Existing Buildings Reach Code Working Group #1: Single Family Policy Review for Adoption Consideration

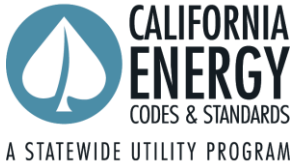
AC to HP

Electric Readiness

FlexPath

Agenda

- Introductions
- Existing Building Reach Code Policy Sessions
  - AC to Heat Pump
  - Electric Readiness
  - Single Family FlexPath
- Open Q&A



Project Partners

TRC is grateful for the collaboration and support of many 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.

Housekeeping Notes

- The meeting presentation will be recorded and shared
- Please enter all questions in the Q&A
- We will prioritize city staff voices
- Everything proposed today can be changed based on your feedback. Please share your thoughts!

Meet the Speakers

Tim Mensalvas

Tim Mensalvas is a Program Manager with over 7 years of experience in clean energy

Farhad Farahmand

Farhad Farahmand is a Director with 15 years of experience, and leads the codes team at TRC

Mayra Vega

Mayra Vega is an Engineering Manager with 12 years of experience in energy efficiency

Overview

Single Family			Multifamily and Nonresidential
AC to Heat Pump	Electric Readiness	FlexPath	Similar Options
			
› *"Time of Installation"* › Requires property owners installing AC to install either: 1. A heat pump 2. Efficiency measures › CALGreen Voluntary Pathway	› *"Time of Renovation"* › Targeted to permit applicants completing a relevant addition or alteration. › Requires electric readiness (circuits or conduit).	› *"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	Available late 2025 and early 2026

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

Air-Conditioning to Heat Pump

Background, Policy Description, Resources, Discussion

Ordinance Objectives

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

- A **heat pump** space conditioner (cooling + heating) and comply with State Code;

  OR

- An **air-conditioner** (cooling only) alongside a ducted gas furnace and make other energy improvements above the State Code

Policy Context

2025 CALGreen (Part 11) Tier 1

- Offers AC-to-HP as voluntary model for local adoption
- Energy Commission, utility consultants, and volunteers have coordinated enhancements to the language, and an Energy Code version (Part 6) soon
- Requires cost-effectiveness determination

2025 Energy Code (Part 6) Nonresidential

- Prescriptively requires AC-to-HP for units up to 65 kBtu/h (5 tons)

Air Quality Regulations

- Bay Area and Los Angeles are in “non-attainment” for ozone and particulate matter (PM)
- Gas appliances generate NOx emissions, which create ozone and PM2.5
- Beginning in 2029 furnace sales will be restricted by California Air Resources Board, Bay Area Air District, and (possibly) South Coast Air Quality Management District

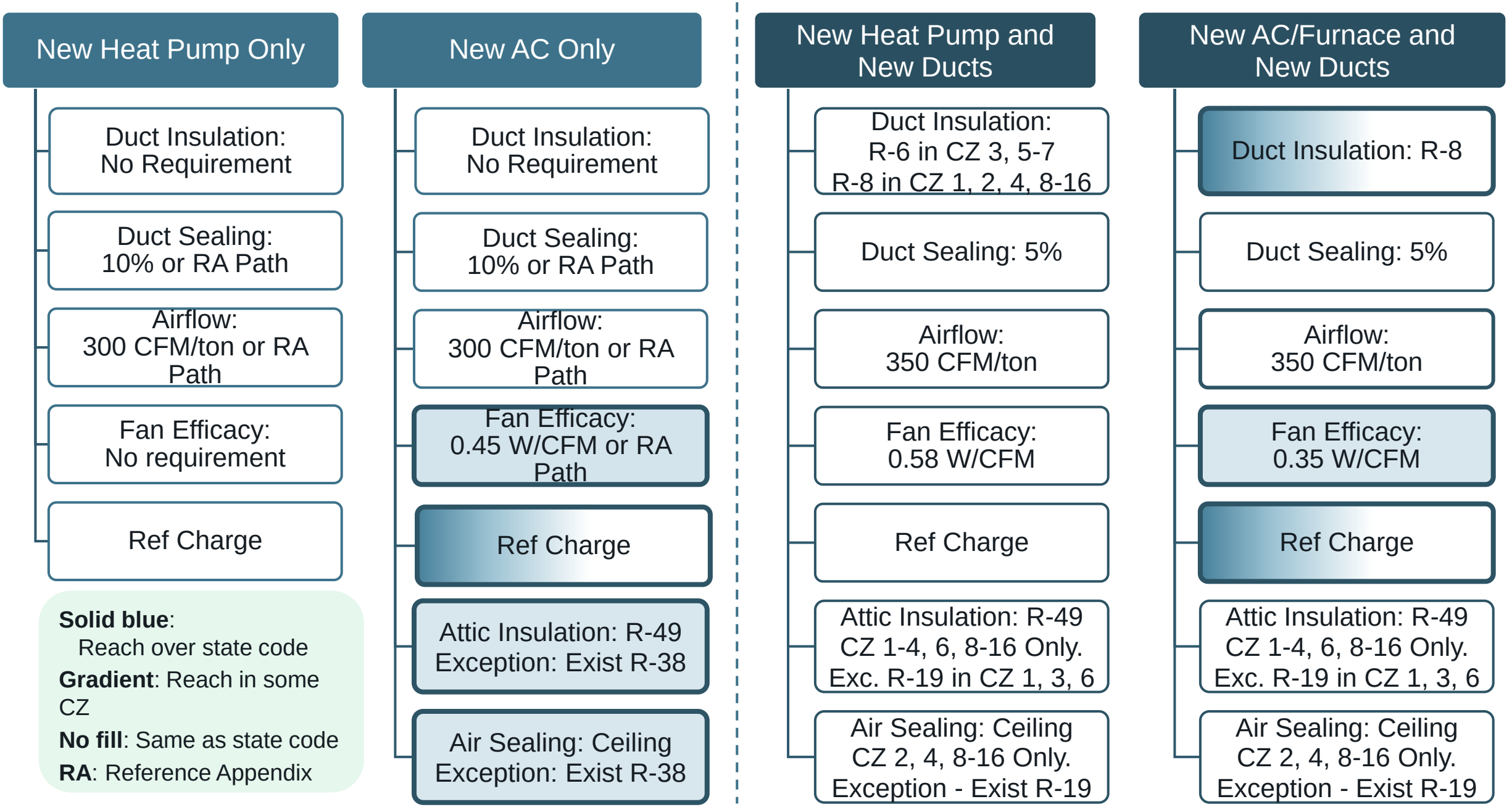
Policy Requirements

Code language structure

Trigger: Altered space-conditioning system serving existing single-family dwelling

1. Furnace-only replacement → no reach requirement
2. All CA Climate Zones except 15 (Palm Springs, Coachella)
3. Installing **new or replacement** air-conditioner
    a. Install a heat pump. Supplemental heating from gas or electric resistance allowed. OR;
    b. Install an AC
        - Reuse **existing ductwork** + efficiency measures
        - Replace or install new **ductwork and furnace** + efficiency measures

Energy equivalency test for **unducted** systems (e.g. wall furnaces) not yet performed.



