

# Statewide Codes and Standards

Reach Codes for Existing Homes  
A Flexible Approach

January 20, 2022



# Agenda

---

- Reach Code Process and Program Overview
- Existing Buildings Study Scope
- Flexible Compliance Approach
- Drafting an Ordinance
- What's in the Pipeline



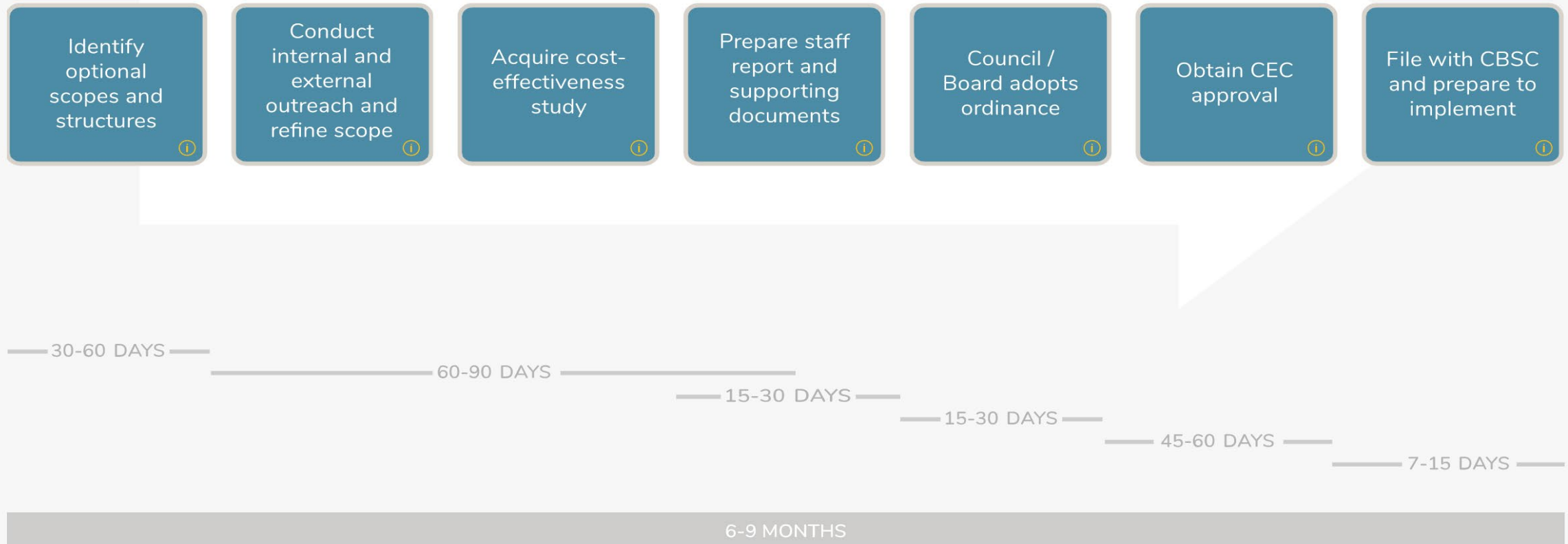


# Reach Codes Process and Program Overview

---

# Reach Codes Process and Program Overview

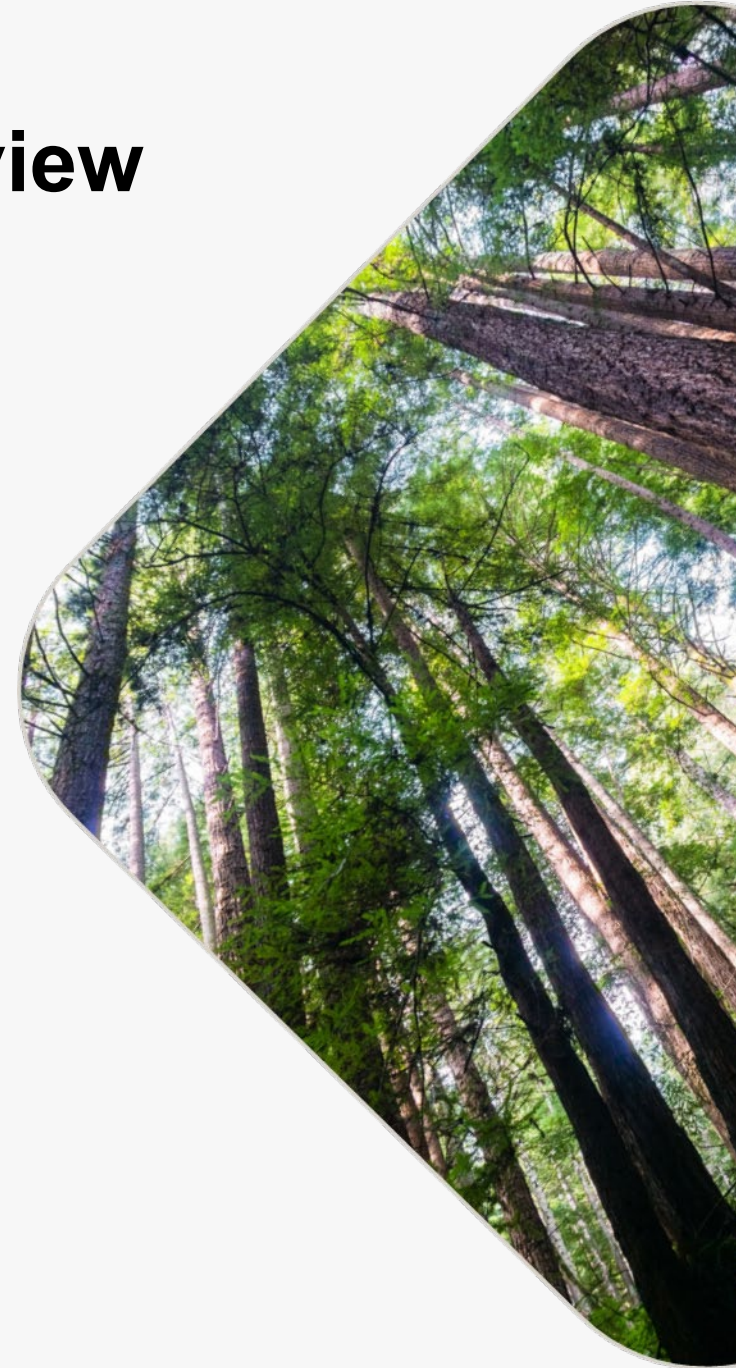
## LOCAL REACH CODE PROCESS ↓



# Reach Codes Process and Program Overview

Objective: Facilitate Adoption of Reach Codes

- Prepare Cost-effectiveness Analyses
- Develop Model Language
- Create staff resources
- Workshops, presentations
- Newsletters
- Frontrunners





# Existing Residential Retrofits Study Scope

---

# Existing Single Family Cost Effectiveness Study

- Prototype Design
  - Single family home: ~1,700 sf
  - Three vintages: Pre 1978, 1979-1991, 1992-2010
- Measures
  - Energy Efficiency
  - Renewables
  - Electric Appliances



