CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM



2025 Code Cycle: Existing Single Family Model Reach Code Process & Decision Guide

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Revision: 1.1
Last modified: 2026/03/31

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Table 1: Summary of Revisions

Date	Description	Reference (page or section)
06/23/2025	Original Release	N/A
3/31/2026	Version 1.1 Modified definition of Covered Project Added sample permit analysis and building stock analysis	Sections 3.1.1 and 3.5

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Introduction

This document is intended to support local jurisdiction staff developing a local reach code for existing single-family homes. It consists of a Process Guide that outlines the adoption process and lists the steps that must be completed in each stage, and a Decision Guide that provides additional information about typical questions that must be answered during Policy Development. Although the Guide is primarily focused on developing a policy for single family homes when undergoing a remodel, the recommendations are also applicable to other policies and home improvement activities. Generally, the proposed policy would require single family buildings that undergo certain improvements to install a set of energy efficiency, renewable energy and/or electrification measures that meet a specified energy-savings target. It may also require electric-readiness and cool roofs for certain project scopes. In addition, this set of policies can be expanded to include AC to heat pump replacements (see supporting documents).

Model language and the companion materials listed below are available at LocalEnergyCodes.com and BayAreaReachCodes.org.

- Model Ordinance Language
- Slide Deck
- FAQs
- Application Checklist
- Air Sealing Checklist
- Exceptions Form and Guidance
- State Submittal Guidance

Visit the Cost Effectiveness Explorer to develop a policy for a specific climate zone. The Explorer is a free policy development tool created by the Local Energy Codes program to help jurisdiction staff effectively use the results from program analyses to easily develop energy efficiency and decarbonization policies.

All of the resources provided by the program are published in a non-branded, editable format with the intention of providing a starting point, from which staff may create jurisdiction-specific materials.

1 Process Guide

The process may vary by local preference and may take up to 12 months to complete. A generic timeline and narrative of the major elements are provided to help get the process started. Program staff are available to assist at any stage in the process.

1.1 Direction & Approvals

These activities typically bookend the adoption process, beginning with an official policy document or statement from the governing body (council or board) and ending with approval from the California Energy Commission (CEC) and California Building Standards Commission (CBSC).

It's good to start from an existing policy document or statement, such as a strategy or measure from a climate action plan (CAP) or a statement from the housing element of the general plan. If such a policy does not exist, or if the existing policy needs to be updated, consider updating it or creating a new policy. It may also be helpful to get an acknowledgment from the governing body in the form of a resolution stating the intent to pursue the reach code. Consider requesting the initiative be included in the formal workplan for your division.

An ordinance requires two readings for adoption, and the second reading must not include any changes from the first reading, so it's important to be sure everything is in order. Some jurisdictions might require the ordinance be presented to specific committees or commissions such as the planning commission before introducing it at a Council or Board meeting. The ordinance must be accompanied by certain findings, including a California Environmental Quality Act (CEQA) declaration. See the model ordinance for details.

A FlexPath ordinance amends the Energy Code (Title 24, Part 6) and will need approval at a business meeting of the California Energy Commission in addition to CBSC approval. . Using submission templates, submit the package to the CEC and the California Building Standards Commission (CBSC). Until June 1, 3031, local amendments to residential building standards must be eligible for an exception to the limitations Assembly Bill 130 (2025) places on changes to standards applicable to residential units. During this period, jurisdictions must receive CBSC approval prior to CEC review.

File the CEQA declaration with the Governor's Office of Land Use and Climate Innovation (LCI) clearinghouse. Note that all documents that will be posted to the CEC or CBSC website must meet accessibility requirements. Both the CEC and CBSC provide helpful resources to facilitate the application submittal and approval process. Contact the CEC at LocalOrdinances@energy.ca.gov early in your adoption process for additional details.

1.1.1 Key Points

- Start from an existing policy statement, if possible
- Deliver a finished product for adoption

- Obtain CBSC approval
- Obtain CEC approval, and file the CEC-approved ordinance with the CBSC

1.2 Engagement

Engaging internal and external stakeholders is a critical component to successfully adopting and effectively implementing an ordinance. Beginning early and engaging both supportive stakeholders as well as those who may be opposed or have reservations provides a wider perspective. The process is often iterative and may involve negotiating a compromise between stakeholders with conflicting concerns.