April 2025, Local Energy Codes Program

AC to HP exceptions allow for the following

Lower efficiency levels

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

Avoiding hazardous conditions

- Asbestos disturbances
- Atmospherically vented combustion appliances

Avoiding large electrical upgrades

- Knob and tube wiring disturbances
- Electrical service upgrades

Avoiding high costs

- Where the heating load is 12 kBtuh greater than the cooling load

Relevant Resources

Cost Estimates

Equipment, over 30-years, accounting for Zero-NOx regulations

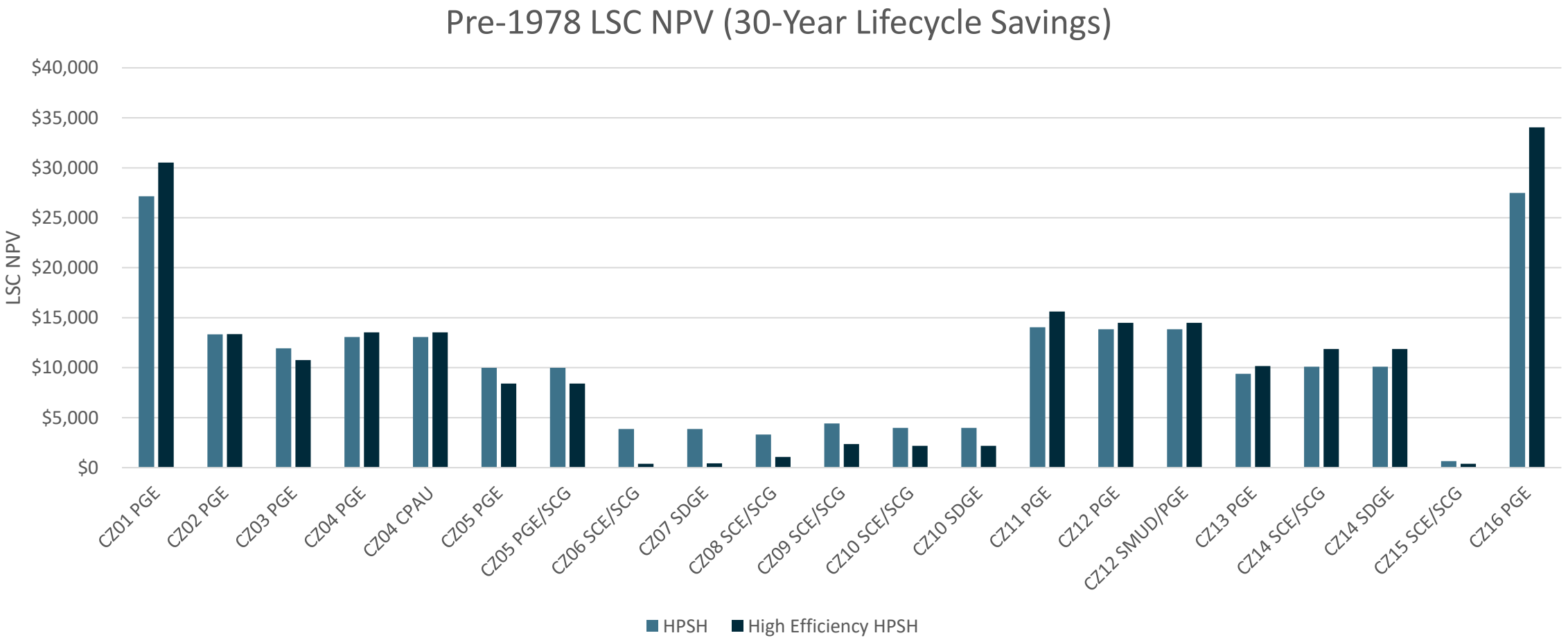
- AC + furnace: $23,100
- Heat pump: $23,200

Efficiency measures, upfront, over the state energy code

- **AC only:** $3,800 - $7,500 depending on existing attic insulation
  - Refrigerant charge, R-49 attic insulation, air sealing
- **AC, furnace and ductwork,** all vintages:
  - Assuming homeowner is already planning to replace their old ducts
  - CZs 3, 5, 6, 7: $2,100 including R-6 to R-8 duct insulation
  - Other CZs: $600 for fan efficacy, refrigerant charge verification

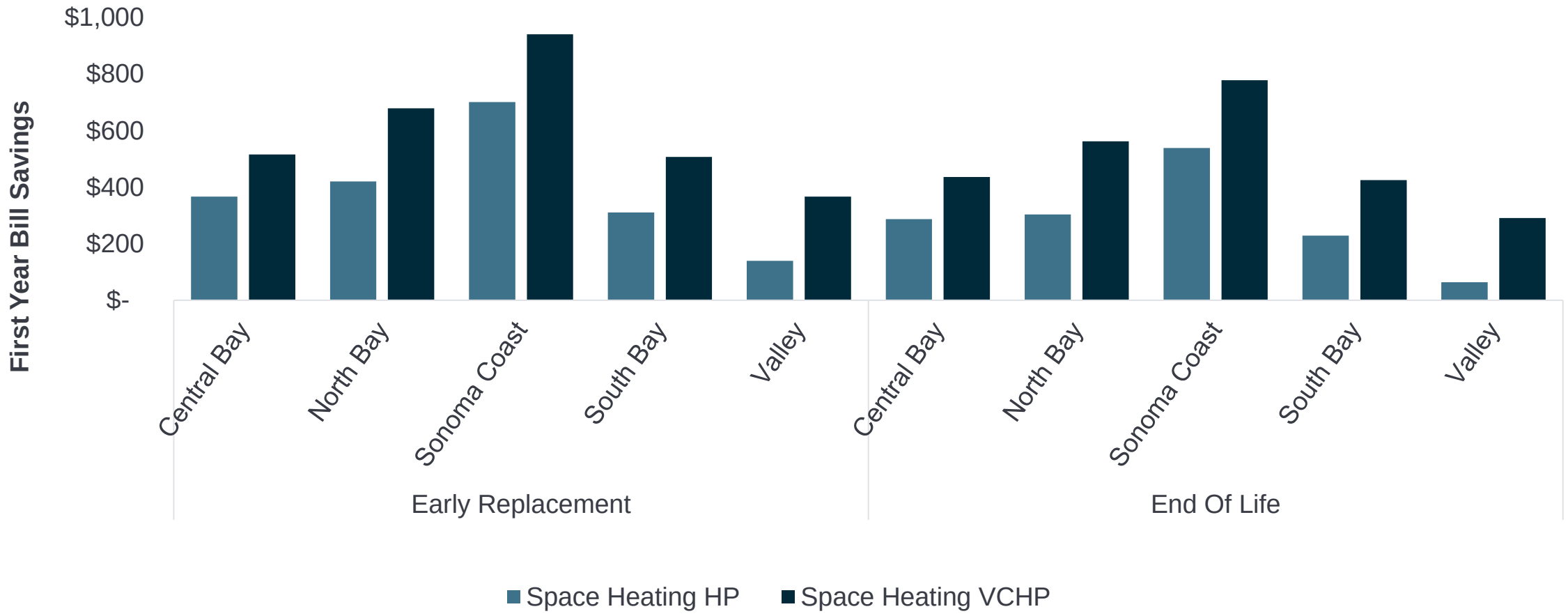
Source: Statewide IOUs C&S: Single Family Air Conditioner Replacements (AC to HP), Cost Effectiveness Study

