready Ready	Level 2 Level 1	
Commercial	6% 10% of total spaces 10% of total spaces 30% of total spaces	Capable Installed Ready Capable	Level 2 Level 1 Level 2	

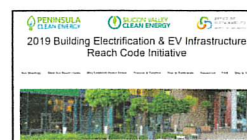
(above charts simplified for illustration purposes)

Sample Recommendation

- Buildings: Adopt a Reach Code to encourage developers to select healthier, safer, all-electric buildings.
 - By increasing the cost to construct for fossil fueled buildings, this pathway becomes less attractive.
 - Note: natural gas fueled homes already cost about \$5,000 more to construct
 - A developer can select the lowest cost pathway, All-Electric
- EV: Adopt a Reach Code reflects Santa Clara County's much higher than average adoption rate, provides more opportunities for EV's within the multifamily community, and saves money by doing so during construction, rather than retrofitting later.

Questions?

Reach Code Websites:
SiliconValleyReachCodes.org



Rafael Reyes
Director of Energy Programs
Peninsula Clean Energy
RReyes@peninsulacleanenergy.com
Phone: 650-257-2116
Cell: 415-225-7645

John Supp
Manager of Account Services
Silicon Valley Clean Energy
John.Supp@svcleanenergy.org
Phone: 408-721-5301 x1014
Cell: 650-646-1524

Rachael Londer
Sustainability Coordinator
County of Santa Clara, OOS
RLonder@smc.gov.org
Phone: 650-363-4077



Appendix Slides

What is Cost-Effective

- Definition of Cost Effectiveness (applies to Buildings Only)
 - "any required measure must save at least as much on the utility bill as the measure itself costs"
 - So, if a measure costs \$1500, it must save \$1500 or more on future utility bills
- The default code (aka Title 24 without local amendment) is considered cost effective by the California Energy Commission.

What is a Pathway

- Definition of Pathway
 - "the code must include separate methodologies based upon the fuel source (natural gas, electricity, or both) of the building"
 - A natural gas only building essentially does not exist. So, a **dual-fuel** building is more likely, using a combination of natural gas and electricity.

Outcome

- Dual-Fuel Building – a model or list of what is required
- Electricity-fueled (aka "All-Electric") Building – a model or list of what is required

Will More Electric or All-Electric Help?

- Cost Savings**
 - Lower first costs by not constructing natural gas infrastructure
 - Operational costs (dependent on many factors)
- Lower risk pathway** according to California Energy Commission
- Healthier air quality** from eliminating indoor combustion according to California Air Resources Board
- Massive carbon reduction** compared to current dual fuel (natural gas + electricity) buildings

Already included in 2019 Title 24 Code

	Residential	Nonresidential
Performance Compliance Margin	Energy Design Rating (EDR)	Percentage
Solar Photovoltaics (PV) Installation	Sized to offset annual kWh consumption of mixed-fuel	n/a
Electric-ready	120V/20A for future electric water heater installation	n/a

These model codes ...

- Represent maximum found **cost-effective**
- Balance regional **consistency** and ability for **customization**
 - Strong suggestions are not formatted
- Live in **Energy Code**, but can be integrated with other codes
- Should be reviewed and refined through your normal processes

Mandatory for New Construction, Additions, Alterations

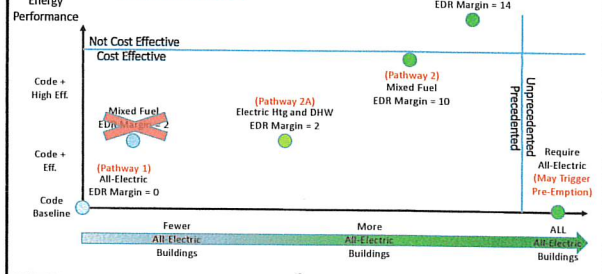
Item	Code Reads	Reach Code Reads	Optional add-on to Reach Code
Water Heating	120V/20A circuit	240V/30A circuit*	Location/design addressing air source and footprint
Clothes Drying	-	240V/40A circuit*	
Cooking	-	240V/50A circuit*	
Space Conditioning	-	-	240V/30A circuit*