# Existing Single Family

## Cost-effectiveness Study Evolution

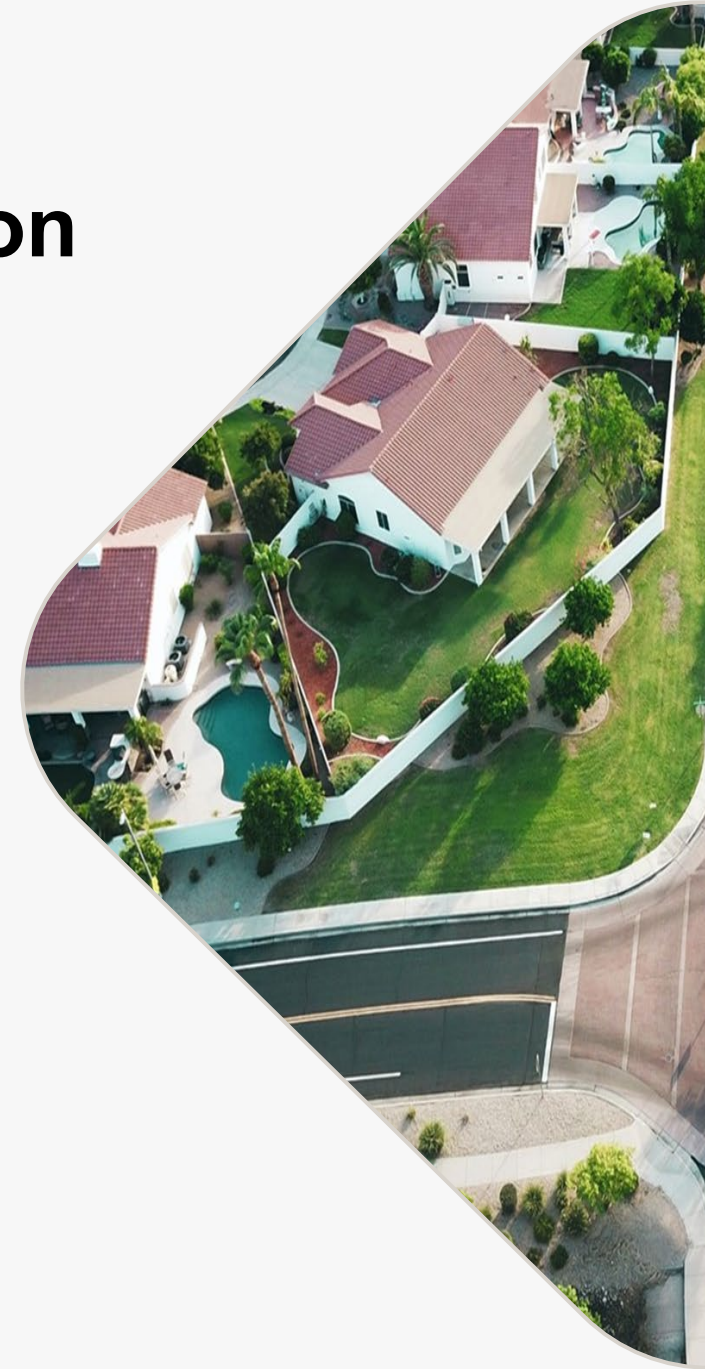
February 2020 (SF and MF): Initial 2019 report released.

- Efficiency measures and packages.
- On-bill results only.

2021 Update (Single family only)

- Efficiency measures and packages
- PV and battery storage systems
- Fuel substitution and demand flexibility measures
- New 2022 weather files
- On-bill, 2019 and 2022 TDV results

- 2022 Update: Low-rise multifamily (Jan/Feb 2022)





# Existing Single Family Cost Effectiveness Study

## Methodology

### ➤ Metrics

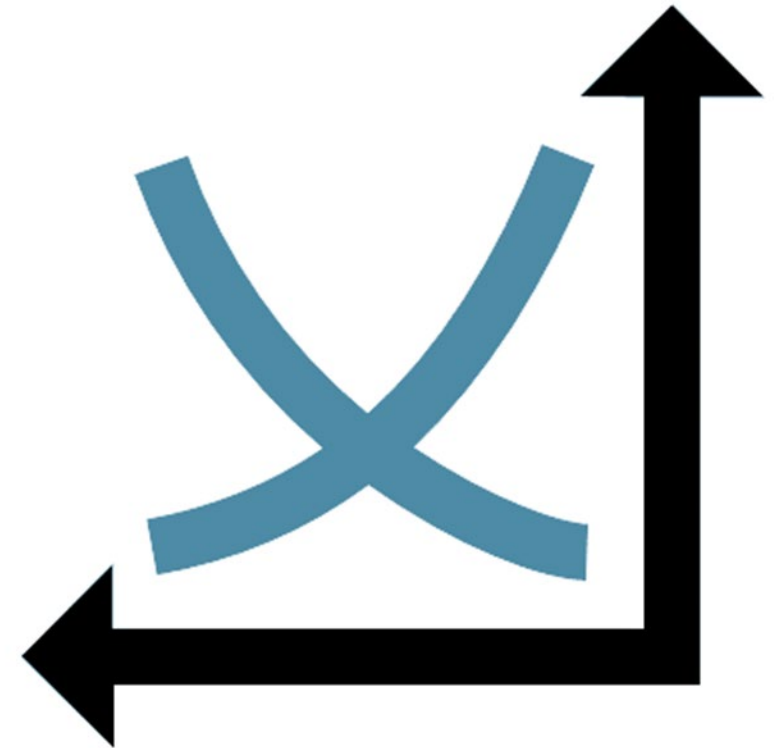
- “On-bill” (customer) and TDV (code/societal)

