Existing Buildings Reach Code Working Group #2

Implementation of Single Family Reach Codes

AC to HP, Electric Readiness, and FlexPath

Agenda

- Introductions
- Existing Building Reach Code Sessions
  - AC to Heat Pump + Q/A
  - Electric Readiness + Q/A
  - Single Family FlexPath + Q/A

Project Partners

We thank our partners who helped develop these codes and resources. Thank you to our Community Choice Aggregator partners and the Statewide Local Energy Codes team, an initiative funded by the California IOUs: PG&E, SCE, and SDG&E. Thank you to the County of San Mateo Sustainability Department for hosting the in-person attendees today.

Today’s speakers

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Director, Rincon

Housekeeping Notes

- We welcome questions and comments
  - Have a question in the room or online? Raise your hand
  - Can’t unmute online? Use the Q&A feature

- The meeting presentation will be **recorded** and shared.
- We are primarily seeking the input of the **contractors** who will comply with these codes and **building department staff** who will enforce**.**

Overview

Single Family Policies

AC to Heat Pump

- *"Time of Installation"*
- Requires property owners installing AC to install either:
  1. A heat pump
  2. Efficiency measures
- CALGreen Voluntary Pathway

Electric Readiness

- *"Time of Renovation"*
- Targeted to permit applicants completing a relevant addition or alteration.
- Requires electric readiness (circuits or conduit).

FlexPath

- *"Time of Renovation"*
- Applies to projects completing major additions or alterations to select 1-3:
  1. Energy efficiency measures
  2. Electrification measures
  3. Solar PV

Who has adopted?

AC to Heat Pump	Electric Readiness	FlexPath
California (nonresidential)	Atherton	Carlsbad
Portola Valley (previous)	Fairfax	Corte Madera
San Mateo (previous)	Mountain View	Encinitas
	Portola Valley	Fairfax
	San Anselmo	Marin County
	San Luis Obispo	Piedmont
	San Mateo	San Anselmo
	Santa Cruz	San Luis Obispo
		San Rafael
		Santa Cruz

AB130

- Prohibits new state and local building standards on residential buildings from Sept 30, 2025 through 2031
- Key exceptions allow local code amendments that are:
  - Equivalent to codes effective before Sept 30, 2025
  - In alignment with local general plan goals before June 10, 2025, and incentivize all-electric construction as part of an adopted GHG reduction strategy
  - Home hardening codes
  - Permit modernization strategies