Reach Code Optional Requirements

Item	Reach Code Option
Solar (PV) installed	Require PV (non-residential only)
Performance documentation	Encourage building simulation and compliance forms by certified energy analysts (must include definition of what meets certified standard)

Options are formatted with green highlights

Code Supporting Electrification Residential



Single and Two-family New Construction

	Performance Path	Prescriptive Path
1 + 2 OR	1. All Electric. Demonstrate that the proposed home will be all electric, OR	Build All Electric. Meet 2019 Title 24 Part 6.
1 + 2, 2A	2. Mixed Fuel Building. Proposed Design Building shall be at least 10 EER points less than the total Energy Design Rating calculated for the Standard Design Building, OR	Mixed Fuel Building a. Low leakage ducts b. R-10 perimeter slab insulation c. Compact hot water distribution d. Fan efficacy of 0.35 Watts/cfm e. Either 1) 5 kWh battery OR 2) A solar water heating system.
	2A. Electrically Heated Building (electric space and water heating, gas cooking and/or clothes drying). Proposed Design Building shall be at least 2 EER points less than the Energy Efficiency Design Rating calculated for the Standard Design Building, OR	Electrically Heated Building a. Low leakage ducts b. R-10 perimeter slab insulation c. Compact hot water distribution d. Fan efficacy of 0.35 Watts/cfm

Menu options are formatted with green highlight

Multifamily New Construction (≤3 stories)

	Performance Path	Prescriptive Path
1 + 2 OR	1. All Electric. Demonstrate that the proposed home will be all electric, OR	Build All-Electric and Meet 2019 Title 24 Part 6.
1 + 2, 2A	2. Mixed Fuel Building. Proposed Design Building shall be at least 10 EER points less than the total Energy Design Rating calculated for the Standard Design Building, OR	Mixed Fuel Building a. low leakage ducts in conditioned space b. 0.25 ASR cool roof c. R-10 slab insulation d. compact Hot Water distribution e. 0.35 W/cfm HVAC fan d. Either 1) 2.75 kWh battery/dwelling OR 2) A solar water heating system.
	2A. Electrically Heated Building (electric space and water heating, gas cooking and/or clothes drying). Proposed Design Building shall be less than the Energy Efficiency Design Rating calculated for the Standard Design Building	Electrically Heated Building Meet 2019 Title 24 Part 6

Menu options are formatted with green highlight

Nonresidential

	Performance Path	Prescriptive Path
1 + 2 OR	1. All Electric. Demonstrate that the proposed building will be all electric, OR	Build All Electric and meet 2019 Title 24 Part 6.
1 + 2, 2A	2. Mixed Fuel Building. All Occupancies. Demonstrate that the energy use of the proposed building is 25 percent efficient than the 2019 State Energy Code, OR	Mixed Fuel Building a. Fenestration with a solar heat gain coefficient ≤ 0.22. b. Airflows to be equal to the zone ventilation minimums. c. Economizers in air handlers ≥ 33,000 Btu/h d. Reduced the lighting power density (Watts/ft ²) by ten percent (10%) e. In common areas, improve lighting: 1) Daylight dimming plus off AND 2) Institutional Tuning. f. Install drains water heat recovery.
	2A. Mixed Fuel Building. Office and Mercantile. Demonstrate that the energy use of the proposed building is 15 percent efficient than the 2019 State Energy Code	Mixed Fuel Building a. Fenestration with a solar heat gain coefficient ≤ 0.22 b. Air Fenestration area to 5% of the 10% fenestration c. Airflows to be equal to the zone ventilation minimums d. Economizers in air handlers ≥ 33,000 Btu/h e. Reduced the lighting Watts/ft ² by 10% f. Improve lighting: 1) Daylight dimming plus off AND 2) institutional tuning AND 3) Commercial lighting question codes

Frequently Asked Questions


- **Additions/Alterations/ADUs?** – Electric-ready req's only
- **High Rise Multifamily?** – Carve-out added to code with results ~Aug/Sep
- **Mixed Use?** – Average of compliance margins required in other spaces, weighted by floor area
- **Core and Shell Nonresidential?** – Exception for core-and-shell which allows plumbing to be installed with no increased performance required. When gas meter is installed (i.e., the tenant would like gas) reach code is required. (currently under development)

Where Are We Now?