1.2.1 Staff Team

As early as possible, assemble a team of internal stakeholders that are critical to success of the initiative. Ideally, the team could include the building official and/or staff that deal with housing policy, communications, community relations, and information technology (i.e., online permitting). This is also the time to begin discussing the proposed ordinance with counsel This group may also include consultants and experts from universities, research institutions, the local utility, Regional Energy Networks, and the local Community Choice Aggregator (CCA).

Action Items

- Adopt a schedule; consider how the reach code aligns with other code adoption processes.
- Get agreement on the scope of the reach code. The model ordinance includes requirements to install energy measures as well as electric readiness and cool roof requirements. They are independent of each other, but they all may come into play during remodels and renovations.
- Ask the staff team to articulate their concerns and ideas. The jurisdiction attorney can help the team understand any legal limitations.
- Be sensitive to existing procedures, workflows and potential bottlenecks.
- Be sure to define expectations and establish regular check-ins.

1.2.2 Elected Officials and Commissions

- Consider workshops for the governing board and/or appropriate committees and commissions
- Identify critical issues and proposed solutions
- Prepare slide deck
- Invite guest speakers as appropriate

1.2.3 External Stakeholders

Well-planned community outreach and engagement often results in a smoother adoption process, a better policy, and more thorough implementation. While community outreach is not required by the CEC, it's essential to communicate the proposed changes to residents and impacted stakeholders. In addition, outreach provides an opportunity to incorporate more perspectives into the proposal to enhance the reach code requirements and language. Confirm outreach needs, requirements and expectations with city council, relevant commissions and other city staff.

Action Items

- Prepare an outreach plan including:
  - Goals
  - Timeline
  - Alignment with governing board expectations and requirements
- Identify critical external stakeholders (e.g., homeowners, contractors, architects, neighborhood associations, tenant groups, real estate professionals, advocacy groups)
- Consider forming an external advisory group; invite experts on equity related issues in the community
- Identify key messages
- Identify potential points of conflict (compliance cost vs. project valuation, etc.)
- Prepare a set of questions to solicit input
- Develop a set of slides and collateral materials
- Identify events and venues for presentations; offer virtual options as well as evening or weekend options for events to facilitate participation by more community members
- Identify and develop methods for soliciting feedback (e.g., surveys, comment forms) in different venues
- Publish information and resources to web site or newsletter

1.2.4 Sample Questions for Community Engagement

- Are the proposed requirements clear?
- Are they fair and reasonable?
- Are there circumstances that should be given special consideration?
- How might you, as a homeowner, comply?
- If you own rental homes in the community, are there different issues that should be considered in comparison to owner-occupied properties?
- If you are a renter, what are your concerns?
- Are there other opportunities for GHG reductions that should be considered?

1.2.5 Key Points

- Engage key staff and counsel early
- Articulate rationale and requirements to all stakeholders
- Solicit, incorporate, and maintain a record of input
- Be transparent; avoid surprises

1.3 Planning and Research

Several activities need to occur before refining specific elements of the policy. These include understanding how the building code is developed and implemented, the nature of the existing building stock and building permit activity, what incentives and other requirements may already exist in the area and getting insights from other communities that have adopted or are considering such a reach code.

Action Items

- Review the model language to become familiar with the basics of the ordinance.
- Identify which section of the municipal code the ordinance should amend. Reference prior ordinances and staff reports to understand the structure of the documents and local process for building code amendments.
- Understand the current building permit application, approval and inspection processes and obtain input from building department staff to anticipate how the proposed ordinance would mesh with these.
- Gather data on the characteristics of the existing building stock. If the information is readily available, categorize the housing stock data by vintage corresponding to the vintages used in the cost effectiveness study.
- Gather permit application data for additions and alterations to single family homes in the last several years (which includes duplexes and townhomes), including project scope, valuation, type of permit, Accessory Dwelling Unit (ADU) conversions, etc.
- Identify “typical” projects that could be used to estimate costs and savings impacts.
- Find out what incentives may already be available in the community, such as federal tax credits, utility and CCA incentives, and any local or regional programs. Inquire whether the city or county could offer any additional incentives.
- Investigate regional requirements, including local air district mandates, coastal community requirements and other regionally specific regulations.
- Consult with jurisdictions that have adopted a similar ordinance. Consult with nearby jurisdictions that are considering a similar policy to determine opportunities to coordinate. If possible, try to maintain consistency across contiguous jurisdictions.
- Determine appropriate exemptions for cost thresholds, technical feasibility, etc.