### ➤ Utility Tariffs

- Most common rate for occupancy type, as provided by utilities
- All IOUs, plus SMUD, LADWP and CPAU
- Others upon request

### ➤ Cost-effectiveness Results

- Net Present Value (NPV) and Benefit to Cost (B/C) Ratio



# Existing Buildings Cost Effectiveness Study

## 2019 TDV versus 2022 TDV Results

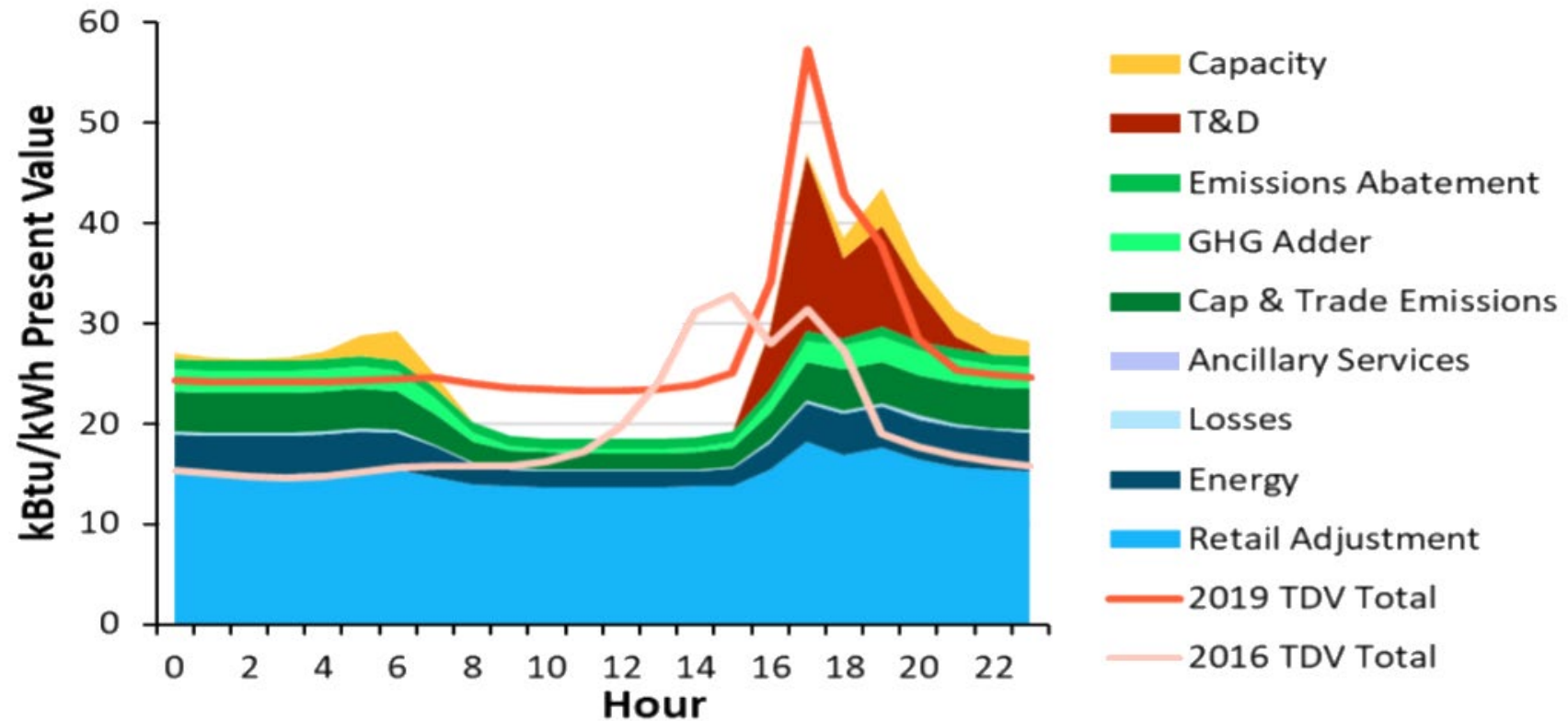
### ➤ 2022 TDV Major Changes

- Changes in peak demand times
- Reflect current elec gen mix
- Methane and refrigerant leakage