AC-HP is widely cost-effective



Source: Statewide IOUs C&S: Single Family Air Conditioner Replacements (AC to HP), May 28, 2025

AC-HP saves $ today



Source: Peninsula Clean Energy / Silicon Valley Clean Energy On-Bill Analysis for CZs 1, 2, 3, 4, 12

Resources

Ready Today

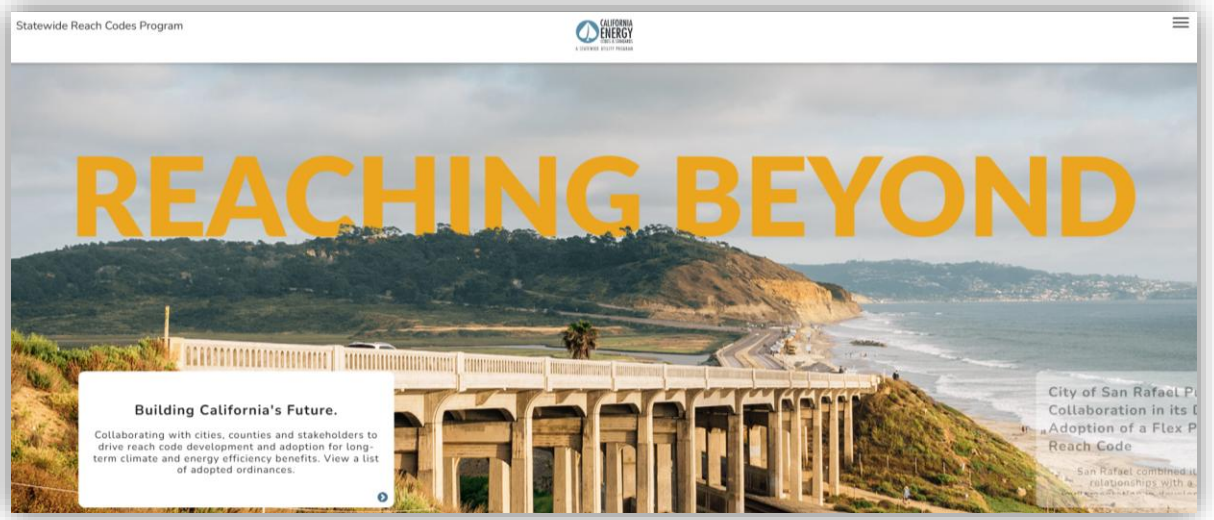
- Part 11 version
- Cost effectiveness study

Coming Soon

- Ordinance Part 6 version
- Cost effectiveness study full data
- Model staff report
- Slides

Cross-posted and customized

- BayAreaReachCodes.org
- CentralCoastReachCodes.org
- CPAReachCodes.org



Jurisdiction Next Steps

Suggested next steps

- Circulate the policy concept with key decision makers
- Analyze property database and last few years of permits to estimate:
  - # of existing single family homes, duplexes and townhomes
  - # with central air conditioning and gas heating
  - # of annual permits for air conditioner installations or replacements
  - % of projects affected annually by proposed requirements

AC-HP: Q&A + Discussion

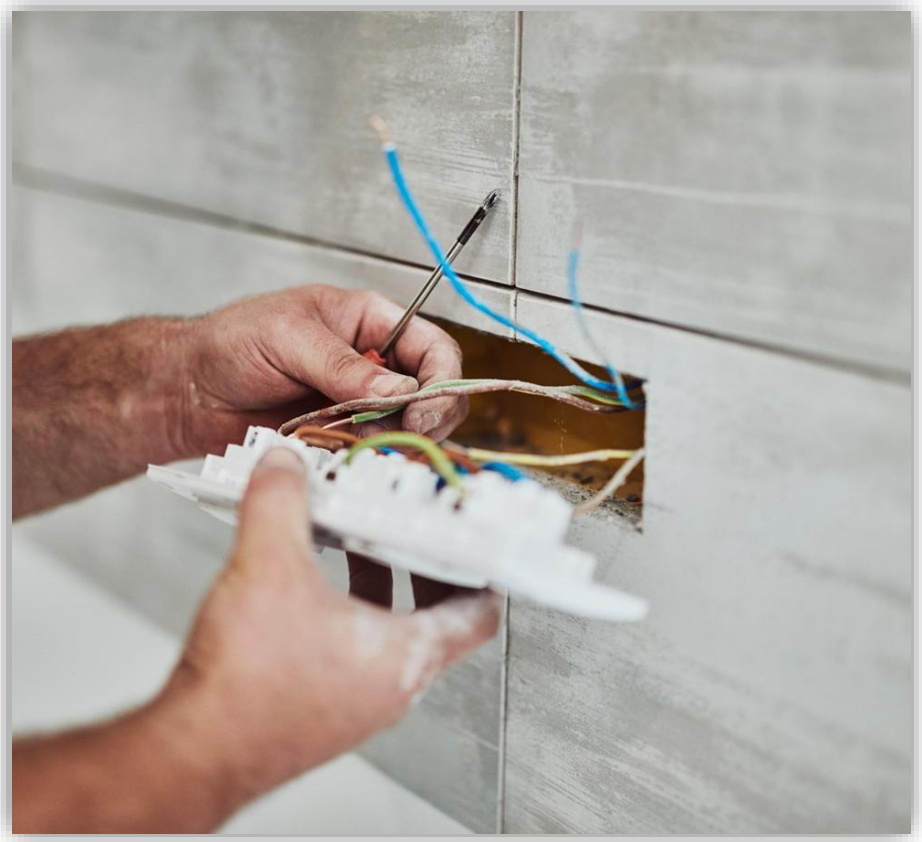
Electric Readiness

Background, Policy Description, Resources, Discussion

Ordinance Objectives

Require some **electrical infrastructure** during major projects to eliminate rework and cost later