1.3.1 Key Points

- Develop the specific features of the ordinance based on local building data and construction activities
- Reference similar policies to facilitate a smooth implementation process
- Learn from the experience of others

1.4 Policy Development

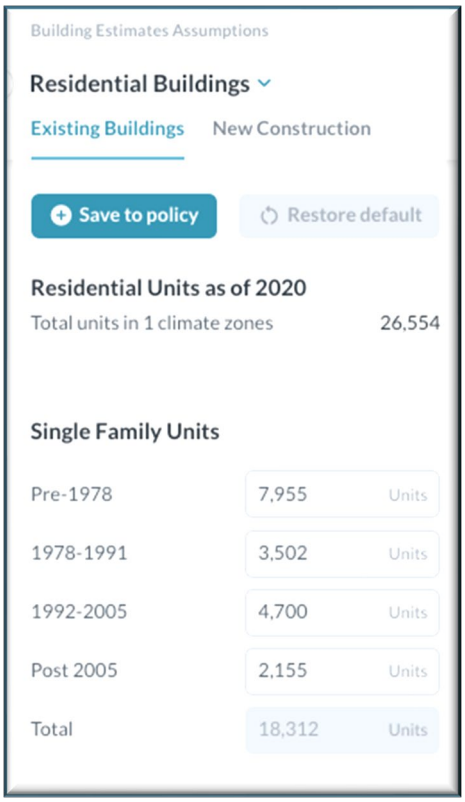
Although model ordinance language is provided, the specifics are highly dependent upon the climate zone, the type of buildings likely to undergo permitted projects in the jurisdiction, and local objectives. Customize the policy by analyzing the data and initial input to propose triggers, requirements and exceptions. Use the model ordinance and the Decision Guide section below to evaluate the impacts of various approaches and develop your recommendations.

A great place to start is the Cost Effectiveness Explorer. This tool presents the results of the cost-effectiveness studies specific to each jurisdiction including energy savings, emissions reductions and cost estimates for each measure, as shown in Figure 2. You can also use the Explorer to determine the subsidy or incentive required to make a measure cost-effective (or to result in a simple payback of five years) on an individual building basis and city- or county-wide.

The Explorer is also designed to facilitate development of a FlexPath ordinance, allowing the user to easily view the FlexPath score for each measure, and to easily identify measure packages that could meet various targets. The Explorer also calculates an estimate of the building-level energy savings and emissions reductions for each measure and package of measures as well as city-wide impacts of the measure and overall policy. The Explorer contains estimates of existing housing stock by vintage which can be edited to better reflect actual data if available, as shown in Figure 1 below.

You may choose to leave the default values or edit the assumptions to test various implementation scenarios, including the duration of the policy and the penetration rate, or number of homes that will be subject to the policy requirements each year, and other parameters.

Figure 1. Housing Stock Assumptions



The Explorer also contains detailed nonresidential building stock data estimates to inform development of nonresidential policies, especially for jurisdictions considering adopting a local benchmarking or building performance standard. As of Summer 2026, users can set the initial parameters of a BPS policy (target type, timing) and easily visualize and estimate the impacts of various changes. For example, users can estimate the number of buildings that already comply with the policy by occupancy type, and the number that will need to complete improvements, as well as the magnitude of the reductions required in each sector.

Action Items

- Begin by creating a draft policy and exploring the range of requirements and the assumptions on housing stock and permit activity. The Explorer has all the information from the cost effectiveness study that supports the FlexPath as shown in Figure 3 (as well as the other program studies).
- Review and update the housing stock data in the Explorer, as shown in Figure 1, if more accurate local data is available. The housing stock data is used to project city-wide or county-wide impacts.
- Review and if necessary, update the penetration rate assumption in the Explorer, which defaults to 5% per year. The actual penetration rate will depend upon the

trigger, exceptions, and local remodeling activities. If a low trigger is established, more homes will be affected.

