

Building Electrification & Electric Vehicle Reach Codes Community Charrette

March 19th, 2019

City of San Mateo Downtown Public Library
55 West 3rd Avenue | San Mateo, CA 94402

Today's Objectives

- To share information on the development of building electrification and electric vehicle reach codes
- To hear your voice
- To gather important feedback to frame reach code options for future adoption

Agenda

- Introductions & Opening Remarks
- What is a Reach Code?
- Statewide Cost-Effectiveness Study & What does it mean?
- Summary of Technologies
- Discussion: Understanding of Impacts
- Next Steps



Introductions and Opening Remarks



Sven Thesen,
Program Manager,
PCE



Rachel Londer,
County of San
Mateo Office of
Sustainability



Douglas Kot,
Head of Section
DNVGL



Farhad Farahmand,
Project Manager, TRC



Reach Code Background



What is a Reach Code?

- California Title 24 Part 6 (the Energy Code)
 - Updated every 3 years
- California Title 24 Part 11 (CALGreen)
- Reach codes exceed Title 24, Part 6
 - Must be proven to be cost-effective
 - Can be prescriptive codes
 - Can be performance codes

What is a Reach Code?

- Local amendment to state code
- Developed through a stakeholder outreach process
 - Developers
 - Architects & Engineers
 - Environmental Organizations
 - Community Organizations
- Regulatory Entities
 - California Energy Commission – reviews and approves amendments to the energy code
 - Building Standards Commission – reviews and approves amendments to building code



How do municipalities adopt a Reach Code?

- Municipality internally explores Reach Codes
- Potential Reach Code options are defined
- Stakeholder and community outreach
- Refinement of Reach Code options
- Municipalities seeks community support for potential Reach Codes
- Municipalities completes the cost-effectiveness study (CEC Reviews)
- Municipalities approves through local Commissions and Councils
- Reach Code is approved!



Why Adopt a Reach Code?

- Construct more cost effective, safer, and healthier buildings
- To facilitate greater Electric Vehicle (EV) adoption rates
 - 2016 Code has an EV Charger density lower than current local uptake
- Prepare to meet future state code requirements, including 2019 Building Standards
- 2019 Energy Code addresses all-electric pathway
 - Solar Photovoltaic (PV) is required
 - Heat pump water heater pre-wiring is required
 - Residential all-electric compliance pathway established (not nonresidential)
- Reduce energy, cost and emissions
- Increase convenience, health and safety

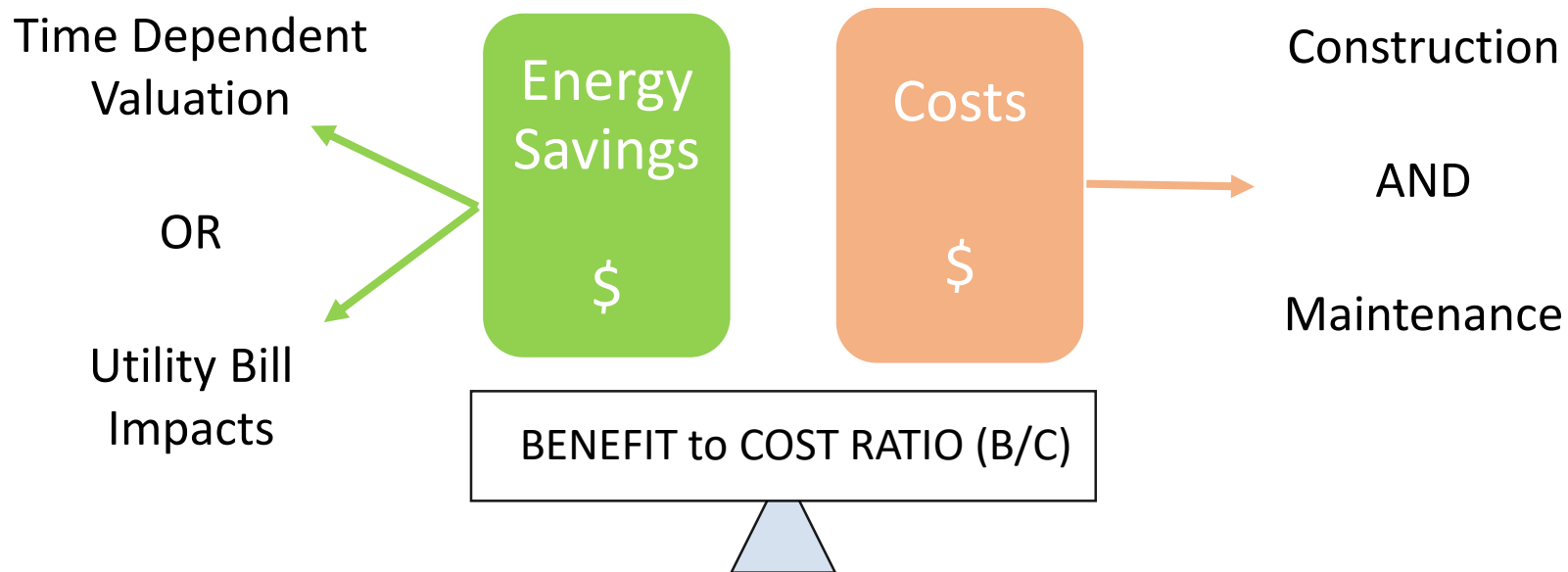
Overview of Statewide Reach Code Cost Effectiveness Study

Overview of Statewide Reach Code Cost-Effectiveness Studies

- Analysis of options to exceed 2019 Energy Code (Title 24, Part 6)
- Cost-effectiveness measured by customer bill impacts as well as tests set by the California Energy Commission
 - Required for local ordinance application and approval
- Measures researched for residential and commercial new construction:
 - All-electric design
 - Energy efficiency (envelope, heating, cooling, lighting, hot water)
 - Solar photovoltaics and battery energy storage systems
- Demonstrates that it is possible to cost-effectively improve energy performance

Determining Cost Effectiveness

- Energy savings determined through building simulations
- Costs derived from local experts and online resources
- 30-year or 15-year net present value