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



Policy Context

Air Quality Regulations

- Beginning in 2027, water heater sales will be restricted by by various regional and state agencies

Cost-effectiveness

- **Unnecessary** as it does not require energy conservation or efficiency
- **Cost savings** from an extra contractor visit and repeated demolition

Technology

- Does not require electric appliances
- **120V appliances** are available for almost all end-uses, needs flexibility

Local Adoption

- Atherton
- Fairfax
- Mountain View
- Portola Valley
- San Anselmo
- San Luis Obispo
- San Mateo

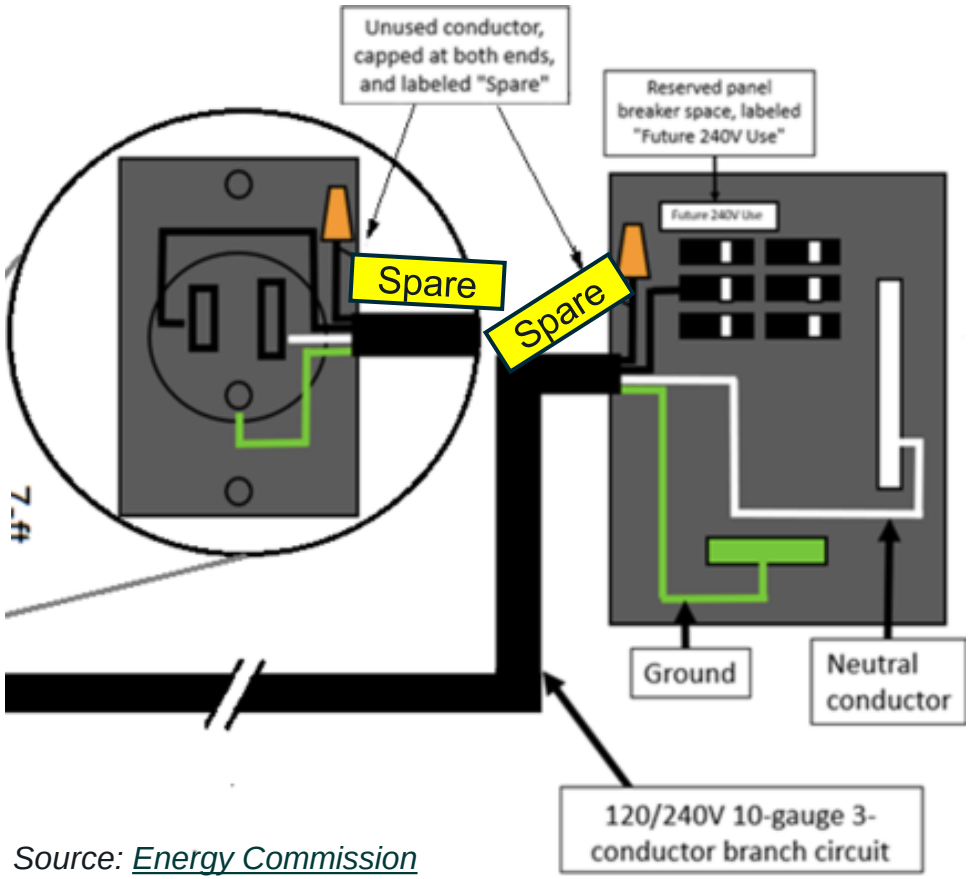
Policy Requirements and Exceptions

Electric Readiness - General Concept

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

Two compliance pathways:

1. 120-volt receptacle that is upgradable to 240 volts by installing an extra (unused) “hot” conductor, each at 120V;
   OR
2. Empty conduit



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

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

- **Install:** Space suitable for future heat pump water heater (2.5’ x 2.5’ x 7’) + condensate drain

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

- **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 Space Heater

Trigger: If a gas space heater is replaced

Install:

- Nothing!
- But, do designate location for future heat pump outdoor unit (compressor)

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

Trigger: Electrical permit increasing capacity to the building

Requirements

Calculate electrical panel size according to *both* 220.83 and 220.87 of the Electrical Code

and include one of

1. A power management or circuit controlling device serving
   - Water heater
   - Clothes dryer
   - Range
   - EV Charger

or

2. At least one 120-volt electric appliance
   - Water heater
   - Clothes dryer
   - Range

or

3. Circuit control between whole home load and EV charger

Rationale

- Contractors may not consider both electrical code calculation options
- Panel upgrades are often unnecessary and expensive
- Alternatives can reduce cost of electrification and reduce coincident peak load

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

Cost Estimates

- **Reserved Breakers or Space:**
  - $0 for physical space
  - $50 for breaker
- **Circuits:**
  - ~$150 for extra conductor incremental if already running a circuit
  - $500 - $1,000 if running a dedicated circuit
- **Conduits:**
  - $500 - $1,000 installed without significant demolition necessary

Source: RSMeans

Suggested next steps

- Circulate the policy concept with key decision makers
- Analyze property database and last few years of permits to estimate:
  - # of existing single family homes, duplexes and townhomes
  - # of annual permits for kitchens, laundry rooms, water heater alterations, furnace replacements, and electrical service upgrades
  - % of projects affected annually by proposed requirements

Electric Readiness: Q&A + Discussion

FlexPath

Scope, Opportunities and Requirements

Purpose

Understand the steps and decisions you need to make to develop a single family FlexPath ordinance

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.