- Identify and document the options for specific ordinance features. The options are more fully discussed in the Decision Guide table. These include bundling vintages, setting target values, including electric readiness requirements, as well as determining triggers and exceptions. As you work through the choices, document the results of different scenarios such as those described in the next bullet to support your recommendations.
- Use the Explorer to create scenarios and assess their impact relative to the CAP goals. Use specific projects if data are available and examine the impacts of the proposed requirements. Consider homeowner capital costs, utility bill impacts and GHG reductions. Adjust the target scores to find an appropriate balance.
- Document the results of these exercises for inclusion in outreach materials. Revise requirements as appropriate following community input.
- Create a narrative summary of the proposed policy, input received, and the rationale for each component.
- Prepare a draft ordinance (with required findings) and circulate iterations to the internal team.
- Develop a final draft of the ordinance and a staff report for the governing board.
- Prepare a CEQA determination.
- Prepare and deliver a presentation to the governing board.
- Prepare implementation materials (application forms, checklists, FAQs, exception forms, etc.).
- File the CEQA determination.

Key Points

- Use local data to inform the policy features
- Develop and compare scenarios to optimize the approach and document the rationale for the requirements
- Use the Decision Guide below to work through the details of the ordinance
- Prepare collateral materials to clearly communicate the rationale and requirements.

Figure 2. Cost Effectiveness Explorer FlexPath Measures (Example)



MEASURE LIST			BENEFIT/COST RATIOS	PER HOME RESULTS
Available Measures	**Flexible Score** annual energy savings	**Mandatory**	**On-Bill (2025 Esc)** ≥ 1.0 is cost effective	**Emissions Reductions** ($MTCO_2e$/year)
Efficiency				
New Ducts, R-8 Insulation + Duct Sealing	11		3.9	0.500 (12.0%)
Windows	8		1.7	0.200 (5.9%)
R-13 Wall Insulation	6		3.3	0.300 (8.6%)
Duct sealing	6		4.8	0.300 (7.1%)
R-49 Attic insulation	8		2.2	0.300 (8.2%)
Air sealing	2		0.6	0.100 (2.6%)
Lighting Measures	--		--	0.004 (0.0%)
R-30 Raised Floor Insulation	8		1.6	0.500 (12.5%)
PV				
Solar PV	16		1.5	0.100 (2.7%)
Electrification				
Heat Pump Water Heater	12		0.8	0.800 (20.7%)
Induction Cooktop	1		--	0.031 (0.0%)
High Eff Heat Pump Water Heater (repl electric)	5		2.0	0.100 (3.4%)
Heat pump water heater with Elec Base	4		2.1	0.100 (2.3%)
Heat Pump Space Conditioner	22		5.3	1.300 (37.4%)

2 Decision Guide

The tables below are intended to be used in conjunction with model ordinance language and the Cost Effectiveness Explorer to guide the development of a reach code.