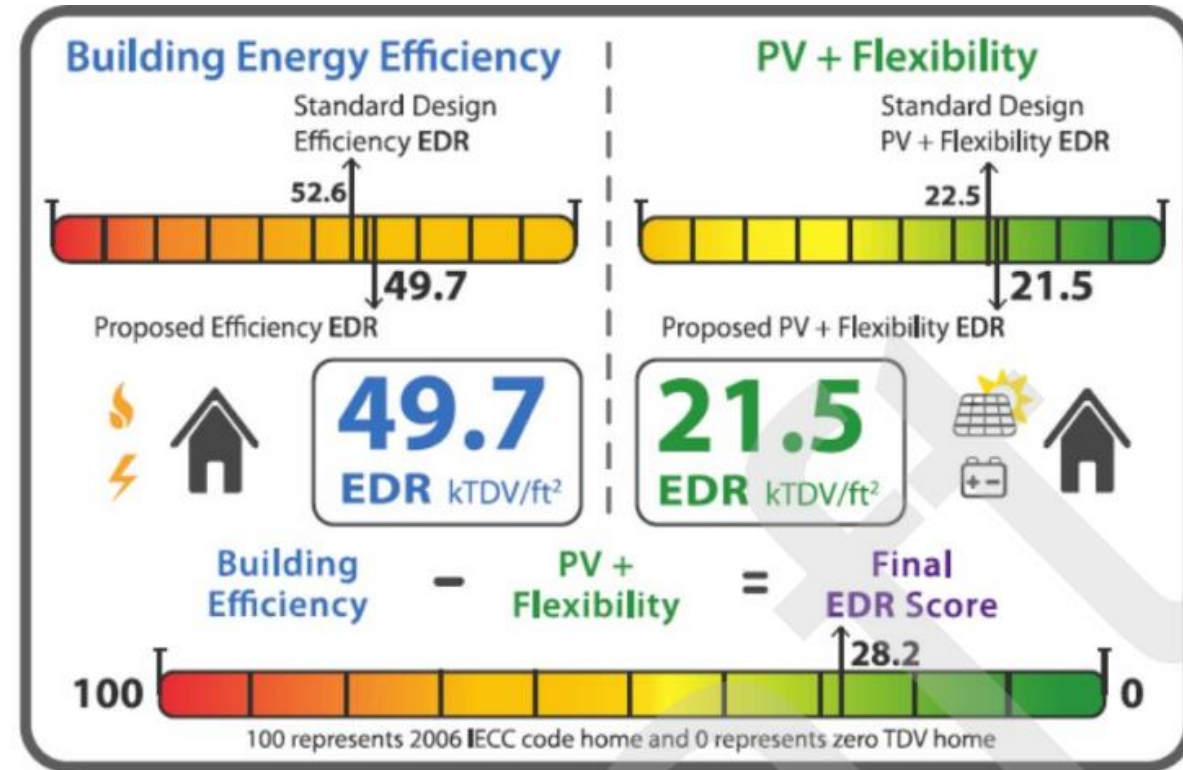
Cost Effectiveness Considerations

- Findings presented hereafter are all cost effective
- Many all-electric packages have lower construction costs than mixed-fuel

	Mixed Fuel		All Electric	
	Energy Efficiency	Energy Efficiency + PV + Battery	Energy Efficiency	Energy Efficiency + PV + Battery
Single family	\$1k	\$4k	-\$4k	\$2k
Medium Office	\$60k	\$360k	-\$50k	\$250k

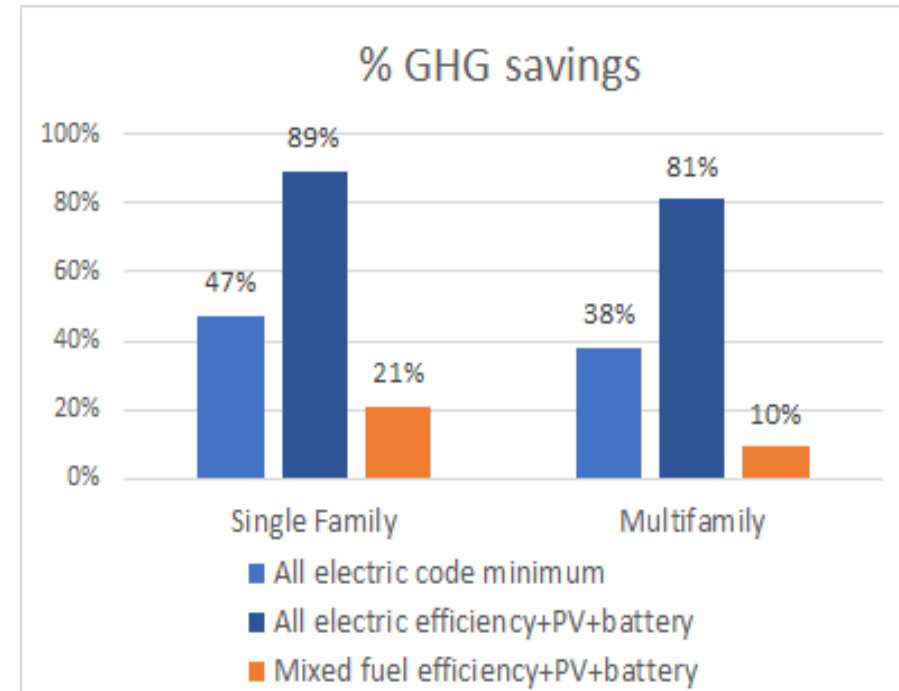
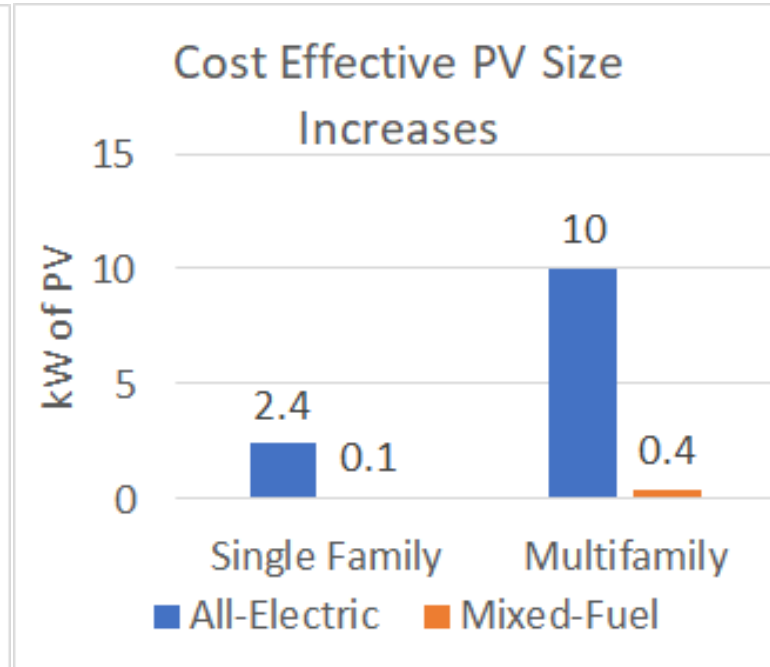
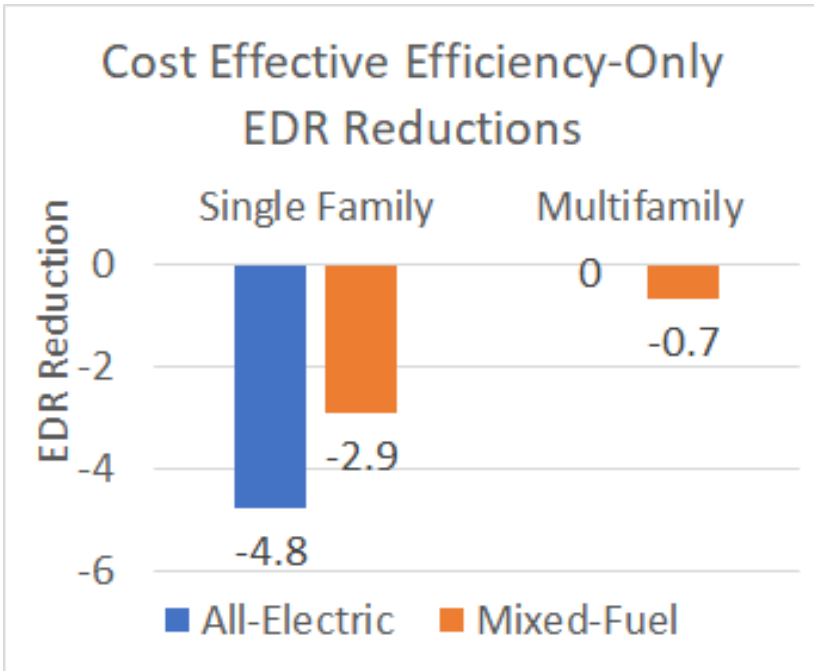
Interpreting the Residential Findings - EDR