Ordinance Objectives

- **Capture GHG reductions during certain projects through:**
  - Electrification
  - Energy efficiency
  - Solar PV
- Provide flexibility for applicants
- Use a simple application process
- Meet Federal and State requirements

Single Family FlexPath Example Project

- Remodels 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 Measures

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

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

5.6% 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-13 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

Identifying Opportunities

Review Building Stock and Permit Data

Permit and building stock data demonstrate reach code opportunities

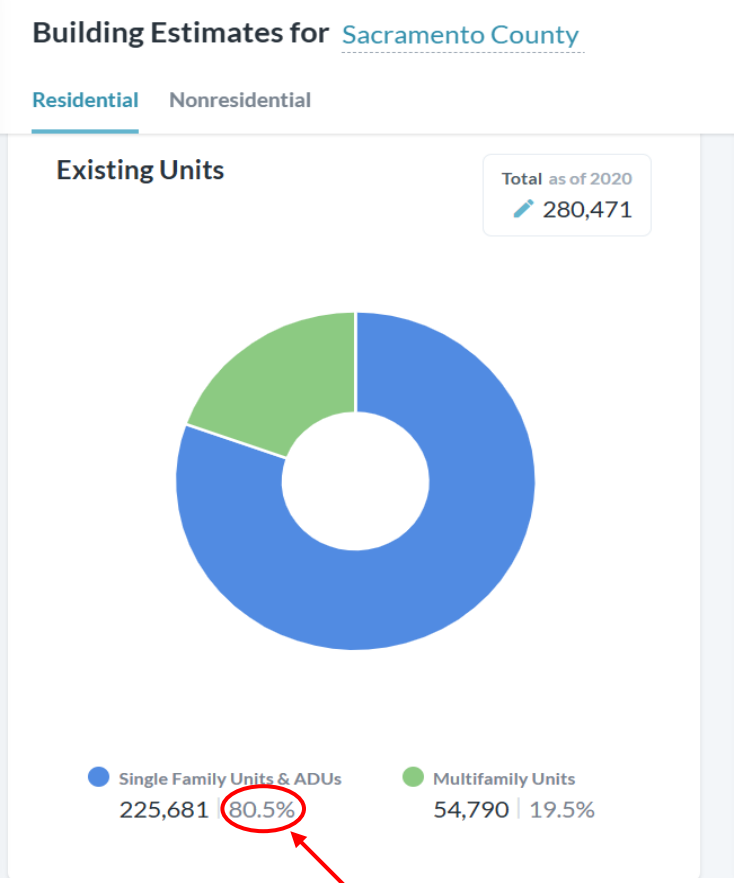
Building stock data identifies:

- Building types & proportion of the building stock
- Building vintages
- Average home size

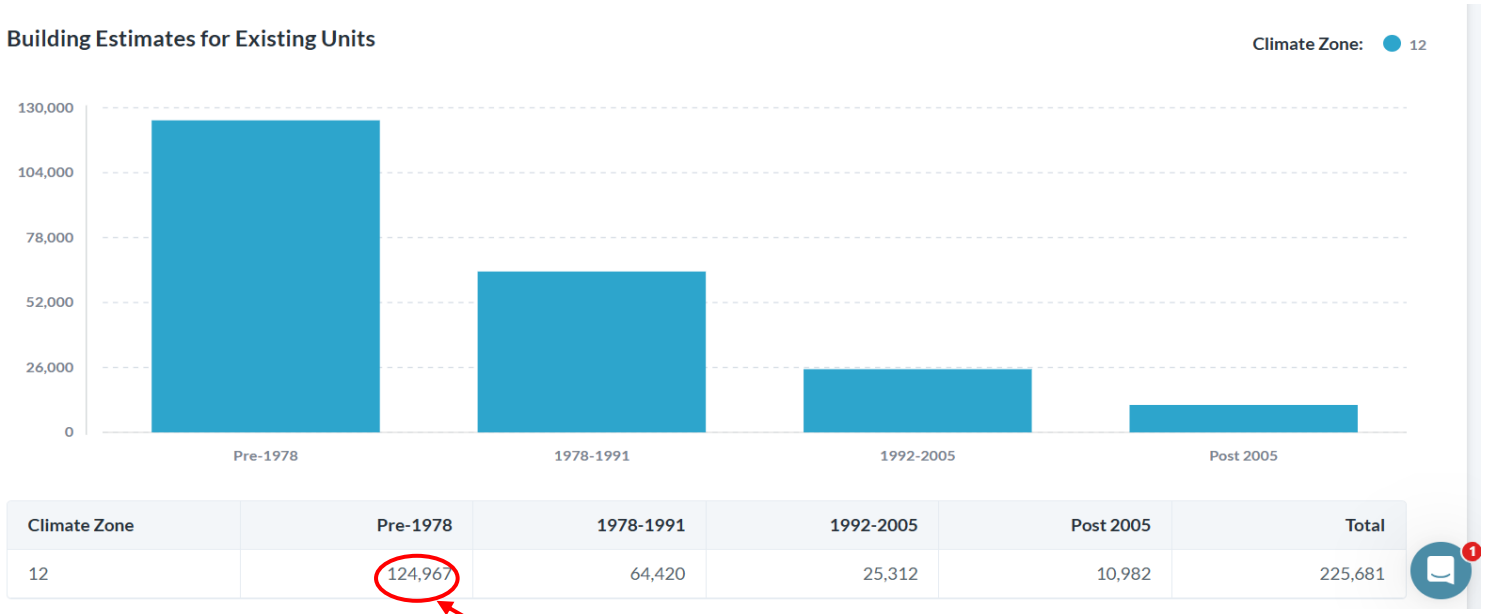
Permit data identifies:

- Covered project definition
- Project valuation/retrofit cost
- Count of applicable projects
- Proof of concept/market readiness for covered projects and measures