Figure 3. Focus Area Descriptions

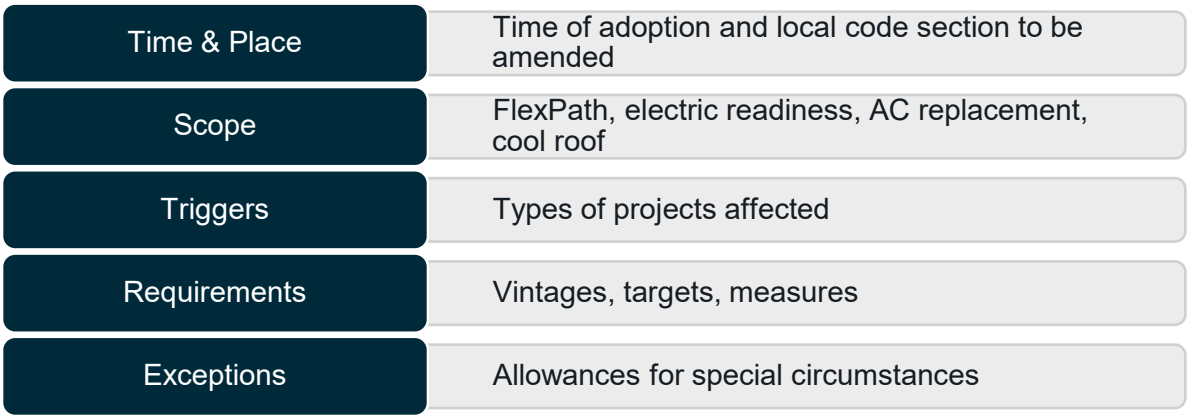


Table 2. Decision Guide

Focus Area	Decision Description
Time & Place	Determine when the amendment to the building code can and should occur. Work backwards from that time to establish a timeline and schedule. Identify the section(s) of local code to be amended/added.
Scope	Define the scope of the reach code. For example: • FlexPath for certain additions and alterations • FlexPath for AC replacements • Electric readiness for certain project scopes • Higher cool roof standard for reroofs
Triggers	Define the events that trigger the requirements. Evaluate the number of homes impacted and estimated impacts that would result from various proposed definitions based on historic permit data. **FlexPath.** The term “Covered Single Family Project” is included in the model language to avoid potential conflict with other terms that might be in use in the local lexicon. Some possible definitions are provided in Attachment 1. The term and definition are at the discretion of the local jurisdiction. Consult building/permitting staff in this process to ensure the proposed definition and other features of the ordinance do not conflict with others already in use. Consider the questions below when developing recommendations. • Are there any existing definitions in use at the jurisdiction that could be used or modified for this purpose? • Who will be making the determination whether a particular project is covered or not (e.g., permit tech, plans examiner)? What information will that person need?

Focus Area	Decision Description
	• Should the trigger be based on project valuation, project scope, or a combination of valuation and scope? • If using project scope, should it be based on floor area, extent of work involved, or a combination of both? • If using floor area, does there need to be more specificity to define the floor area being altered? E.G., *any construction or renovation with a work area that includes a portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by this code.* • Based on historic permit data, how many projects would be affected? • Does the ordinance need to account for serial permits, i.e., a single project that has a series of permits over the course of its execution. If so, consider language such as: *The scope or valuation shall include the sum of all addition or alteration permits issued within the past three years, except that additions or alterations made prior to the initial adoption of this ordinance shall not be counted.* • Should the policy include different tiers, i.e., higher target scores for more extensive project scopes? • Should it specifically include air conditioner replacements (possibly with a lower target score) and additions as a trigger? This could enable a combination AC to heat pump and FlexPath ordinance. • What types of buildings and project scopes should be exempted (see exceptions in the model ordinance)? Should these exceptions be embedded in the definition or listed separately as exceptions? • If the jurisdiction has already amended the definition of “Newly Constructed Building”, the definition of a Covered Project should exclude such projects or there should be an exception. • Under the State Code, the term “Single Family” includes duplexes and townhomes. Is this definition consistent with the jurisdiction’s definition? • Is a separate AC replacement ordinance (or other relevant reach code) on the books or under consideration? How would the ordinances mesh? **Electric Readiness**. Is the language in the electric readiness section of the model ordinance appropriate and reasonable? Does it represent projects with good opportunities for electric readiness? How will your jurisdiction identify projects within 3 feet of gas equipment?
Requirements: FlexPath	**Establish Vintages.** Separate target scores can be applied to the three vintages - Pre 1978, 1978-1991, 1992-2010. Should all three be maintained or should they be consolidated into one or two categories (e.g., pre-1978, 1978-2010)? The most robust approach would include all three vintage categories. Consolidation may be simpler to implement but may result in less savings (the target score should not exceed the maximum for the newest vintage). Consult the Cost Effectiveness Explorer or other data sources for estimates of existing stock by vintage. (Note, the Explorer uses 2005 as the cutoff for the latest vintage because this date corresponds to statewide building stock data