AC to HP

Background, Requirements, Costs, Implementation

Ordinance Objectives

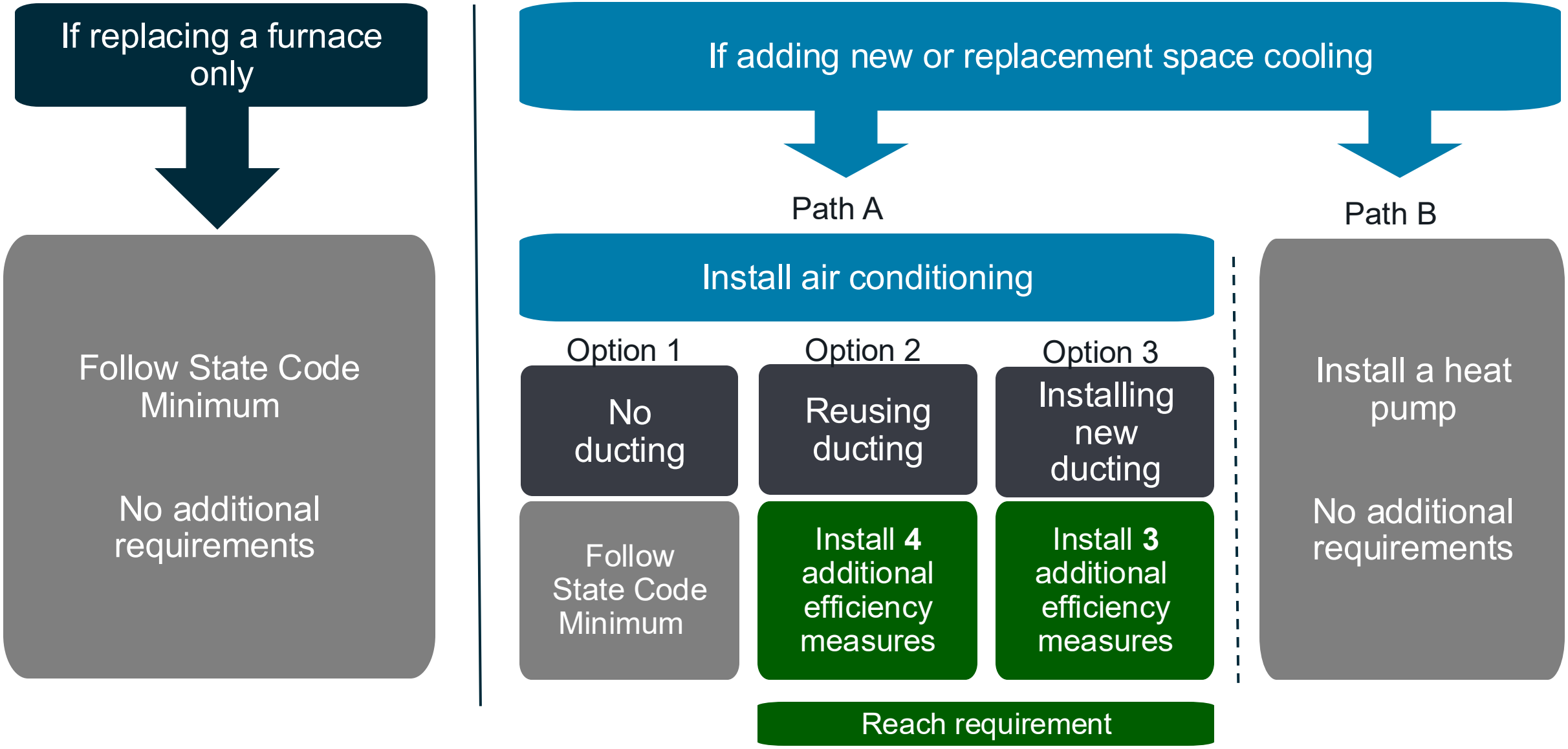
When **replacing or adding space cooling** require energy upgrades by either installing:

- A **heat pump** space conditioner at State Code;

  OR

- An **air-conditioner, ducted gas furnace, and other energy improvements** above State Code

What are the requirements when altering space-conditioning systems?



Additional efficiency measures for A/Cs

If the project reuses existing ducts:

1. Higher fan efficacy (0.45 W/cfm)
2. Refrigerant charge verification
3. R-49 attic insulation
4. Air sealing at the ceiling plane

Additional efficiency measures for A/Cs

If the project includes new ducts:

1. Higher fan efficacy (0.35 W/cfm)
2. Refrigerant charge verification
3. R-8 duct insulation

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1) Specify AC unit with an ECM motor
2) Perform field testing according to Reference Appendices

$$\text{Fan Efficacy} = \frac{Wattage}{CFM}$$

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Image: Refrigerant charge verification testing

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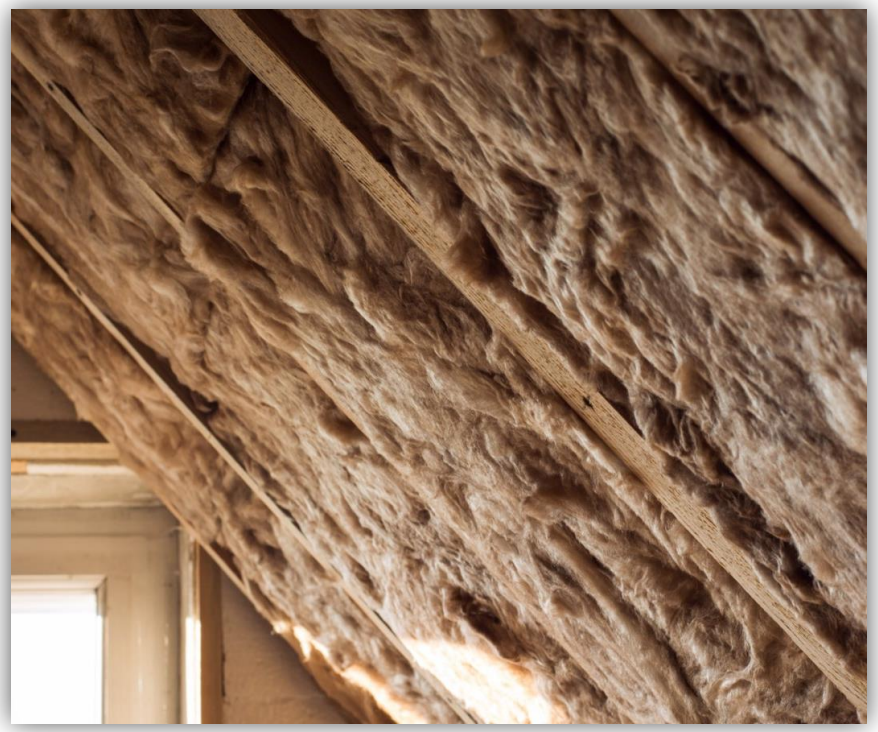