Building Stock Data Example



81% of residential building stock is single-family

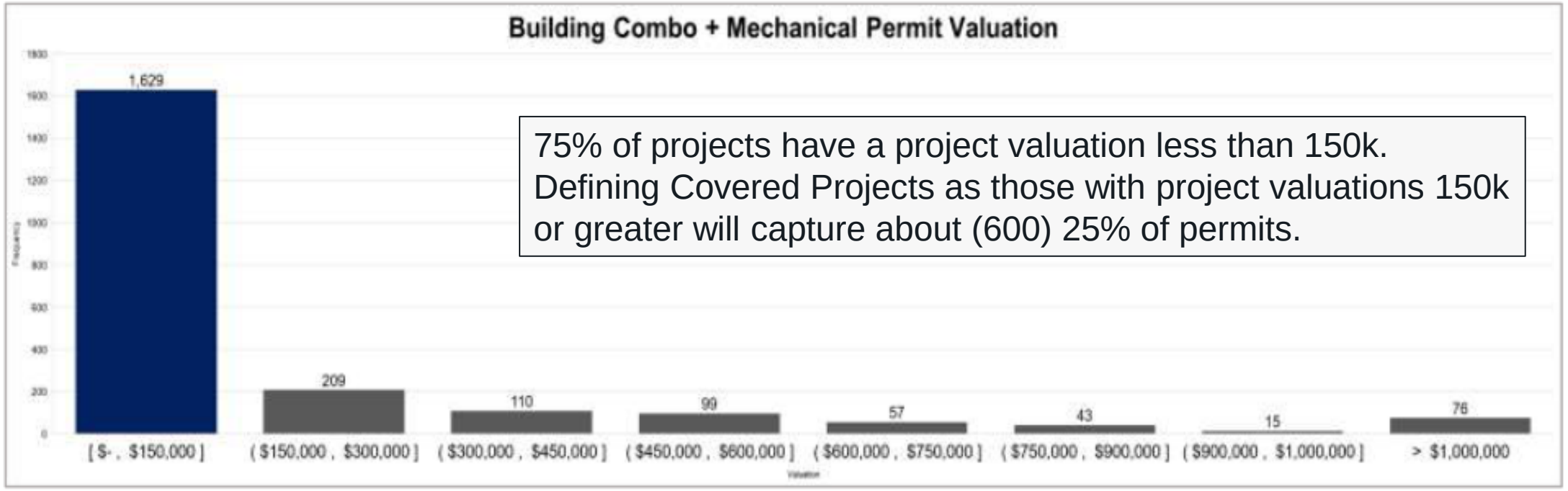


Climate Zone	Pre-1978	1978-1991	1992-2005	Post 2005	Total
12	124,967	64,420	25,312	10,982	225,681

55% of existing building stock was built before 1978

Source: Cost Effectiveness Explorer

Permit Data Example – Project Valuation



Flexpath Requirements

Target Score, Measures and Exceptions

Covered Projects Definition Options

Additions and Alterations

Valuation

Specific Permit Type

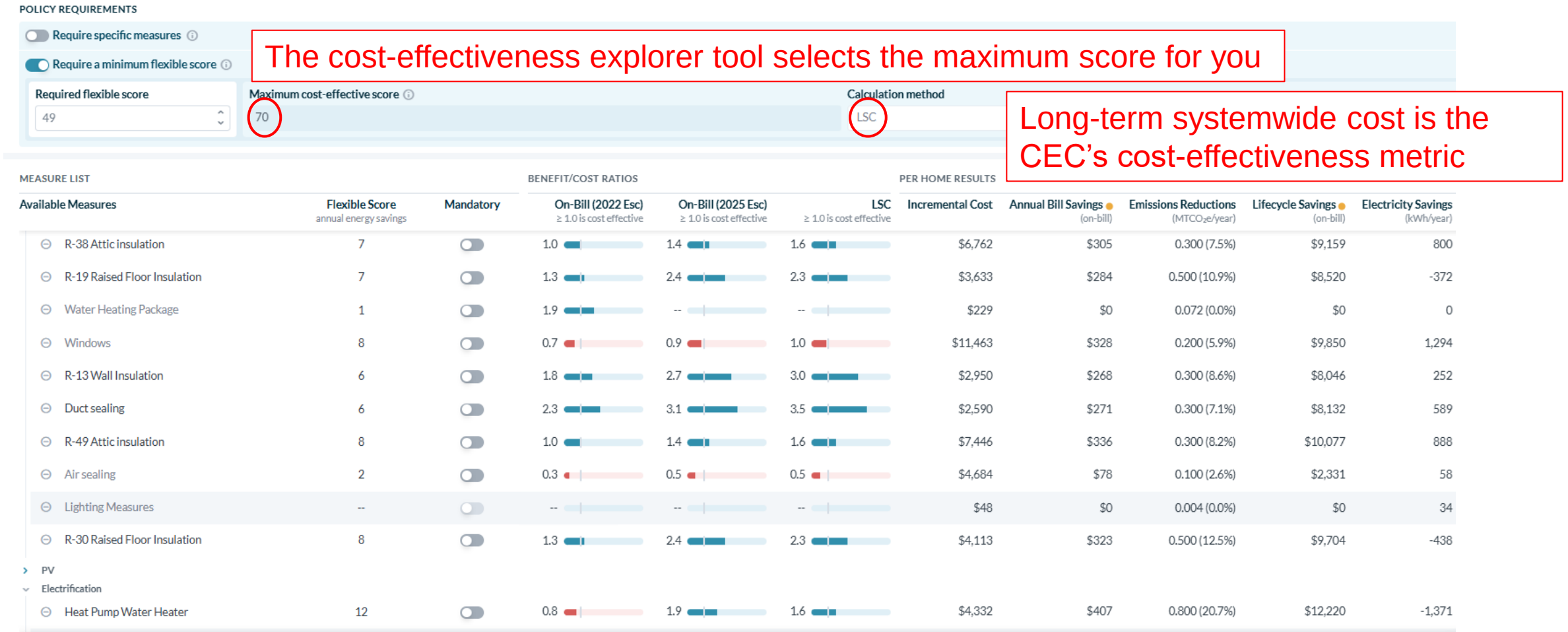
Equipment Replacements and Modifications

How to Determine Target Score

Requirement: There must be at least one cost-effective compliance pathway that does not require electrification

Identify vintage (Pre-1978, 1978 – 1991, 1991-2005)
Identify maximum score
Determine target score based on flexibility and compliance cost
Determine if you want to set a tiered approach
Develop compliance packages to understand how many compliance options there are and their associated cost

Cost-effectiveness explorer example



POLICY REQUIREMENTS

Require specific measures

Require a minimum flexible score

Required flexible score: 49

Maximum cost-effective score: 70

Calculation method: LSC

The cost-effectiveness explorer tool selects the maximum score for you

Long-term systemwide cost is the CEC's cost-effectiveness metric

MEASURE LIST			BENEFIT/COST RATIOS			PER HOME RESULTS				
Available Measures	Flexible Score annual energy savings	Mandatory	On-Bill (2022 Esc) ≥ 1.0 is cost effective	On-Bill (2025 Esc) ≥ 1.0 is cost effective	LSC ≥ 1.0 is cost effective	Incremental Cost	Annual Bill Savings (on-bill)	Emissions Reductions ($MTCO_2e$/year)	Lifecycle Savings (on-bill)	Electricity Savings (kWh/year)
R-38 Attic insulation	7		1.0	1.4	1.6	$6,762	$305	0.300 (7.5%)	$9,159	800
R-19 Raised Floor Insulation	7		1.3	2.4	2.3	$3,633	$284	0.500 (10.9%)	$8,520	-372
Water Heating Package	1		1.9	--	--	$229	$0	0.072 (0.0%)	$0	0
Windows	8		0.7	0.9	1.0	$11,463	$328	0.200 (5.9%)	$9,850	1,294
R-13 Wall Insulation	6		1.8	2.7	3.0	$2,950	$268	0.300 (8.6%)	$8,046	252
Duct sealing	6		2.3	3.1	3.5	$2,590	$271	0.300 (7.1%)	$8,132	589
R-49 Attic insulation	8		1.0	1.4	1.6	$7,446	$336	0.300 (8.2%)	$10,077	888
Air sealing	2		0.3	0.5	0.5	$4,684	$78	0.100 (2.6%)	$2,331	58
Lighting Measures	--		--	--	--	$48	$0	0.004 (0.0%)	$0	34
R-30 Raised Floor Insulation	8		1.3	2.4	2.3	$4,113	$323	0.500 (12.5%)	$9,704	-438
PV										
Electrification										
Heat Pump Water Heater	12		0.8	1.9	1.6	$4,332	$407	0.800 (20.7%)	$12,220	-1,371