Focus Area	Decision Description
	that is used for projections. The cost effectiveness study includes homes built before 2011.) **Measures Required by State Code.** The default model code does **not** allow credit for measures that are required under the State Energy Code for a particular project. In other words, determine whether to allow credit for measures used to comply with the state code. Consider this decision including the potential savings impacts when determining the target score. One option may be to limit the reduction to the target score. **Target Score.** Use the Cost Effectiveness Explorer to consider several levels of requirements and determine the target score for each vintage. Review and evaluate several packages of measures that meet the proposed target to ensure the requirements are reasonable, including the estimated costs. (The Explorer includes estimated measure costs.) See sample at Attachment 2. **Mandatory Measures.** Certain measures may be designated as mandatory (reduce the target score accordingly). These measures may be designated as mandatory because they provide energy savings with minimal or no incremental cost. Outdoor lighting is mandatory by default. **Solar PV.** Solar has a high point value under FlexPath and in some cases may be enough or almost enough to satisfy the requirements. There is an option to raise the bar by also requiring certain electric readiness measures to claim the PV credit. The rationale is that the PV installation will require some work in the electric panel, and this may be a good opportunity to prepare for conversion. Also consider whether the proposed project includes other work inside the home. Decide whether to propose including this option and if so, how many electric-readiness options will be required.
Requirements: Electric Readiness and Cool Roofs	**Electric Readiness & Appliances.** Decide whether electric readiness should be required for certain project scopes. (Note, electric readiness is not an energy-savings measure and does not require findings of cost-effectiveness.) Are the trigger events and requirements appropriate? Consider whether readiness is needed for electric clothes dryers in particular. There are heat pump models on the market that will operate on a 120 volt/15 amp circuit and others that will operate on a 120v/20 amp circuit. If there is a concern that these lower power models will not serve the needs of a larger, multi-bedroom home, the 240 volt readiness option may be worth considering. However, the existence of the more powerful circuit could trigger an electrical panel upgrade and discourage the use of smaller models that have less coincident demand. **Panel Upgrades.** Decide whether you want to discourage unnecessary panel upgrades. While panel upgrades may, in certain circumstances, be necessary for electrification, there are often more economical solutions that can also reduce coincident demand. The proposed requirements would require panel upgrade applicants to first consider and prepare calculations that include load controllers or low-power electric appliances in load calculations to identify alternative options.

Focus Area	Decision Description
	Cool Roof. Cool roofs are prescriptively required in the Energy Code when replacing 50% or more of an existing roof depending on location and roof type. This reach code measure would increase the requirement for a steep-sloped roof from a minimum aged solar reflectance of 0.20 to 0.25 and extend the requirement to certain vintages in Climate Zones 6 and 7. There are also opportunities to extend the requirements for low-sloped roofs in some climate zones (analysis results pending as of publication). The applicability of this measure is limited because it may increase energy consumption in certain cases.

Exceptions	The model ordinance includes a set of standard and optional exceptions. These may be modified to suit local needs. Consideration should be given to the issues below.
	• Review the standard exceptions and consult with the building/permitting staff regarding how these will be administered (see sample Exceptions Checklist).
	• Are there exceptions for Covered Single Family Projects that need to be added or are they addressed in the definition?
	• There are two sample versions of exceptions for technical and economic infeasibility that authorize the building official to modify the requirements. Review the language with your building official to ensure it meets enforcement requirements and is consistent with other definitions in use. A guidance document is available that includes objective standards for a reduction in the target score if certain measures that were used to determine the cost-effective target score are unavailable (e.g., homes with a ductless heating system).
	• Decide which, if any, of the other exceptions (or any others) should be included, such as:
	  • Projects that would not otherwise be “Covered” except for the inclusion of certain elements, such as EV charging, or energy storage.
	  • Projects related to medical necessity, seismic retrofitting, or repairs.
	  • A separate consideration of cost burden for income-qualified homeowners.
	  • An exception for historic significance.

3 Attachments

3.1 Attachment 1: Triggers

Consult with the building and permitting staff to determine the definition of a “Covered Single Family Project”. The term refers to projects that are subject to the FlexPath Target requirement for single family remodels. Electric-readiness and cool roof requirements may be triggered for other specific project scopes.

The term “Covered Single Family Project” has been suggested here to avoid potential conflict with other terms that might be in use in the local lexicon.

See the table above for considerations related to developing the definition.

3.1.1 Sample Definitions

COVERED SINGLE FAMILY PROJECT shall mean any project in a Single Family residential building originally permitted for construction before 2011…

Option 1

… that meets any of the following criteria:

1. Any change to an existing building that increases conditioned floor area by [XX] [specify value] or more square feet in a one-year period.
2. Any project that includes an alteration whose altered components cover [XX] [specify value] square feet or greater in a one-year period.
3. Any project that includes an addition or alteration whose altered components cover [ZZ] [specify value] square feet or greater in a one-year period.
4. Installation or replacement of an air conditioner.