- For each building type, select 1 & 2, 1 & 2 & 2A, or Other (specify)
 - Single and Two-Family
 - Multifamily (≤3 stories)
 - Nonresidential
- Report out on current thinking. This is not a commitment.

Discussion

- What works?
- What is still unresolved?
- How closely aligned are we? How important is that?



Electric Vehicle Code

CALGreen Enhancements

EV Terms, Charge Rates

Level 1 "Trickle Charging"
Standard household outlet 15-20 Amp, 120v AC
Driving distance provided: 3-4 miles/hour

Level 2 "Standard Charging"
Equivalent to a dryer outlet. 40+ Amp, 208/240v AC
Driving distance provided (standard charging): 25-30 miles/hour

Level 3 "DC Fast Charging / SuperCharging"
24-350kW
Driving distance provided 72-1,200 miles/hour

EV Terms, Readiness of Charging Station

EV Capable - Some Assembly Required
Panel **capacity**, raceway (**conduit**) only at critical areas (underground, pinch points, etc.) Definition is less stringent than CALGreen 2019

EV Ready - Plug & Play
Panel **capacity**, raceway (**conduit**), overcurrent protection device (**breaker**), **wire**, **receptacle** & signage. Can refer to Level 1 or Level 2

EV Charging Station (EVCS) - Level 2 Charge!
Charging station fully installed. All the equipment needed to deliver electrical energy from an electricity source to the EV at Level 2

Single and Two-family New Construction

	2016 CALGreen	2019 CALGreen	PCE/SVCE Proposed
Single Family	Mandatory	Mandatory	
Two-Family			
Townhome			

(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

"EV Capable" is more extensive than that proposed by PCE/SVCE

Multifamily New Construction

	2016 CALGreen	2019 CALGreen	PCE/SVCE Proposed
Multi-Family	Mandatory	Mandatory	

3% Level 2 EV Capable for buildings with ≥17 units

10% Level 2 EV Capable

≤20 dwelling units: One Level 2 EV Ready per dwelling

>20 units: Of all dwelling units,
• 25% Level 2 EV Ready (10% in affordable housing)
• 75% are Level 1 EV Ready (90% in affordable housing)

Non-Residential, Office & Commercial

	2016 CALGreen	2019 CALGreen	PCE/SVCE Proposed
Non-Residential	Mandatory	Mandatory	

~6% Level 2 EV Capable (for buildings with at least 10 parking spaces)

Office building:
• 10% Level 2 EVSE
• 10% Level 1 EV Ready
• 30% EV Capable or EV Ready

Commercial: Of all parking spaces
• 6% Level 2 EVSE
• 5% Level 1 EV Ready
• Over 100 spaces: option for 80kW DC Fast Charger per 100 spaces

Where Are We Now?

- For each building type, identify **OK as is**, or Increase **Quantity, Readiness, or Charge Rate**
 - Single and Two-Family
 - Multifamily (≤ 3 stories)
 - Nonresidential
- Report out on **current** thinking. This is not a commitment.

Discussion

- What works?
- What is still unresolved?
- How closely aligned are we? How important is that?