Image: Attic insulation

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Image: Caulking sealing the drywall and top plate.
Courtesy of Building America Solutions Center

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Image: Duct insulation installation

AC to HP exceptions minimize difficult replacements

Lower efficiency levels

Avoiding hazardous conditions

Avoiding large electrical upgrades

Avoiding high costs

AC to HP exceptions difficult replacements

Lower efficiency levels

Avoiding hazardous conditions

Avoiding large electrical upgrades

Avoiding high costs

- Existing levels of ceiling insulation
- Small attics
- Inaccessible ducts for sealing
- Furnace fans manufactured before July 2019

AC to HP exceptions difficult replacements

Lower efficiency levels

Avoiding hazardous conditions

- Asbestos disturbances
- Atmospherically vented combustion appliances

Avoiding large electrical upgrades

Avoiding high costs

AC to HP exceptions difficult replacements

Lower efficiency levels

Avoiding hazardous conditions

Avoiding large electrical upgrades

- Knob and tube wiring disturbances
- Electrical service upgrades

Avoiding high costs

AC to HP exceptions difficult replacements

Lower efficiency levels

Avoiding hazardous conditions

Avoiding large electrical upgrades

Avoiding high costs

- Heating loads 12 kBTUh greater than the cooling load

When will AC to HP impact my projects?

Retrofit Example 1:

Homeowner replaces an old furnace, or installs a heat pump.

Requirements:

None additional to state.

The homeowner may install new ducts, maintain old ducts, or replace old ducts.

They may also have supplemental gas or electric heating for a heat pump.

Image: Heat Pump

Policy Example 2:

Homeowner installs an AC unit and reuses existing ducts.

Requirements:

4 efficiency measures:

1. Higher fan efficacy (0.45 W/cfm)
2. Refrigerant charge verification
3. R-49 attic insulation
4. Air sealing at the ceiling plane

Image: Attic Insulation

Policy Example 3:

Homeowner installs an AC unit and new ducts.

Requirements:

3 efficiency measures:

1. Higher fan efficacy (0.35 W/cfm)
2. Refrigerant charge verification
3. R-8 duct insulation

Image: Duct Insulation

Implementation Considerations and Questions

Contractor implementation considerations

- **What AC projects do you usually see?**
  - Ducted furnace maintained?
  - Full duct replacements?
- **How will this policy impact your day-to-day work?**
  - More heat pumps?
  - More AC + efficiency measures?
  - More trades involved?
- **Will you receive more requests to bypass permits to:**
  - Reduce inspection time?
  - Reduce costs?

AC path - HVAC measures

- **Higher Fan Efficacy**
  - 0.45 W/cfm (Reusing existing ductwork)
  - 0.35 W/cfm (New ducts)

- **Refrigerant Charge Verification**
  - Airflow measurement
  - Manufacturer specs
  - Weigh-in method

- **Will these add time?**
  - Inspections
  - ECC-rating
  - Enforcement
- **Any feasibility or technical concerns?**
  - Inaccessible spaces
  - Insufficient space

AC path – Envelope measures

- **Attic Insulation**
  - R-49 (Reusing existing ductwork)

- **Air sealing at the ceiling plane**
  - Caulking, gasketing, weather stripping

- **Will these add time?**
  - Inspections
  - ECC-rating
  - Enforcement

- **Any feasibility or technical concerns?**
  - Inaccessible spaces
  - Insufficient space

Image Source: Building America Solutions Center 1, 2

Electric Readiness

Policy Background, Requirements, Exceptions, Costs, Implementation

Ordinance objectives

Require some **electrical infrastructure** during major renovations to reduce cost when electrifying later

- Options for most gas appliances
- Two methods
  - Extra unused conductor
  - Conduit