- Energy Design Rating (EDR) is based on Home Energy Rating System (HERS)
 - 2006 IECC Standard = 100 EDR
 - Zero Net Energy = 0 EDR
 - 2019 Title 24 prescriptive home is
 - ~ 40-50 EDR with efficiency only
 - ~ 20 EDR with PV offsetting electricity use of a mixed-fuel home
 - Currently a compliance output
- **EDR Reduction** -> going lower than 2019 Title 24 with cost-effective measures

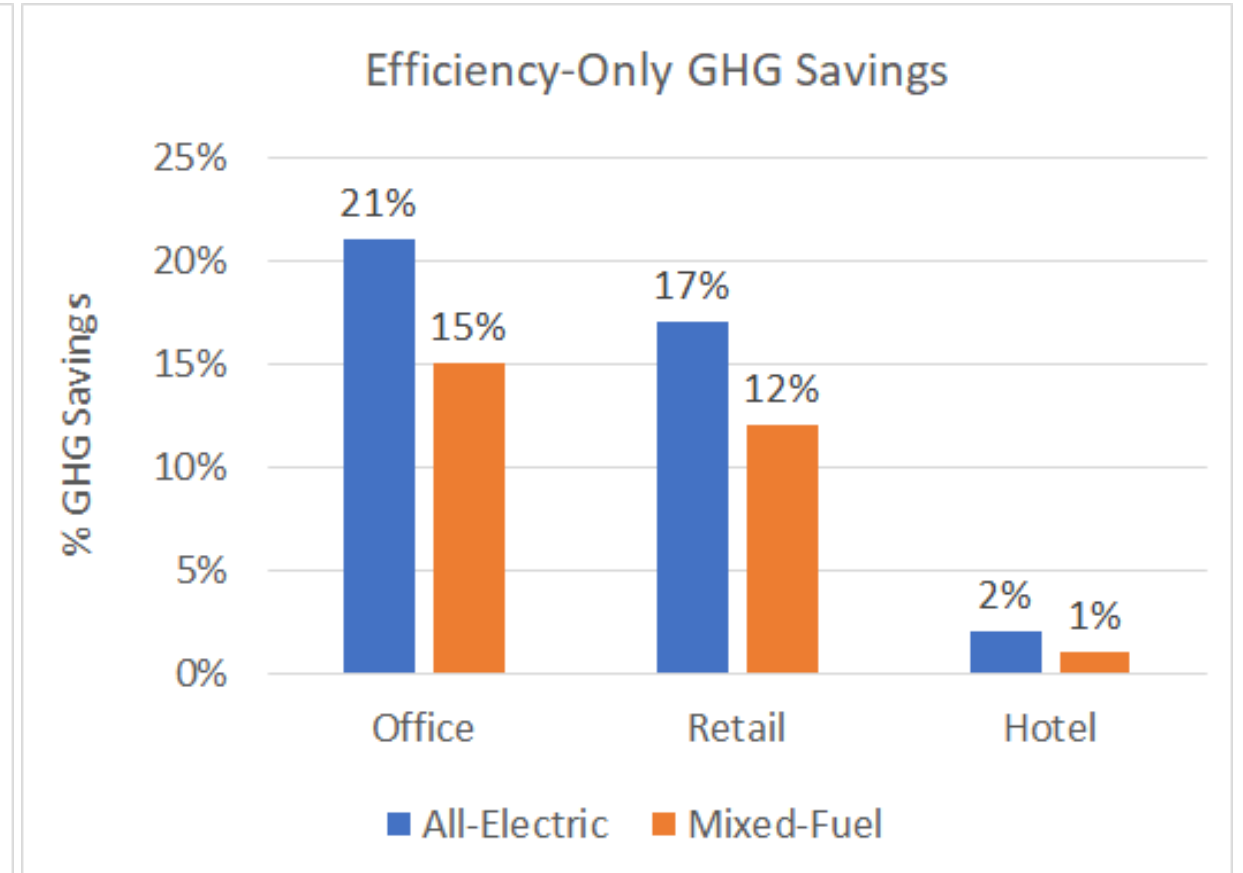
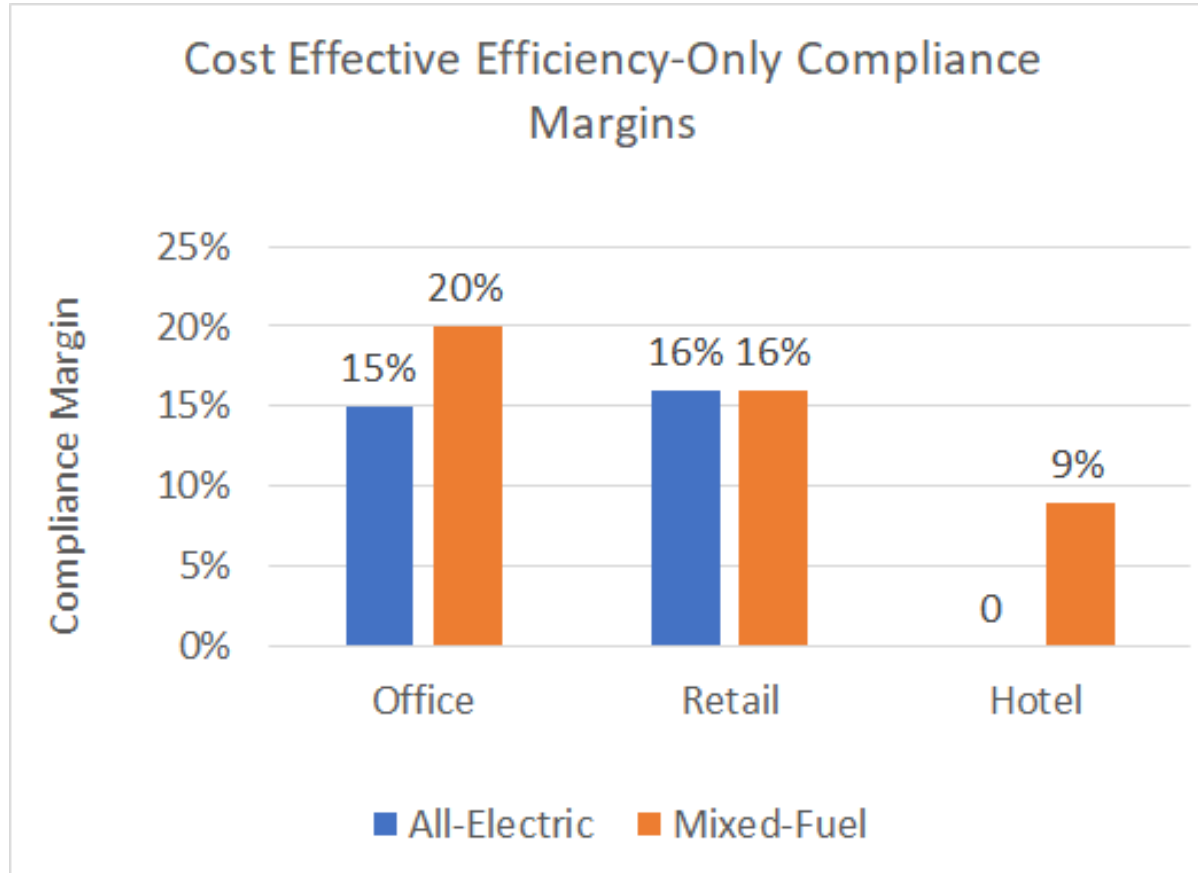