Tools and Resources



Adoption Tools & Resources



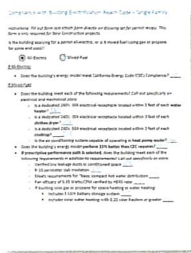
Presentation to Council

- Staff Report Template
- Reach Code Ordinance Language
- Presentation Template

Information for Council

- Carbon Emissions Savings
- Housing Impacts
- FAQs
- Cost Effectiveness Presentation

Implementation Tools & Resources



Permitting, enforcement, and inspection resources

- Permit Checklist
- Inspection Checklist
- Training for Building Department Staff
- FAQs

Implementation Tools & Resources



Public and Building Owner Resources

- Case Studies
- Website
- Homeowner Flyer
- FAQs on website
- Trainings for Environmental Advocates
- Community Advocates List
- Cost Effectiveness Presentation Tool
- Carbon Emissions Savings
- Housing Impacts

How do we go from here to there?

Conceptual Next Steps

- **Staff agreement on proposal**
 - What is needed for this?
- **Stakeholder Engagement(s)**
 - What is needed for this?
 - Refine as warranted
- **Including this topic on Council calendar**
 - **What Month are you planning to vote on Building Codes?**
 - What is needed? Staff Report? Other?

Wrap-up

- Summarize findings of "Where are we Now"
- Schedule support for your upcoming internal, stakeholder, or council meetings
- Develop additional tools/resources

"Together, we can make an incredible difference – Economics and the Environment
both win in this Reach Code."
 -- Unnamed SVCE staff member

Questions?

Reach Code Websites:
PeninsulaReachCodes.org
SiliconValleyReachCodes.org

Rafael Reyes
 Director of Energy Programs
 Peninsula Clean Energy
RReyes@peninsulacleanenergy.com
 Phone: 650-257-2116
 Cell: 415-225-7645

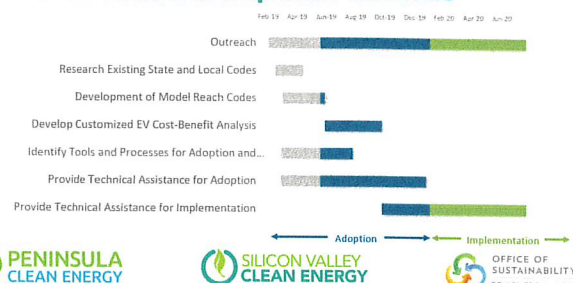
John Supp
 Manager of Account Services
 Silicon Valley Clean Energy
John.Supp@svcleanenergy.org
 Phone: 408-721-5301 x1014
 Cell: 650-646-1524

Rachael Londer
 Sustainability Coordinator
 County of Santa Clara, OOS
RLonder@smcgov.org
 Phone: 650-363-4077



A BUILDING CODE ORDNANCE TO SUPPORT ELECTRICITY USE DURING INFRASTRUCTURE FOR NEW CONSTRUCTION & RENOVATIONS

Reach Code Development Timeline



Next Steps

Activities:

- Review Proposed Reach Codes with your city staff members
- Share this with important community groups and commissions
- Engage Consultation support by contacting your respective OOS/PCE/SVCE representative
- Request \$10k Grant from PCE/SVCE
- Sign up for June 6th EV Infrastructure Code Webinar

Questions:

- Is this on an internal commission schedule?
- Is this scheduled on a Council Agenda?
- Has legal reviewed the proposed language?
- When does your city plan to vote on all new Title 24 language?




A BUILDING CODE ORDNANCE TO SUPPORT ELECTRICITY USE DURING INFRASTRUCTURE FOR NEW CONSTRUCTION & RENOVATIONS

Compliance and Enforcement



Plan Check / Permit – Compliance Form

GENERAL INFORMATION					
61	Project Name	Standard Design			
62	Calculation Description	2019 CALF Proposition with the total			
63	Project Location	1111 Main St			
64	City	San Francisco, CA			
65	Zip Code	94104	66	Standards Version	Compliance 2020
67	Climate Zone	CEC	68	Compliance Minimum Version	CEC Appendix 2019 & 21 Alpha 1000
69	Building Type	Single Family	70	Software Version	CEC Appendix 2019 & 21 Alpha 1000
71	Project Review	Energy Consultant	72	Event Observation (log Cardinal)	0
73	Total Load (Power Area BTU)	1.15	74	Number of Dwelling Units	1
75	Additional Load (Power Area BTU)	1.15	76	Number of Stories	1
77	Additional Load (Power Area BTU)	1.15	78	Gas Type	All Electric
79	Additional Load (Power Area BTU)	1.15	80	Existing Performance (P) Score	