Option 2

… that requires an electrical permit, a mechanical permit and a plumbing permit, with the exception of projects with a total valuation of less than $XX,XXX [specify value], or includes installation or replacement of an air conditioner.

Option 3

… that includes an addition, of any size or value, or alteration of such a structure with a building permit valuation of $25,000 [or other value] or higher or includes installation or replacement of an air conditioner.

Option 4

… with a building permit valuation of $25,000 [or other value] or higher and that includes any of the following: 1. Any additions, or any change, rearrangement or

addition, other than a repair, of the structural elements of an existing building including foundations, footing, sub-floors, lintels, beams, columns, girders, slabs, roof trusses, staircases, load bearing walls, door frames, window frames, or any other part of the building that resists force or moment. 2. Change or rearrangement of the plan configuration of walls and full-height partitions of an existing building. 3. Modification of the electrical system, heating or cooling equipment or gas plumbing.

Option 5 *[If using this definition, consider including the optional exception capping the expenditure at 20% (or some other value)]*

…that includes an addition, alteration, or remodel or the alteration to such a structure that affects a floor area which exceeds twenty percent (20%) [or other value] of the existing floor area of the structure or has a combined valuation of $25,000 [or other value] or more or includes installation or replacement of an air conditioner. When any changes are made in the building, such as walls, columns, beams or girders, floor or ceiling joists and coverings (subfloor and drywall), roof rafters, roof diaphragms, foundations, piles or retaining walls or similar components, the floor area of all rooms affected by such changes shall be included in computing floor areas for purposes of applying this definition. This definition does not apply to project scopes that are solely limited to any of the following: the replacement and upgrading of residential roof coverings, exterior wall finishes and/or floor finishes; alterations that are limited to adding no more than 75 square feet of fenestration; alterations limited to adding no more than 16 square feet of skylight area with a maximum U-factor of 0.55 and a maximum SHGC of 0.30; alterations that are limited to providing access for persons with disabilities; and additions of 300 [or other amount] square feet or less.

3.2 Attachment 2: Compliance Table

Figure 4. Cost Effectiveness Explorer Compliance Options, Example

	Pre-1978	1978-1991	1992-2005
Max Cost-Effective Score On-Bill (2025)	57	41	20
Max Possible Score	57	41	20
Target Score	25	20	10