Overview of circuit needs

Component	120V circuits	240V circuits
# of “hot” wires	1	2
Neutral wire	Always	Sometimes
Ground wire	Always	Always
Amperage	15-20	20-50

Extra conductor allows for any future electric appliance

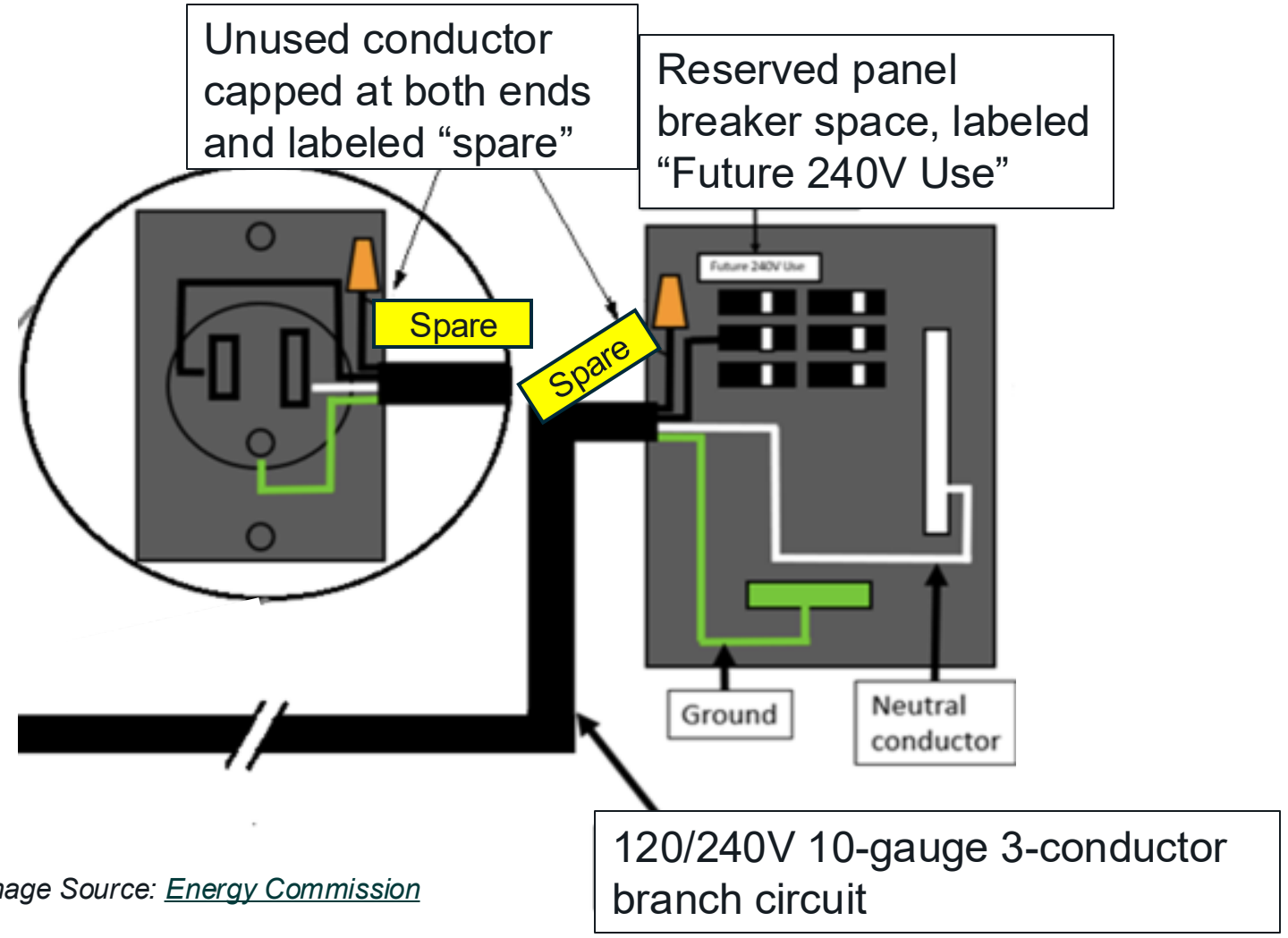

Image Source: Energy Commission

Electric Readiness for kitchens

Trigger: Electrical permit scope includes circuits or receptacles in the kitchen

Install:

- Reserved breaker space, AND
- Either
  - 120-volt, 20-amp receptacle with three conductors (1 unused) at 50 amps within 3 feet of the appliance; OR
  - Pathway for raceway/conduit for 240V / 50-amp circuit from the main electrical service panel to the appliance

Electric Readiness for dryers

Trigger: Electrical permit scope includes circuits or receptacles within 3’ of a gas clothes dryer

Install:

- Reserved breaker space, AND
- Either
  - 120-volt, 20-amp receptacle with three conductors (1 unused) at 30 amps within 3 feet of the appliance; OR
  - Pathway for raceway/conduit for 240V / 30-amp circuit from the main electrical service panel to the appliance

Electric Readiness for water heating (1)

Trigger #1: Wall framing is removed or replaced within 3’ of a gas water heater

- **Action:** Define the space suitable for future heat pump water heater (2.5’ x 2.5’ x 7’) + condensate drain

Electric Readiness for water heating (2)

Trigger #2: Electrical permit scope includes circuits or receptacles within 3’ of existing water heater or 10’ of a future HPWH location

- **Install:**
  - Reserved breaker space, AND
  - Either
    - 120-volt, 20-amp receptacle with three conductors (1 unused) at 30 amps within 3 feet of the appliance;

    OR
    - Pathway for raceway/conduit for 240V / 30 amp circuit from the main electrical service panel to the appliance

Electric Readiness for outdoor appliances

Trigger: When a gas line is extended to outdoor appliances (pools, spas, fireplaces, BBQ)

Install:

- Reserved circuit breakers
- Conduit to serve future electrical appliances

Readiness for electric power upgrades — Managed load calculations

- **Trigger**: A permit requesting increased capacity will also include calculations exploring the impact of load management devices.

- **Rationale**
  - Panel upgrades are often unnecessary and expensive.
  - Contractors should consider both electrical code calculation options from State code: 220.83 and 220.87.
  - Alternatives can reduce cost of electrification and reduce coincident peak load.

Readiness for electric power upgrades- Managed load calculations

- **Trigger**: A permit requesting increased capacity will also include calculations exploring the impact of load management devices.

- **Requirement:** provide panel size calculations from *both* 220.83 and 220.87 of the Electrical Code and include one of the following in the calculations:

  - A power management or circuit controlling device for listed appliances*
  - At least one 120-volt electric appliance for listed appliances*
  - Circuit control between whole home load and EV charger

***Listed Appliances:** Range, Dryer, Water Heater, EV Charger (not included in 120V substitution)

Electric Readiness exceptions

1. No electrical permit otherwise required for the project
2. Reach measures trigger electrical service upgrades
3. Repairs, safety improvements
4. New attached ADUs
5. Mobile homes, manufactured housing
6. Electrical panel upgrade only: Upgrade is due to a project unrelated to electrification (e.g., pool, bowling alley)

Cost estimates

Measure	Cost	Notes
Reserved Space or Breakers	$0 - $150	physical space hardware
Circuits	$2.50 - $5 per foot, ~$150 $500 - $1,000	incremental if already running a circuit if running a dedicated circuit
Conduits	$25 per foot, ~$1,000	assuming 40’
Physical Space	$0	

Source: RSMeans

Implementation questions to consider

- Will homeowners add much scope for opening walls?
- Will there be more unpermitted work?
- Will this be plan-checked?
  - A note on the drawings
  - Single-line diagrams
- Unforeseen outcomes?
  - Additional field inspections
  - Rework
  - Ensuring future homeowner or contractor is aware there is pre-wiring
- What additional resources may help?
  - Checklists
  - Guides

FlexPath

Policy Description, Requirements and Exceptions

Scope

Single Family Homes, Duplexes and Townhomes

During remodels of a certain size and scope, install energy improvements from among a menu of options to achieve an established target score.

Electric appliances are **NOT** required, only encouraged.

Typically, does not include small projects, unpermitted work and repairs.