Plan Check / Permit – Compliance Form

Mixed-fuel residence (Option 3), Total EDR Compliance Margin $\geq 2\%$

This project meets compliance margin

ENERGY DESIGN RATING				
	Energy Design Rating		Compliance Margin	
	Efficiency* (E100)	Total (E100)	Efficiency* (E100)	Total (E100)
Standard Design	10.7	10.7	10.7	10.7
Proposed Design	10.7	10.7	10.7	10.7

RESULT: **COMPLIES**

Mixed-fuel nonresidential building (Option 2), Compliance Margin $\geq 9\%$

COMPLIES				
Energy Component	Standard Design (2019)	Proposed Design (2019)	Compliance Margin (2019)	
Space Heating	10.7	10.7	0.0	
Water Heating	10.7	10.7	0.0	
Air Conditioning	10.7	10.7	0.0	
Lighting	10.7	10.7	0.0	
Power & Other	10.7	10.7	0.0	
Electricity	10.7	10.7	0.0	
Gas	10.7	10.7	0.0	
ENERGY STANDARDS COMPLIANCE TOTAL	242.83	242.45	0.00 (0.0%)	

This project does not meet compliance margin

EV Interest & Adoption

- Residents very interested in adopting EVs
- PCE Survey: Interest in adopting is independent of whether they have a garage
- Charging access is the #1 concern

75% open to obtaining an EV

36% Very likely to obtain an EV

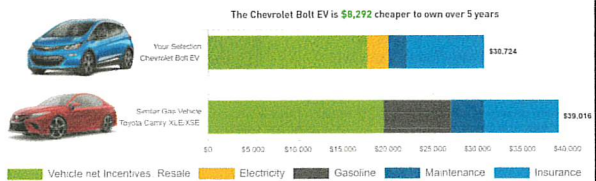
Palo Alto Resident Survey

- 7 in 10 existing EV drivers likely to get a 2nd EV
- 70% of non-EV drivers "extremely" interested in getting an EV if they knew charging would be readily available

95% Sales increase 2017 to 2018 Santa Clara County

Why CA & Bay Area?

New EV vs. New Gas Car



Local Economic Impacts

Reduced fueling costs for residents

- By 2025 approximately 100,000 EVs in PCE and SVCE
- EV savings over gas car \$1,200+/year

Over \$100M/yr Savings by Santa Clara and SVCE territory Residents

Reduced capital expenses

- 50,000 new housing units
- EV Reach Code <\$1.5k/unit at new construction
- \$7k/unit for retrofit

\$300M In avoided retrofitting costs

Savings (and costs) stay local

Feedback on Draft & Response

- EV Ready is preferred:**
 - Access to Power
- Level 1 can be effective, reduce costs:**
 - High Level 1 to Level 2 Ratio
- Impact on Affordable Housing:**
 - Lower power requirements
 - Incentives
- Future Technologies:**
 - Large raceway
 - Load management
- DC fast charging:**
 - Option for commercial sites



EV Requirements, Summary

Residential



Single Family: Complete L1 + L2 EV Ready circuits

Multifamily Buildings (<=20 units):

- One L2 EV Ready circuit per dwelling unit

Multifamily Buildings (>20 units):

- 25% of units: L2 EV Ready &
- 75% of units: L1 EV Ready

Affordable Housing (+ PCE/SVCE funding)

- 10% of units: L2 EV Ready &
- 90% of units: L1 EV Ready

Non-Residential



Workplace/ Office

- 10% of parking spaces: L2 EVSE &
- 10% of parking spaces: L1 EV Ready &
- 30% of parking spaces: EV Capable or EV Ready