Explorer tool training

Source: Cost Effectiveness Explorer

Available Measures

Heat Pump Appliances

- Water Heater
- Space Conditioning
- Clothes Dryer

Roof Improvements

- Cool Roof
- Radiant Barrier

Other Electrification

- Induction Cooktop
- All-electric Home

Envelope Improvements

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

Duct Improvements

- Duct Sealing
- New Ducts + Insulation + sealing

Other Efficiency

- Solar PV
- Electric Readiness
- Lighting
- Water Heating Package

Considerations when Selecting Measures

Which measures should be mandatory?

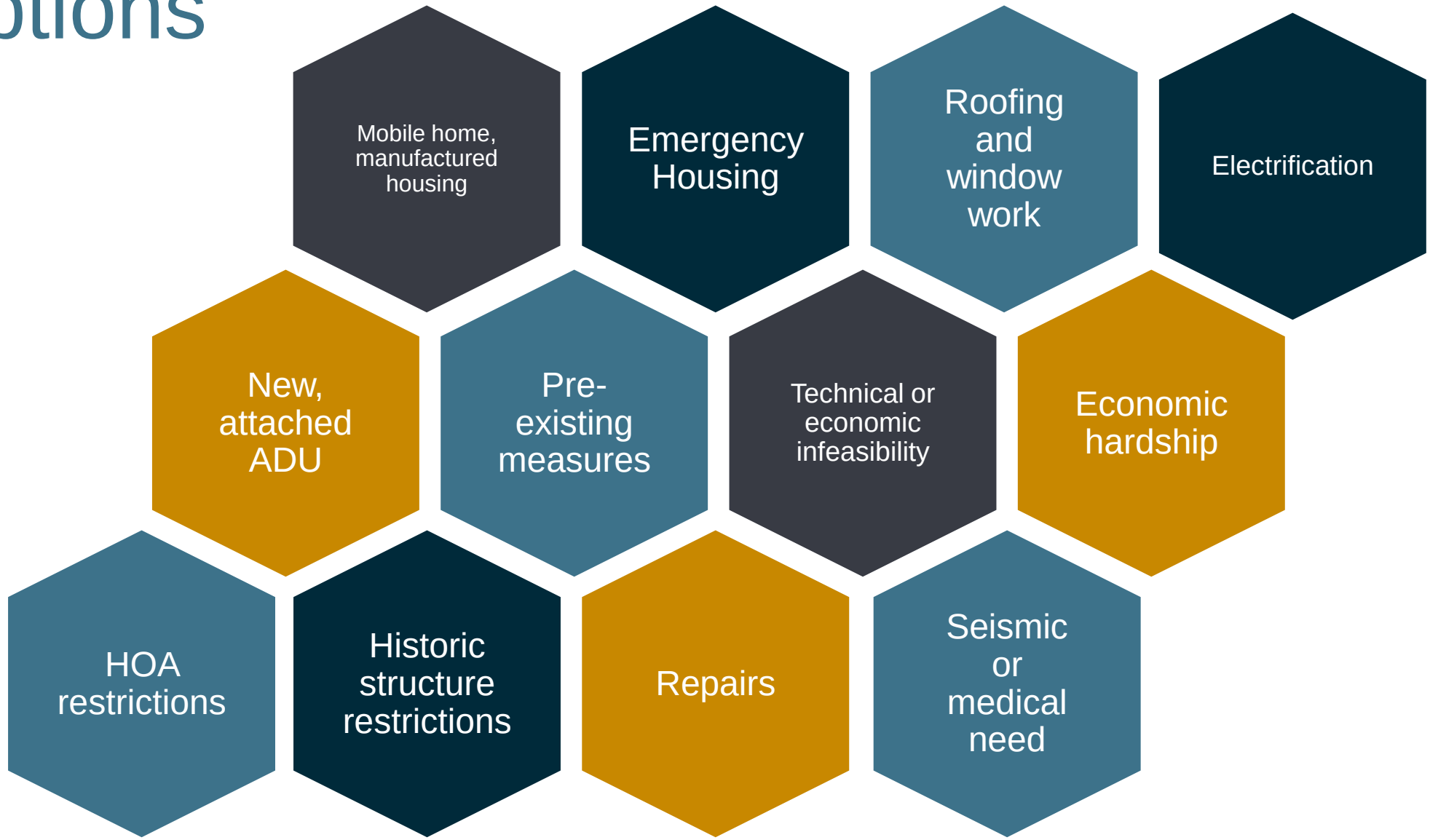
Cost Effectiveness explorer sets mandatory measures for you

Should solar pair with electric readiness?

Should high efficiency measures have higher values?

Should electrification measures be included?

Exceptions


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

Flexpath Q & A

Resources Review

Resource Review

Working Group recording and slides to be shared on CCA websites

AC-HP model code – Local Energy Codes

- Part 11 Section A204.1.1
- Part 6 version coming soon

Flexpath and Electric Readiness model code – Local Energy Codes

- Flexpath: Part 6 Section 150.0(w)
- Electric Readiness: Part 6 Section 150.0(x)

Adoption Resource	AC-HP	FlexPath	Electric Readiness
Model Code	**Complete** + Part 6 coming	**Complete**	**Complete**
Slide Deck	**Complete**	**Complete**	**Complete**
Staff Report	**Posting soon**	**Posting soon**	**Posting soon**
Decision Guide	**Posting this month**	n/a	n/a

Working Group #2 this Summer focused on submittal and implementation

- **Compliance and enforcement process**
  - Technical features
  - Inspections and workflow
  - Checklists
- **Submittal to CEC/BSC**
  - Key ordinance features for submittal
  - Template
- **Other resources**
  - Exceptions forms
  - FAQ resources

Scheduling for late August or early September

We hope you can join us!