Residential Findings for San Mateo County

- Analyzed 2430 ft² single family home and 6960 ft² 8-unit MF building
- Separate compliance pathways for mixed-fuel and all-electric homes
 - 2019 Energy Code (Title 24, Part 6) will require ~2.5 kW of PV/dwelling



Nonresidential Findings for San Mateo County



Key Takeaways for Community

- All-electric compliance pathways are possible for new construction residential and some commercial buildings (including Retail, Office and Small Hotel)
- All-electric buildings reduce greenhouse gas emissions and are less-expensive to build
- Your Cities and County are actively engaged in this process

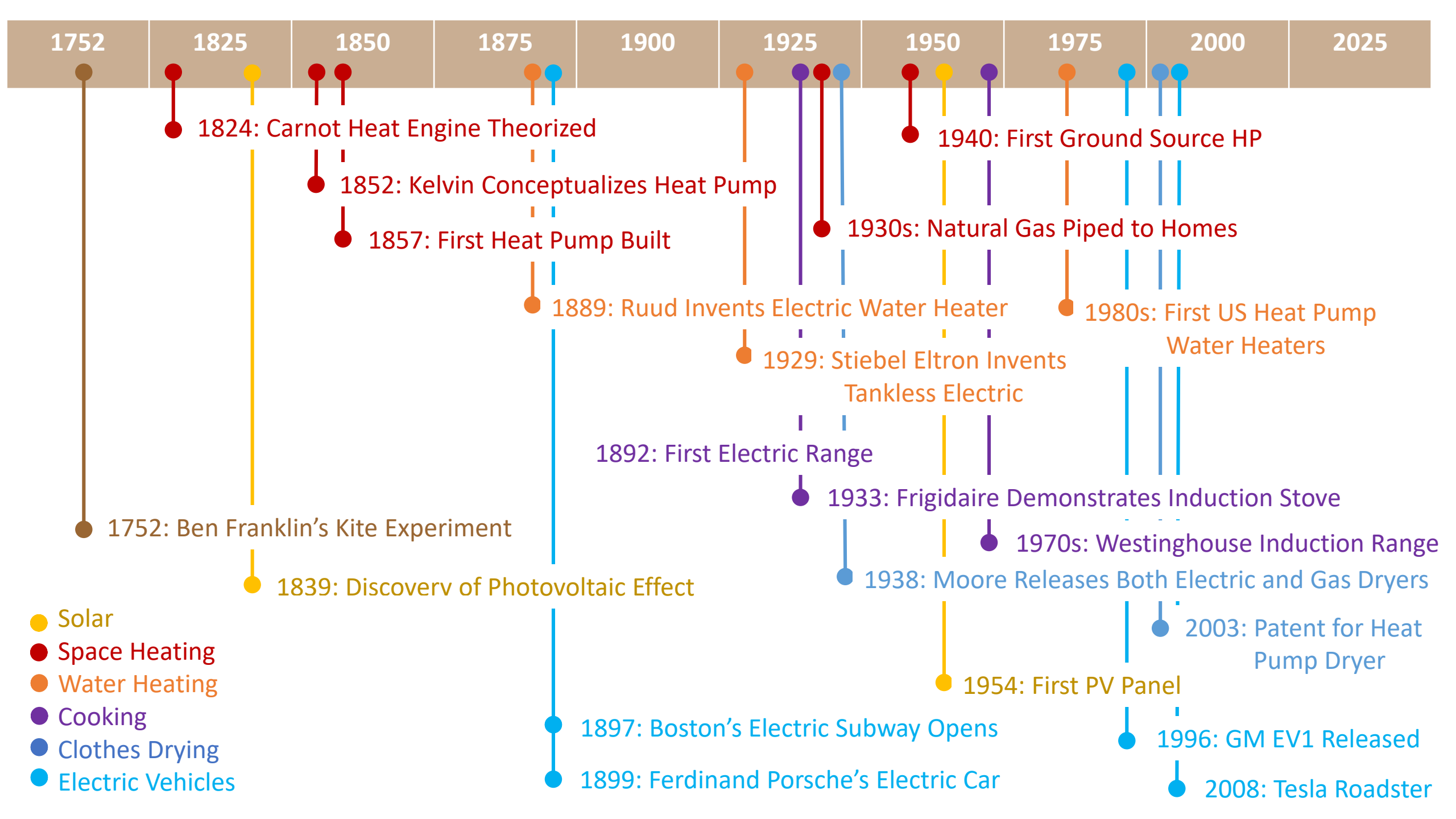


Discussion Question:

What are your hopes and concerns for a Reach Code in your community?