### ➤ Cost-effectiveness Impacts

- Efficiency: Increase
- PV: Reduction
- Storage: Increase
- Electrification: Large increase

2022 Nonresidential Electricity TDV for CZ12, compared to 2019 and 2016 TDV



# Cost-effectiveness of Heat Pump at DHW Replacement (On-bill, 2019 TDV, and 2022 TDV)

Climate Zone		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Utility		PG&E	PG&E	PG&E	PG&E CPAU	PG&E SCG	SCE	SDG&E	SCE	SCE	SCE SDGE	PG&E	PG&E SMUD	PG&E	SCE SDGE	SCE	PG&E
		HPWH at DHW Replacement															
2019 TDV	Pre-1978	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A On-Bill	N/A	N/A	N/A	N/A
	1978-1991	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A On-Bill	N/A	N/A	N/A	N/A
	1992-2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A On-Bill	N/A	N/A	N/A	N/A



# Flexible Compliance Approach

---

# Short Video: Flexible Compliance

- <https://youtu.be/DSofCEeqEQ>

The screenshot displays the 'Cost Effectiveness Explorer' interface. It features two main panels: 'Rigid Compliance Policy' and 'Flexible Compliance Path Policy'. The 'Rigid Compliance Policy' panel, labeled 'Required Measure', shows a single measure 'Attic Insulation'. The 'Flexible Compliance Path Policy' panel, labeled 'Measure Menu', lists five measures with checkboxes: 'Attic Insulation' (unchecked), 'Duct Sealing' (unchecked), 'New Ducts' (unchecked), 'LED lamp vs CFL' (checked), and 'PV' (checked).

**Cost Effectiveness Explorer**

**Rigid Compliance Policy**  
Required Measure

Attic Insulation

**Flexible Compliance Path Policy**  
Measure Menu

Attic Insulation	<input type="checkbox"/>
Duct Sealing	<input type="checkbox"/>
New Ducts	<input type="checkbox"/>
LED lamp vs CFL	<input checked="" type="checkbox"/>
PV	<input checked="" type="checkbox"/>

# Flexible Compliance

## Concept

- Establish narrow set of Cost-Effective Measures
- Based on Study Results

- Allow substitution from a wider list of measures
- Must save at least as much energy
- Substitution based on point system
- Points/scores based on estimated energy savings from study findings

# Flexible Compliance

---

## Concept

### Cost-effective Measures (5)

R-49 Attic Insulation  
New Sealed Ducts  
Water Heating Package  
LEDs & Photosensors  
PV

### Available Measures to Choose (16)

R49 Attic Insulation  
Air Sealing  
New Sealed Ducts  
Duct Sealing Only  
R-13 Wall Insulation  
Windows  
Cool Roof  
Water Heating Package  
LEDs & Photosensors  
Prescriptive PV System  
Heat Pump Water Heater  
NEEA Tier 3 HP Water Heater  
Heat Pump HVAC  
High-Efficiency HP HVAC  
Heat Pump Dryer  
Inductive Cooktop

# Flexible Compliance Concept

## Cost-effective Measures (5)

	<b>Measure Score</b>
	Rounded Energy Savings
LED lamp vs CFL	0
PV	12
R-49 Attic + Duc	4
Water Heating P	1
Exterior Photosen	0

## Available Measures to Choose (16)

<div style="background-color: #e0e0e0; padding: 2px;"> <span style="font-size: 0.8em;">v</span> Efficiency         </div>	
LED + Exterior Photosensor	Mandatory
Water Heating Package	1
R-49 Attic Insulation	3
Duct Sealing	1
New Ducts + Duct Sealing	2
Windows	1
R-13 Wall Insulation	1
Cool Roof	1
<div style="background-color: #e0e0e0; padding: 2px;"> <span style="font-size: 0.8em;">v</span> Electrification         </div>	
HPWH	12
High Eff HPWH	13
HVAC Heat Pump	3
High Eff HVAC Heat Pump	4
Heat Pump Clothes Dryer	1
Induction Cooktop	1
<div style="background-color: #e0e0e0; padding: 2px;"> <span style="font-size: 0.8em;">v</span> PV         </div>	
PV	12
PV (points per KW)	6
PV + Battery	11