Nonresidential Alterations Cost Effectiveness Webinar

Hosted by the Statewide Local Energy Codes Team

Tuesday, June 24th from 11a-1230

Register here

Stop Recording

General Q & A + Discussion

Thank You

We appreciate your time and commitment to better buildings in California

Get in Touch

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Central California and 3CE member agencies:

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All others (will be redirected as appropriate):

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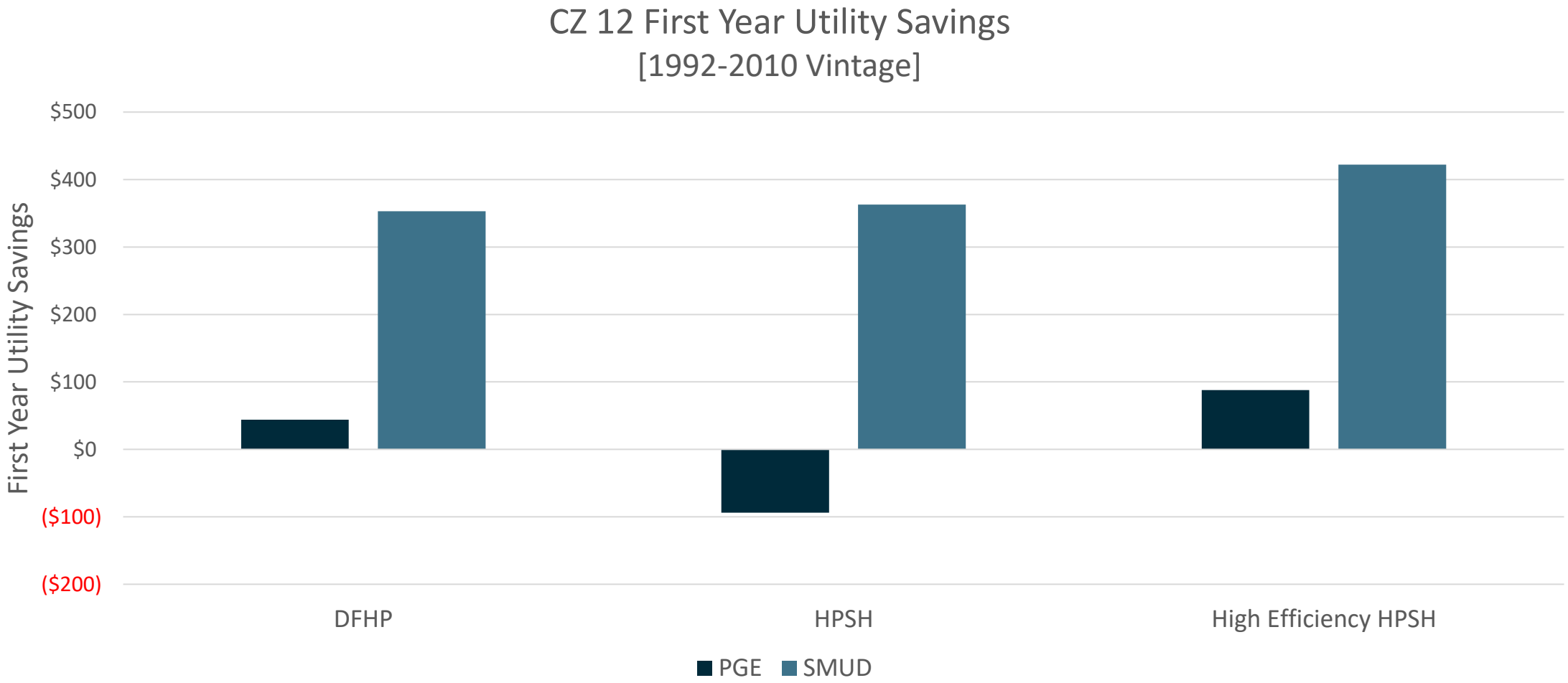
Resources for Staff

Visit **LocalEnergyCodes.com** or **Bay Area Reach Codes** to download the latest version of the resources (as they become available)

- This slide deck
- Model ordinance
- Cost-effectiveness study
- Cost Effectiveness Explorer
- Process and Decision Guide
- FAQs
- List of jurisdictions that have adopted a similar ordinance
- Application checklist
- Exception form
- Filing checklist
- Submission instructions

On-bill savings are possible



Source: Statewide IOUs C&S: Single Family Air Conditioner Replacements (AC to HP), May 28, 2025

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	

Compliance Package Examples

with Tiered Approach

Target Score of 8 for renovations between 300 – 999 square feet

Measures	Score	Incremental Cost
Duct sealing + R-49 attic insulation	8	$10,036
HPWH	12	$7,300

Target score of 19 for renovations 1,000 square feet or over

Measures	Score	Incremental Cost
Duct sealing + windows + R-13 wall insulation + R-49 insulation + water heating package + air sealing + heat pump clothes dryer	19	$29,709
HPWH + Heat pump space heater	19	$8,472

Measures	Table 150.0-J ID	Points
Water Heating Package	E1	1
Induction Cooktop	E2	1
Heat Pump Clothes Dryer	E3	1
Air Sealing	E4	1
Duct Sealing	E5	3
R-49 Attic Insulation	E6	5
Windows	E7	5
R-13 Wall Insulation	E8	3
New Ducts + Duct Sealing	E9	6
R-19 Floor Insulation	E10	1
R-30 Floor Insulation	E11	2
Heat Pump Water Heater (HPWH)	E12	12
Solar PV + Electric Ready Pre-Wire	E13	17
Heat Pump Space Heater	E14	7
Utility Room, Kitchen & Laundry-Related Electric Ready Pre-Wire	M1	Mandatory
Panel-Related Electric Ready Pre-Wire	M2	Mandatory

Cost Threshold Analysis

- Identify the appropriate cost burden threshold based on:
  - Typical project cost and project valuation
  - Estimated cost of compliance
  - Expected number of exemption request
- From permit data

Cost Burden Threshold - Project Valuation	Number of Permits that Apply for Cost Burden per Year*	Median Project Valuation	Maximum Cost of Compliance	Estimated Project Cost	Cost Burden Threshold-Estimated Project Cost**
20%	1	$131,000	$26,200	$227,500	11.5%
15%	3	$131,000	$19,700	$227,500	8.7%
12.5%	5	$131,000	$16,400	$227,500	7.2%
10%	11	$131,000	$13,100	$227,500	5.7%
5%	24	$131,000	$6,600	$227,500	2.9%

**Using the expected cost of compliance $6,600*

*** Based on an estimated construction cost of $650/sf. Construction costs can range.*

Permit Data Example – Identify Opportunities

Permit year	Total Permits	
	Building Combo	Mechanical
2014	26	
2015	1,290	242
2016	1,159	201
2017	1,123	189
2018	1,130	181
2019	1,081	178
2020	677	111

Permit Data Example – Identify Opportunities

2,581 permits pulled in 2019 for residential households

SF permits, 2019

- 8% of households

MF permits, 2019

- 5% of households