Other Non-Residential Buildings

- 6% of parking spaces: L2 EVSE &
- 5% of parking spaces: L1 EV Ready &
- DC Fast Charging Option over 100 spaces

Affordable Housing

1. Adjusted Code Requirement

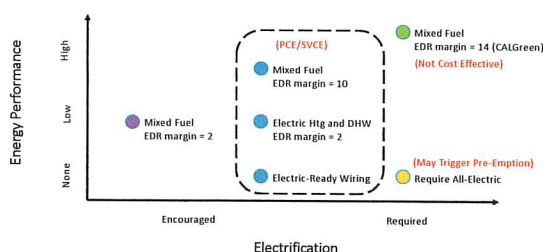
- 10% Level 2 EV Ready (CALGreen)
- 90% Level 1 EV Ready

2. Financial Support Program (Under Development)

- To cover most or all of install cost above State code
- Available in cities that adopt reach codes
- Available during the 2020-2022 code cycle
- Specific funding amounts are under development
- Technical assistance on implementation, including policies such as pricing, access control, etc.



Reach Code Map (Electrification v Performance)



Brisbane Staff Reach Code Proposals

Building Type	Mandates to install water PV		Increase Energy Efficiency & encourage building electrification (no natural gas)		Electric Vehicle Charging Infrastructure	
	2019 State Code	Proposed Reach Code	2019 State Code	Proposed Reach Code	2019 State Code	Proposed Reach Code
Single Family or Duplex	None	Min. 100% PV system + roof load	None	None	1 EV Capable space per unit	1 L2 EV Ready space per unit
Small Multifamily*	None	Min. 2 L2 EV PV system + roof load	None	None	1 EV Capable space per unit	1 L2 EV Ready space per unit
Large Multifamily**	None	Min. 3 L2 EV PV system + roof load	None	None	1 EV Capable space per unit	1 L2 EV Ready space per unit
Hotels	None	Min. 100% PV system + roof load	None	None	1 EV Capable space per unit	1 L2 EV Ready space per unit
Workplace + Office	None	Min. 100% PV system + roof load	None	None	1 EV Capable space per unit	1 L2 EV Ready space per unit
Other Non-Residential (Commercial, etc.)	None	Min. 100% PV system + roof load	None	None	1 EV Capable space per unit	1 L2 EV Ready space per unit

* Small Multi-Family defined in City's current Reach Code as 3-10 units. In PCE Proposed EV Reach Code as >20 units.
 ** Large Multi-Family defined in City's current Reach Code as 11+ units. In PCE Proposed EV Reach Code as 20+ units, for building electrification + electric.
 + Not for the sake of ensuring any additional for mixed fuel & EV only, waiting for further study.
 * See PCE proposal regarding load sharing & parking space considerations for EV Reach Code, also consider how parking is arranged, particularly for MUD.

Key Terms

All-Electric - Buildings using permanent supply of electricity for space heating, water heating, cooking, and clothes drying, with no natural gas plumbing installed.

Mixed Fuel - Uses natural gas or propane as fuel for space heating, water heating, cooking appliances or clothes drying appliances or is plumbed for such equipment.

Compliance Margin - How much less energy a building uses than state code, expressed as a percentage (e.g., 5%) or EDR (e.g., 1 point)

Mandatory Requirements - Features that must be installed, as applicable.

Performance Pathway - Demonstrate compliance using a compliance margin using CEC-approved modeling software.

Prescriptive Pathway - Demonstrate compliance using a list of specific measures (e.g. drain water heat recovery).

Climate Zone - Santa Clara county is located primarily within Climate Zone 4.

PURPOSE of the Reach Code

- Encourage developers to select cleaner electric pathway
- Preserve at least one lowest cost construction pathway for each building type (just meet the code, no reach)

How can we do this?

- By maintaining Title 24 baseline code for all-electric buildings, the all-electric pathway becomes more appealing to developers from a cost perspective and resulting in a lower emissions, healthier building.