# Flexible Compliance





## Creating your ordinance



# Flexible Path

## Getting Started at [LocalEnergyCodes.com](https://LocalEnergyCodes.com)



REQUIREMENT	PROS	CONS	ADOPTER CITY
<p>Install efficiency, renewable, or electrification measures in existing home if not included in project scope</p> <p><i>Require upgrades beyond work triggered by Title 24 code. Examples include: add attic insulation to vented attic spaces, or apply air sealing to accessible areas</i></p> 	<ul style="list-style-type: none"><li>Impact on existing homes with greatest savings potential</li><li>Flexibility to limit maximum incremental cost</li></ul>	<ul style="list-style-type: none"><li>Often politically challenging to adopt requirements for existing homes</li></ul>	 Carlsbad, Chula Vista, Encinitas
 Cost Effectiveness Explorer	<p>APPLICATION PACKAGE</p> <ul style="list-style-type: none"><li>2019 Residential Retrofit Cost-eff Report (8/27/2021)</li><li>2019 Sample CEC Cover Letters</li></ul> <p>INTERNAL STAFF RESOURCES</p> <ul style="list-style-type: none"><li>Model Ord - Single Family Renovations</li></ul>		<a href="#">Download All</a> 

Design a policy

Get the text

Edit your documents

# Flexible Path

## Access Cost Effectiveness Explorer Directly

- [Explorer.localenergycodes.com](http://Explorer.localenergycodes.com)
- Download model ordinance during policy configuration

# Cost-Effectiveness Explorer

[explorer.localenergycodes.com](http://explorer.localenergycodes.com)

- ✓ Web-based software for California local government energy policy makers
- ✓ Designed to help accelerate reach code adoption and support data-driven decision making
- ✓ Launched in late 2020
- ✓ Aggregates findings from 4 state-wide cost-effectiveness studies
- ✓ Estimates residential building stock for each of 500+ California cities and counties
- ✓ Helps users evaluate and develop cost-effective policy options



# Flexible Path

## Exported Table

	A	B	C	D	E	F
1	<b>Flexible Compliance Tables</b>					
2	<b>Single Family Homes</b>					
3	<b>Climate Zone 7</b>					
4						
5	<b>Table 1A: Target Score</b>					
6	<b>Single Family Homes - Climate Zone 7</b>		<b>Building Vintage</b>			
7			<b>Pre-1979</b>	<b>1979-1992</b>	<b>1993-2011</b>	
8	<b>Target Score</b>		<b>9</b>	<b>7</b>	<b>7</b>	
9						
10	<b>Table 1B: Measure Menu</b>					
11	<b>Single Family Homes - Climate Zone 7</b>		<b>Building Vintage</b>			
12			<b>Pre-1979</b>	<b>1979-1992</b>	<b>1993-2011</b>	
13	<b>Cool Roof</b>		<b>1</b>	<b>--</b>	<b>--</b>	
14	<b>Duct Sealing</b>		<b>1</b>	<b>Mandatory</b>	<b>--</b>	
15	<b>Heat Pump Clothes Dryer</b>		<b>1</b>	<b>1</b>	<b>1</b>	
16	<b>High Eff HPWH</b>		<b>13</b>	<b>13</b>	<b>13</b>	
17	<b>High Eff HVAC Heat Pump</b>		<b>4</b>	<b>2</b>	<b>2</b>	
18	<b>HPWH</b>		<b>12</b>	<b>12</b>	<b>12</b>	
19	<b>HVAC Heat Pump</b>		<b>3</b>	<b>2</b>	<b>1</b>	
20	<b>Induction Cooktop</b>		<b>1</b>	<b>1</b>	<b>1</b>	
21	<b>LED + Exterior Photosensor</b>		<b>Mandatory</b>	<b>Mandatory</b>	<b>Mandatory</b>	
22	<b>New Ducts + Duct Sealing</b>		<b>2</b>	<b>1</b>	<b>--</b>	
23	<b>PV</b>		<b>12</b>	<b>12</b>	<b>12</b>	
24	<b>PV + Battery</b>		<b>11</b>	<b>11</b>	<b>11</b>	
25	<b>PV + Electric Ready Pre-Wire</b>		<b>12</b>	<b>12</b>	<b>12</b>	
26	<b>PV (points per KW)</b>		<b>6</b>	<b>6</b>	<b>6</b>	
27	<b>R-13 Wall Insulation</b>		<b>1</b>	<b>--</b>	<b>--</b>	
28	<b>R-49 Attic Insulation</b>		<b>3</b>	<b>1</b>	<b>--</b>	
29	<b>Water Heating Package</b>		<b>1</b>	<b>1</b>	<b>1</b>	
30	<b>Windows</b>		<b>1</b>	<b>1</b>	<b>--</b>	
31	<b>Inductive Cooktop</b>		<b>2</b>	<b>2</b>	<b>2</b>	
32						