Covered Projects Definition Options

Additions and Alterations

Valuation

Equipment Replacements and Modifications

Available Measures

Heat Pump Appliances

- Water Heater
- Space Conditioning
- Clothes Dryer

Roof Improvements

- Cool Roof
- Radiant Barrier

Other Electrification

- Induction Cooktop
- All-electric Home
- Solar PV
- Electric Readiness

Envelope Improvements

- Air Sealing
- Attic Insulation
- Wall Insulation
- Windows
- Raised Floor Insulation

Duct Improvements

- Duct Sealing
- New Ducts + Insulation + sealing

Other Efficiency

- Lighting
- Water Heating Insulation

Exceptions


Mobile home, manufactured housing
Emergency Housing
Roofing and window work
New, attached ADU
Pre-existing measures
Technical infeasibility
Economic hardship
HOA restrictions
Historic structure restrictions
Repairs
Seismic or medical need

Single Family FlexPath example project

- Remodel of 1,000 ft^2 kitchen and living room
- No existing air conditioning
- Construction cost ~$500,000 ($500/ft^2)
- Flex Path Target Score: 19 for alterations that are 1,000 square feet or larger

How will this comply with a FlexPath Ordinance?

FlexPath example project: Target score = 19

Compliance Path 1

- Project chooses a heat pump hot water heater (12 points) + heat pump space heater (7 points) to comply
- Total compliance cost = $25,000
- 12+7 = 19: Target score met

5% cost increase

Rebates available to homeowner, not included in FlexPath calculations

Compliance Path 2

- Project chooses attic insulation (5) + windows (5) + wall insulation (3) + new ducts + duct sealing (6) Keeps existing gas furnace
- Total compliance cost = $28,200
- 5+5+3+6 = 19: Target score met

5.6% cost increase

Measure	Point Value
Water Heating Package	1
Induction Cooktop	1
Heat Pump Clothes Dryer	1
Air Sealing	1
Duct Sealing	3
R-49 Attic Insulation	5
Windows	5
R-15 Wall Insulation	3
New Ducts + Duct Sealing	6
R-19 Floor Insulation	1
R-30 Floor Insulation	2
Heat Pump Water Heater	12
Solar PV + Electric Readiness	17
Heat Pump Space Heater	7

Implementation questions to consider

- What are the challenges with the trigger options?
  - Square footage
  - Valuation
- How familiar are you with the efficiency measures?
  - Are any particularly difficult to install in existing buildings?
  - Are you comfortable making recommendations to customers?
- Is demonstrating compliance difficult?
  - During plan check
  - During field inspections
- What would be helpful training or implementation resources?
  - Checklists
  - Air sealing guide

Resources for Staff

Visit us to download the latest version of the resources as they become available:

- These slides
- Model ordinances
- Cost-effectiveness studies
- **FAQs**
- **Application checklist**
- **Exception form**
- State submission instructions
- And more...

Statewide IOUs reach codes program: LocalEnergyCodes.com
San Mateo and Santa Clara counties: BayAreaReachCodes.org
LA and Ventura counties: CPAReachCodes.org
Santa Cruz through Santa Barbara counties: CentralCoastReachCodes.org

Thank You

We appreciate your time and commitment to better buildings in California

Get in Touch

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Agency & Rule	Status	Appliance	2026	2027	2028	2029	2031	2033	2036
CARB	In-Process	Boilers and Water Heaters		< 75 kbtu/hr		< 400 kbtu/hr	< 2000 kbtu/hr		
		Tankless Water Heaters				< 400 kbtu/hr	< 2000 kbtu/hr		
		Other/ Specialty				Furnaces < 175 kbtu/hr	Pool heaters < 2000 kbtu/hr	High-temp boilers and water heaters	
BAAD Rule 9-4	Adopted	Furnaces				All furnaces			
BAAD Rule 9-6		Boilers and Water Heaters		< 75 kbtu/hr				Large commercial	
SCAQMD Rule 1111	In-Process	Furnaces		**New construction:** res furnaces **OR**: 30% sales target		**Existing buildings:** residential furnaces **OR**: 50% sales target		75% sales target	90% sales target
SCAQMD Rule 1121		Residential Water Heaters		**New construction:** res furnaces **OR**: 30% sales target		**Existing buildings:** residential furnaces **OR**: 50% sales target		75% sales target	90% sales target
SCAQMD Rule 1146.2	Adopted	Large Water Heaters, Small Boilers and Process Heaters	**New construction:** Boilers, storage water heaters, and process heaters ≤ 400 kbtu/hr; tankless ≤200 kbtu/hr		**New construction:** boilers, storage water heaters, and process heaters ≤ 2000 kbtu/hr; tankless >200 kbtu/hr; pool heaters ≤ 400 kbtu/hr	**New buildings:** high temperature units **Existing buildings:** apply 2026 new construction rule	**Existing buildings:** apply 2028 new construction rules	**Existing buildings:** high temperature units	