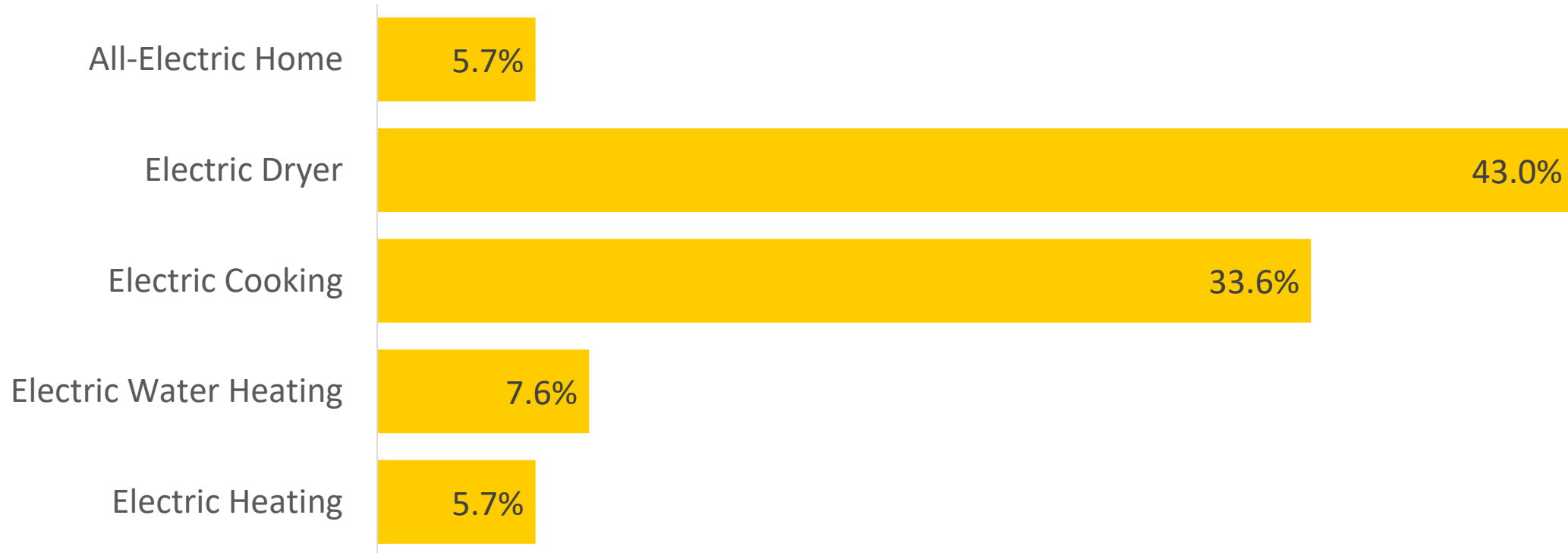
All Electric Building Technologies & Policy Examples





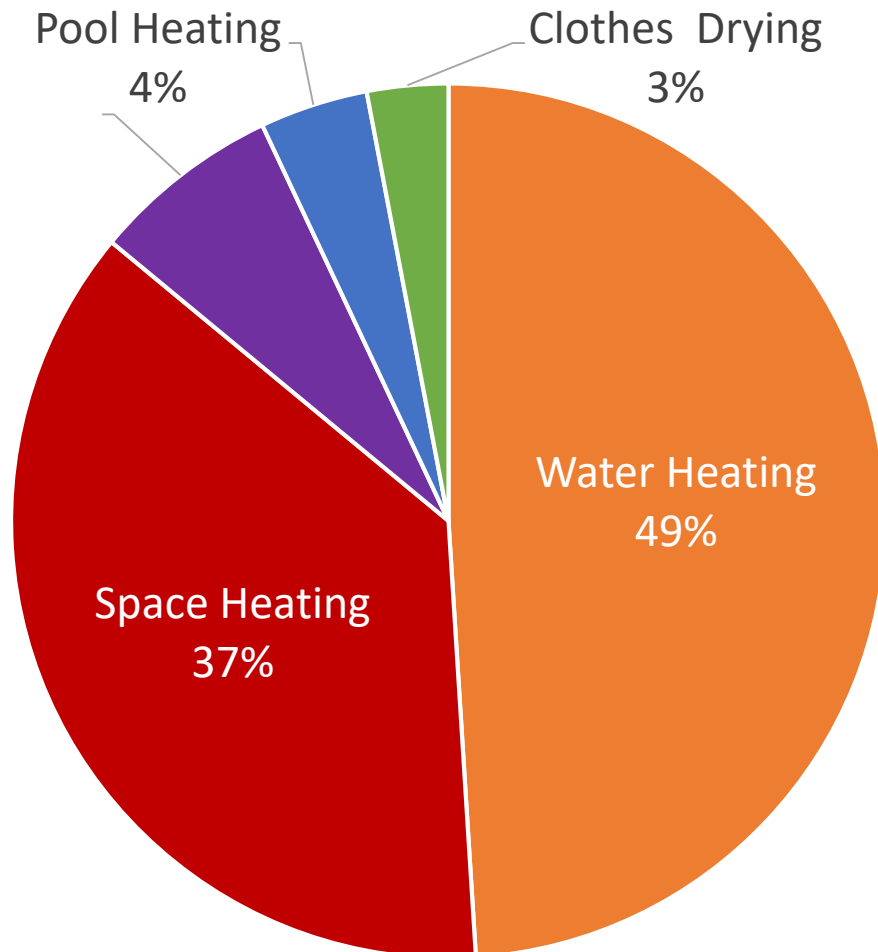
Many Homes are All-Electric Today (2009)

Percent of California Homes Electrified by End Use (RASS 2009)