# Flexible Path

## Model Ordinance


Word File Edit View Insert Format Tools Table Window Help

AutoSave OFF

Model\_Ord\_SF\_Renovations (1) — Saved to my Mac

Home Insert Draw Design Layout References Mailings >> Tell me Share Comments

SINGLE FAMILY RENOVATION MODEL REACH CODE

**CALIFORNIA ENERGY**  
CODES & STANDARDS  
A STATEWIDE UTILITY PROGRAM

Please Note:

This template is intended for educational purposes only, without any express or implied warranty of any kind, including warranties of accuracy, completeness, or fitness for any particular purpose. You agree that your use of the template is without any recourse whatsoever to PG&E, SCE, SDG&E, or their affiliates. The template is a draft, and anyone using this document should seek the advice of an attorney to develop appropriate ordinance language to meet its jurisdiction's specific needs, as state and local laws may differ.

Please contact the Codes and Standards Reach Codes Team at [info@LocalEnergyCodes.com](mailto:info@LocalEnergyCodes.com) for additional information.

*This document is the product of a collaborative effort by Building Decarbonization Coalition, BayREN, SMUD, PCE/SVCE, staff from several jurisdictions, and the IOU Statewide Codes and Standards, Reach Codes Program.*

This program is funded by California utility customers and administered by Pacific Gas and Electric Company, San Diego Gas & Electric Company

Page 1 of 18 6123 words English (United States) Focus 110%



# Drafting an Ordinance

---

# Model Ordinance Features

- Flexible triggers, structure, and stringency
- Feasible across a wide range of existing conditions
- Encourages electrification measures
- Based on site energy savings
- Compatible with 2019 and 2022 codes
- More measure options, including non-cost-effective choices





# Existing Homes: Some Considerations

- Widely varying, complex existing site conditions
- Energy Code Alterations Structure
  - “You touch it, you update it.”
- Study assumes compliance without ordinance measures
- Larger projects do not inherently have more opportunities to exceed code.
- Recommend setting requirement at minimum needed to achieve objectives



# Draft an Ordinance

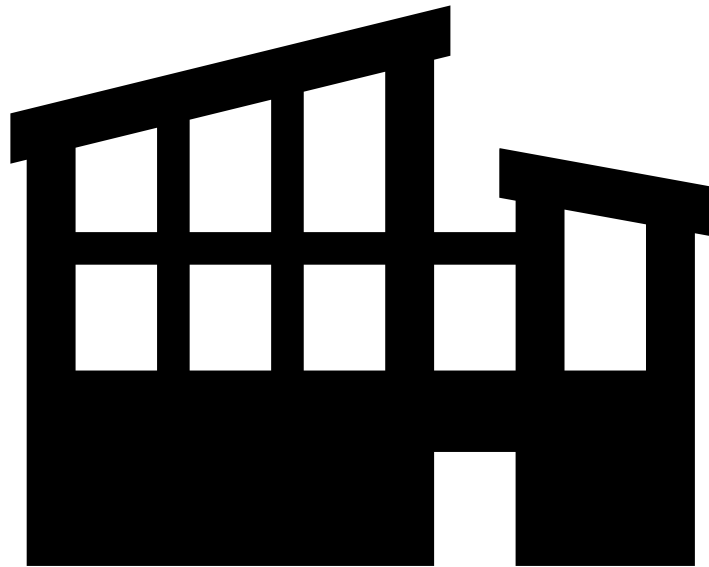
## Model Ordinance Language



- Amends the Energy Code
  - New mandatory section
- Provides optional definitions for scope/covered projects
- Includes rationale and recommendations
  
- Download model language from the Explorer or from [LocalEnergyCodes.com](http://LocalEnergyCodes.com)