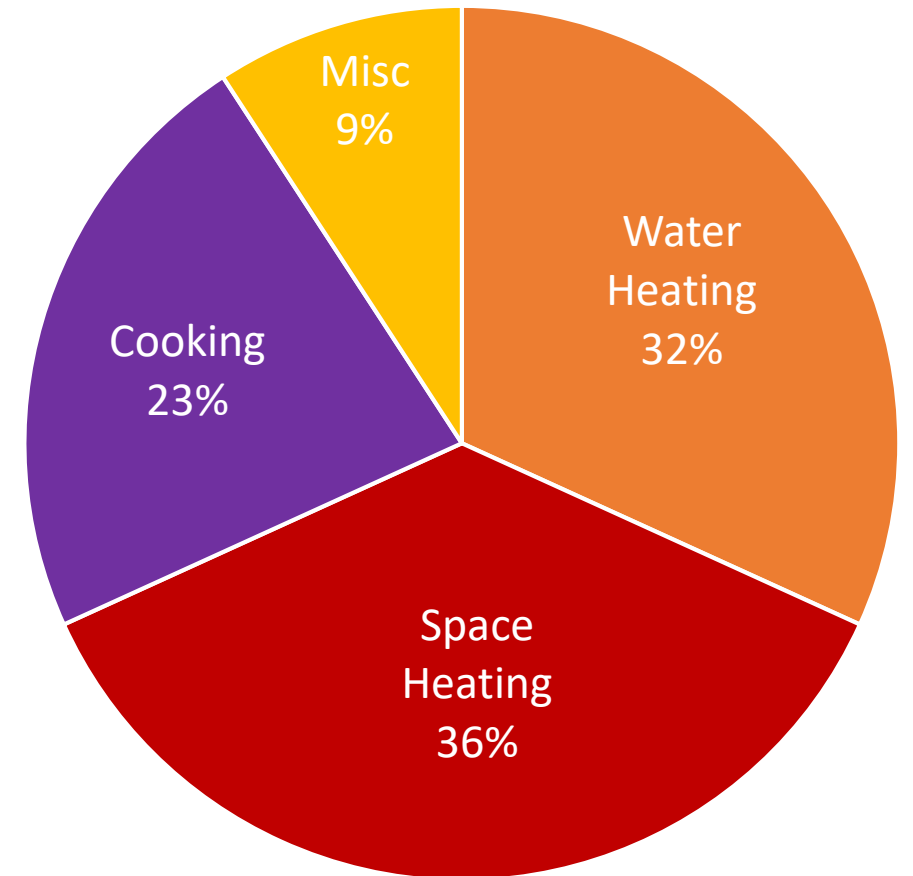


Thermal Energy Use in California Buildings

Residential



Non-Residential



All Electric Building Measures

Space Heating



Water Heating



Cooking

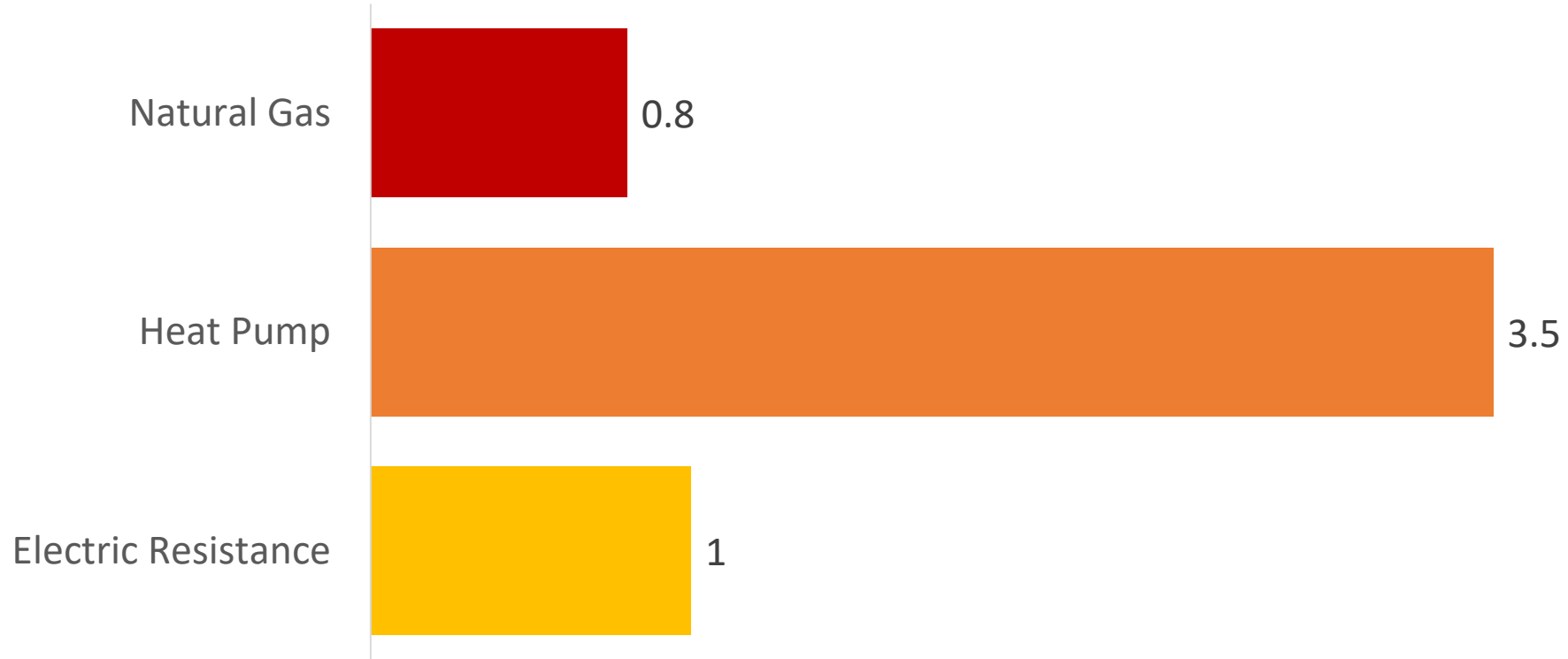


Clothes Drying

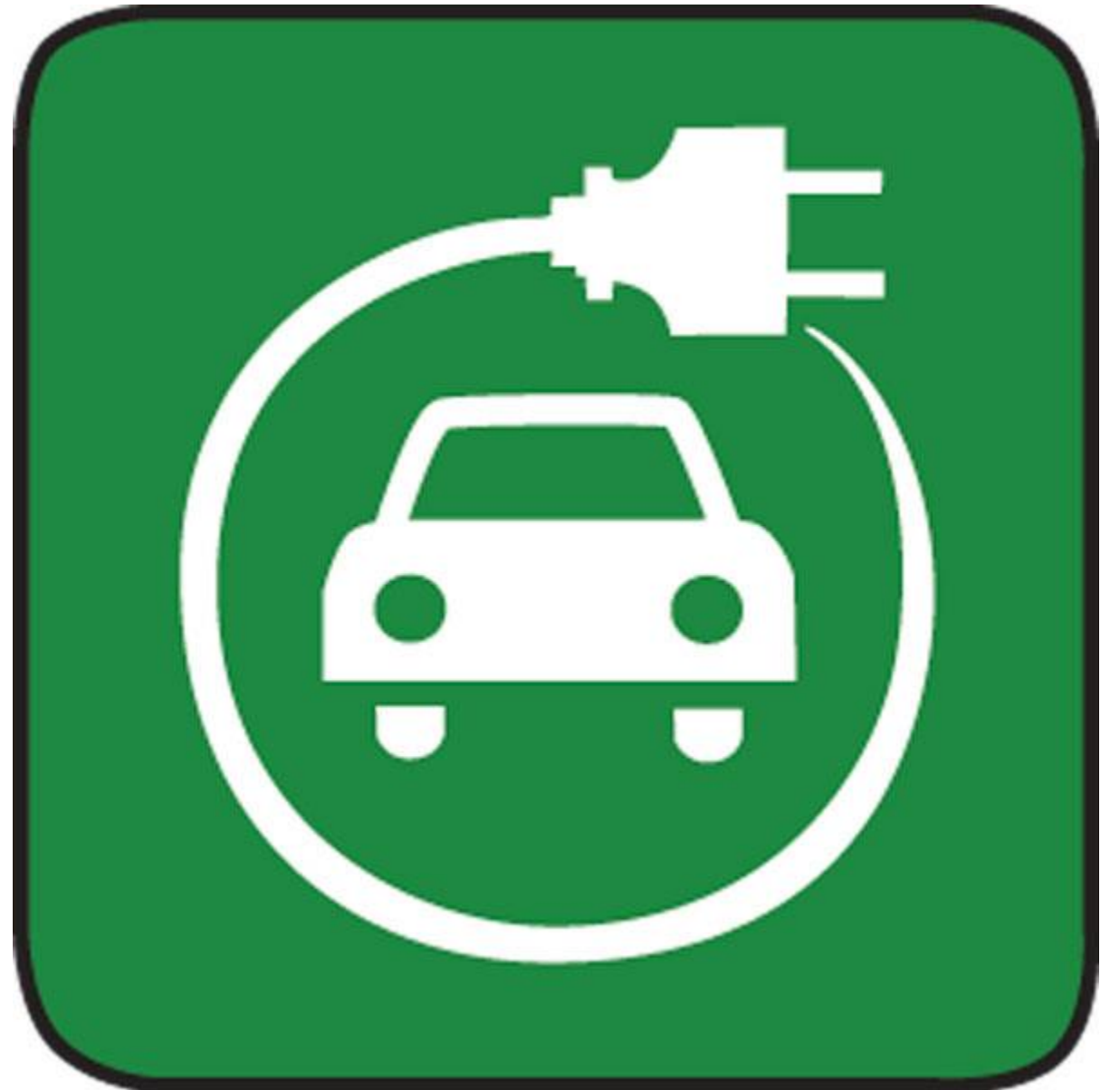


Equipment Efficiency

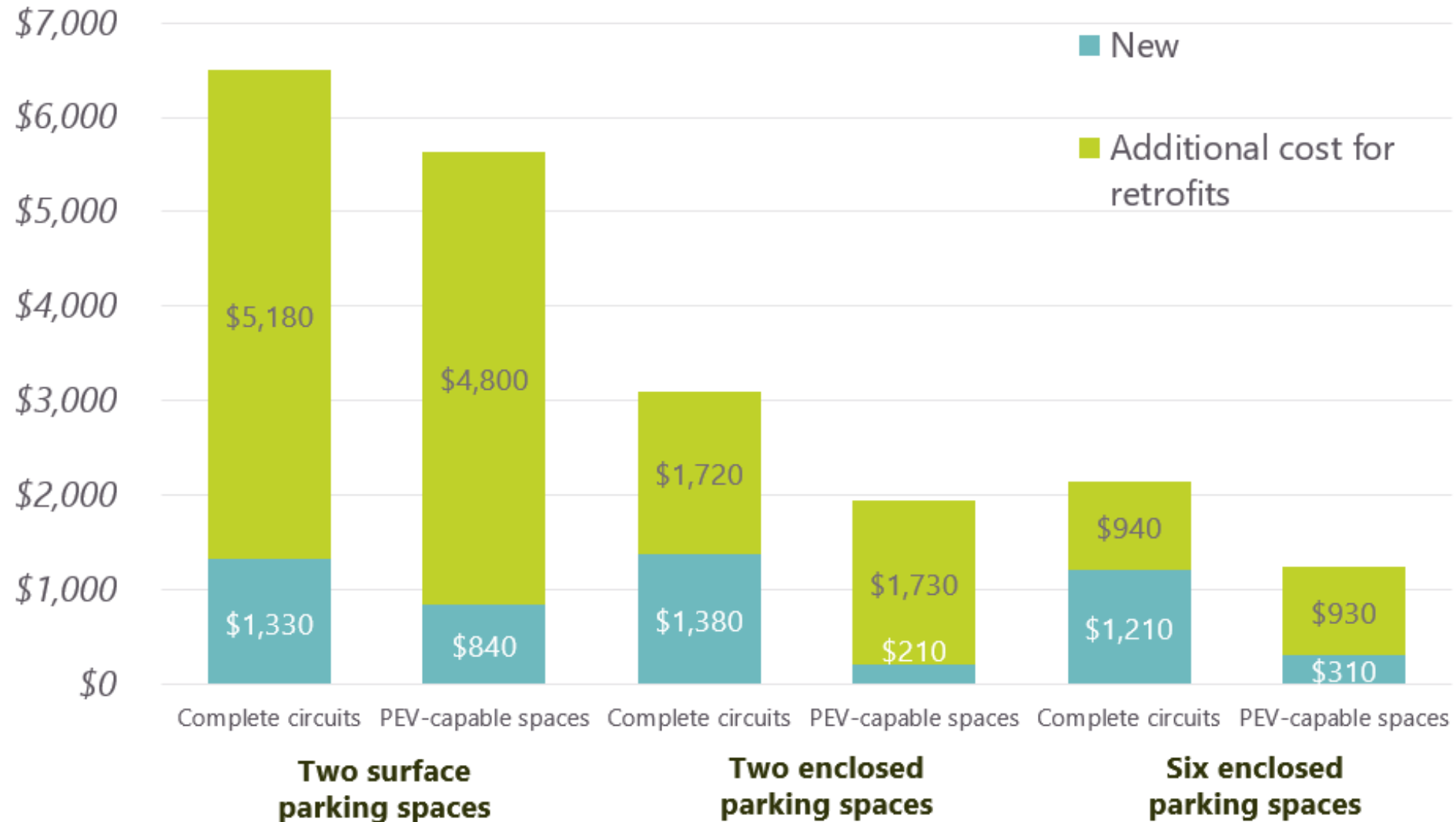
Energy Efficiency Comparison of Technology
Typical Energy Factors



**Electric
Vehicle (EV)
Technologies
and Ordinance
Examples**

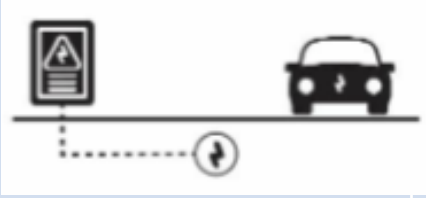




Why Adopt EV Measures into Codes?


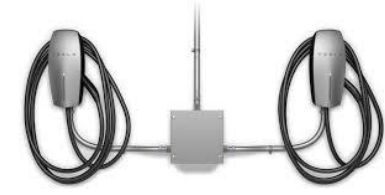



"Driving Plug-In Electric Vehicle Adoption with Green Building Codes" by Energy Solutions, PG&E, ARB.

Electric Vehicle Definitions – Space Types

<p>EV Capable</p>		<p>Raceway (conduit), electrical capacity (breaker space)</p>
<p>EV Ready</p>		<p>Raceway (conduit), electrical service capacity, overcurrent protection devices, wire, and suitable termination points such as junction box (i.e. full circuit)</p>
<p>EVSE (electric vehicle supply equipment)</p>		<p>All the equipment needed to deliver electrical energy from an electricity source to a Plug-in Electric Vehicle (PEV's) battery</p>

Electric Vehicle Definitions – Charger Types

Level 1		<p>15-20 Amp, 120v AC (standard household outlet) Driving Distance: 3.3 miles/hour Charging Time: 10-24 hours</p>
Level 2		<p>40+ Amp, 208/240v AC Driving Distance: 25-30 miles/hour Charging Time: 1-10 hours</p>
DC Fast Charge		<p>80-400 Amp, 200-600v DC Driving Distance: 125-400 miles/hour Charging Time: 10 min - 1 hour</p>

Discussion Question:

What all-electric technology is most important to you?

Can you see yourself living and driving all-electric?

Understanding Impacts



Electric Vehicle Infrastructure Code Examples

Building Sector	Baseline (2019 CALGreen Mandatory)	Bay Area Example Reach Codes
Single Family	EV Capable space	Marin County, San Rafael: EV Ready space Palo Alto: at least EV Capable (increased amperage compared to CALGreen)
Multi Family	EV Capable for 10% of parking spaces	Oakland and San Francisco: 10% Level 2 EV Ready; remaining parking spaces EV Capable (including electrical capacity for an addition 50% of spaces with load sharing) Palo Alto and Menlo Park: One Level 2 EV Ready space per dwelling unit, and EVSE installation at some spaces
Non-Residential	EV Capable for 6% of parking spaces	San Francisco: 10% Level 2 EV Ready; remaining spaces EV Capable (including electrical capacity for an addition 50% of spaces with load sharing)

Additional Examples

Topic	Baseline (CALGreen Mandatory)	Example Reach Codes
Renovations and Additions	Not included	Marin County – based on renovations to parking spaces and/or electrical room San Francisco – based on overall building renovation
Harmonize with state accessibility codes	Not included*	Design EV parking spaces to comply with accessibility requirements (slope, barrier-free path of travel, etc.)