# Draft an Ordinance

## Trigger Options



### ➤ Remodels

- Valuation: Based on permit valuation
- Scope: Based on permit scope, e.g., extent of structural change
- Multiple Tiers: Higher target scores for more extensive scopes

### ➤ Time of Listing/Sale

### ➤ Date Certain

# Draft an Ordinance

## Equity



### ➤ Potential Options

- Reduce maximum expenditure required
- Set alternate target: Install one of the most cost-effective measures (Duct Sealing or PV System)
  - Duct sealing is low-cost option to achieve energy savings and emission reductions
  - Duct sealing in older homes yields similar GHG emissions reductions as PV system, except in mild/low-heating climate zones

# Draft an Ordinance

## Exceptions



### ➤ Standard Exceptions

- Performance-based equivalent savings
- Manufactured housing
- Technical/financial infeasibility
- HOA covenants

### ➤ Optional Exceptions

- Energy upgrade only projects
- ADUs
- Expenditure cap
- Low-Income
- Health and safety improvements

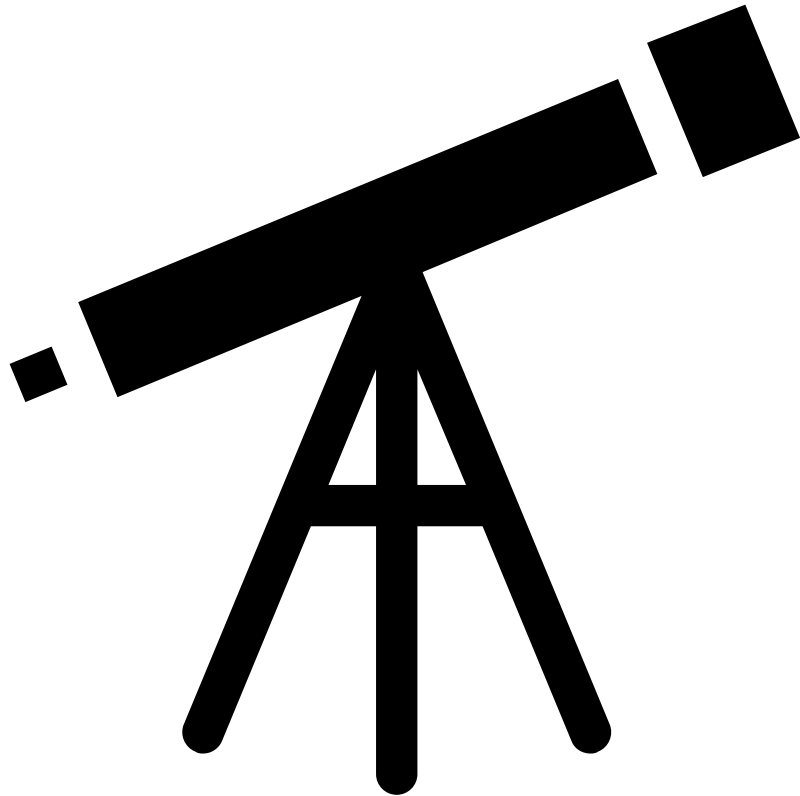
# Implementation

## Support



- Applicant FAQs
- Application checklists / fact sheets
- Model language review and guidance
- Other technical assistance upon request
  
- Newcomers Webinar: Preparing for Implementation, September 2022

# What's in the Pipeline?



- 2019 Code – Existing Buildings
  - Multifamily and Nonresidential Alterations studies release Q1 2022
  - Technical memo in support of revisions required for 2022 adoption
  
- 2022 Code – New Construction
  - New studies underway
  - Results will be in Cost Effectiveness Explorer

# Thank You!

Statewide Reach Codes Program



## REACHING BEYOND

### Building California's Future.

Collaborating with cities, counties and stakeholders to drive reach code development and adoption for long-term climate and energy efficiency benefits.

Reach Code Fr  
Carlsbad

Nestled along t  
between Los An  
Carlsbad offer  
magnifice  
diversi



We Appreciate your time!

Eric Engelman  
eric.engelman@gmail.com

Misti Bruceri  
mistib@mbaenergy.com

[LocalEnergyCodes.com](https://LocalEnergyCodes.com)

[Explorer.LocalEnergyCodes.com](https://Explorer.LocalEnergyCodes.com)