*In some cases, design of a single space may be required in multifamily housing.

Building Ordinance Examples

Ordinance Type	Example Reach Codes
Electric Preferred	Marin County and Palo Alto: Mixed-fuel required to be 10-15% more efficient than state code, or All-electric
Carbon Neutral	Vancouver will require all new buildings to be carbon neutral by 2025
Natural Gas Connections	Arcata and Berkeley have proposed ordinances banning natural gas piping No natural gas appliances installed Replace existing municipal natural gas equipment with electric Amsterdam is weaning homes off natural gas by 2050, starting with public housing units “towards a city without natural gas.”

Reach Code Examples

A) Performance

- Buildings using natural gas must exceed Title 24 by X%
- Buildings using electricity only must meet or exceed Title 24 by Y%
- Buildings over a certain size using.... must exceed Title 24 by Z%
- Buildings using XYZ equipment (e.g. packaged rooftop units).... must exceed Title 24 by Z%

B) Prescriptive

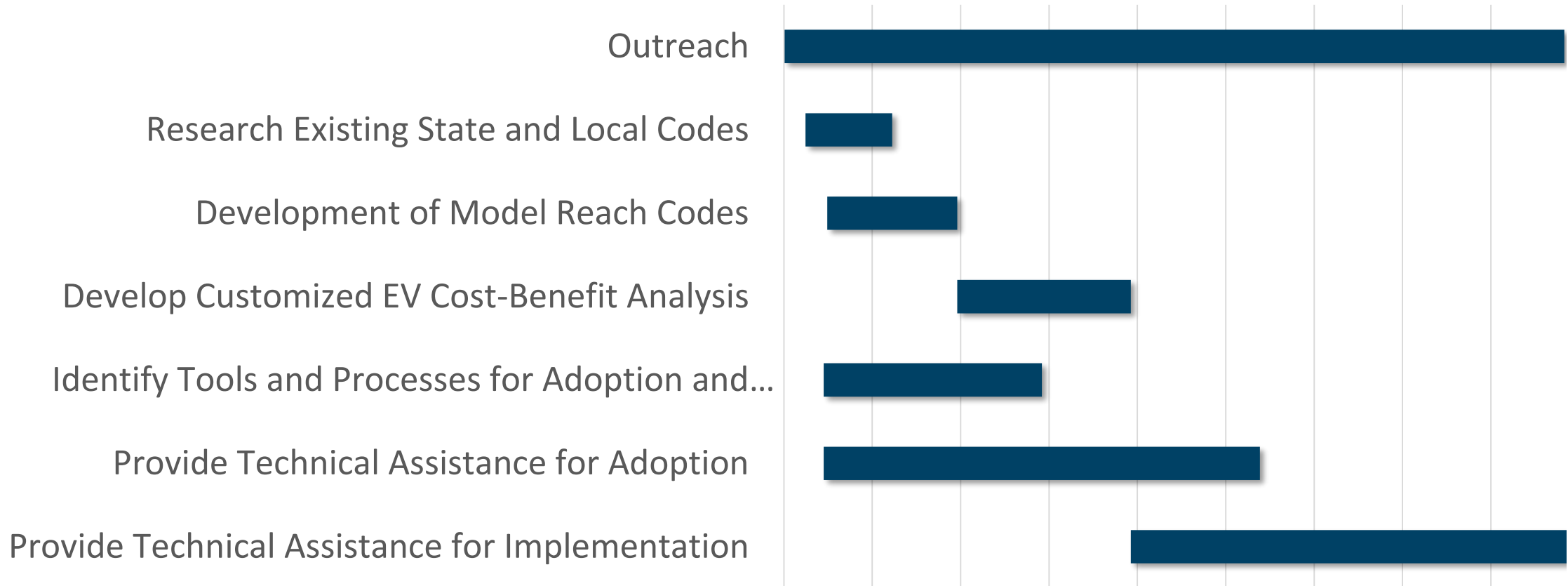
- Buildings must include EV charging infrastructure or charger beyond CALGreen requirements
- Buildings must include pre-wiring for electric induction stoves

Discussion Questions on Impacts

Which reach codes would you support for your community?

Reach Code Development Timeline

Feb-19 Apr-19 Jun-19 Aug-19 Oct-19 Dec-19 Feb-20 Apr-20 Jun-20



Overview of Next Steps

Next Steps

- We are working with your City to provide adoption and implementation support

What you can do?

- Help get the word out about all-electric buildings and transportation
- Attend a citizen commission meeting and provide your opinion
- Look for (and attend) the follow-up meeting in late-April or early-May



Stay Connected

🏠 <https://peninsulareachcodes.org>

Contact Us

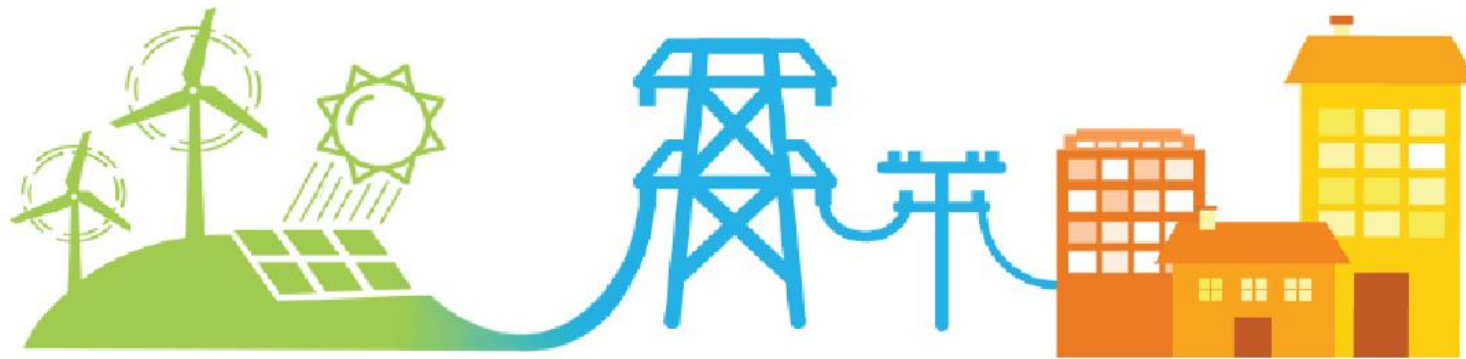


2019 Building Electrification & EV Infrastructure Reach Code Initiative

www.peninsulareachcodes.org



Thank You!



Electricity Generation
Peninsula Clean Energy

Electricity Delivery
PG&E

Customer
You