Target Scores

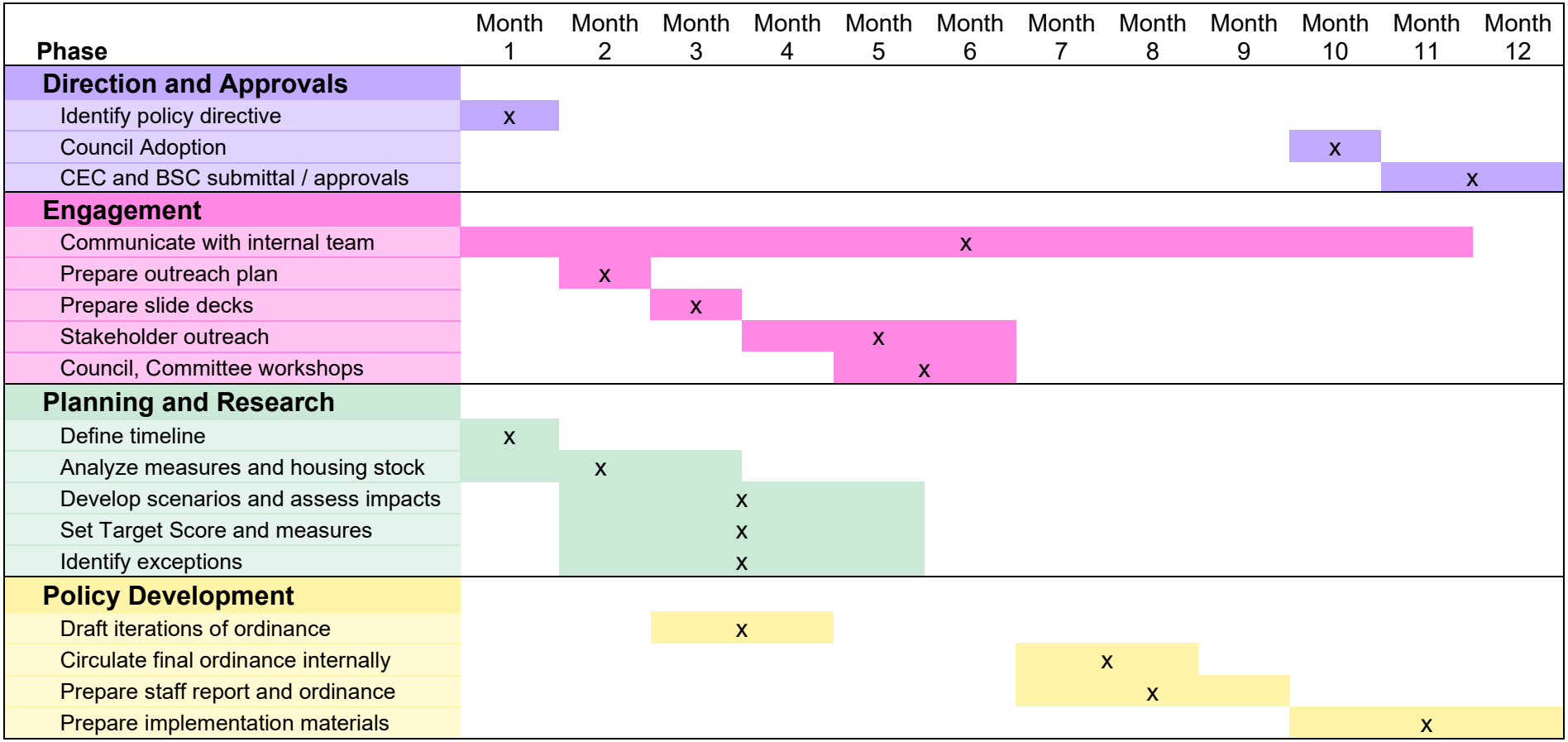
Measure Score Table
scores reflect energy savings

	Pre-1978	1978-1991	1992-2005
Efficiency			
New Ducts, R-8 Insulation + Duct Sealing	11	8	3
New Ducts, R-6 Insulation + Duct Sealing	--	8	3
Radiant Barrier Under Roof (when re-roofing)	--	2	1
R-38 Attic insulation	--	3	1
R-19 Raised Floor Insulation	--	6	
Water Heating Package	--	1	1
Windows	8	6	3
R-13 Wall Insulation	6	--	--
Duct sealing	6	5	1
R-49 Attic insulation	8	4	1
Air sealing	2	1	1
R-30 Raised Floor Insulation	8	7	--
Electrification			
Heat Pump Water Heater	12	12	12
Induction Cooktop	1	1	1
High Eff Heat Pump Water Heater (repl electric)	5	5	5
Heat pump water heater with Elec Base	4	4	4
Heat Pump Space Conditioner	22	17	14
Dual fuel heat pump space conditioner	--	15	13
Heat Pump Clothes Dryer	1	1	1
High Eff Heat Pump Space Conditioner	24	19	15
High Eff Heat Pump Water Heater	13	13	13
PV			
Solar PV	16	16	16

Measure Values

3.3 Attachment 3: Timeline

Figure 5. Detailed Timeline



3.4 Attachment 4: Building Stock Analysis

The purpose of the building stock analysis is to determine which reach codes present the best opportunity for emissions reductions based on building type and number in the jurisdiction. The building stock is generally comprised of single family, multifamily and nonresidential properties. Multifamily buildings can be categorized as either residential or commercial properties, so it is important to understand how the data source categorizes this building type.

Building stock analysis can help answer the following fundamental questions:

- How many buildings could be impacted by a specific reach code?
- What emissions reductions could this achieve?
- What is the age distribution of the building stock? (This will help determine if the existing building stock is ready for alteration projects)
- What are future opportunities for emissions savings based on unaddressed needs in the building stock?

The building stock example below is from the Cost Effectiveness Explorer tool from the Local Energy Codes website. This is one source for building stock data. If more accurate data is available through a jurisdiction's own records, users may enter the data as shown in Figure 1. In addition, if users would like to submit local data to improve the building stock data in the Explorer tool, reach out to contact@policystudio.co.

Figure 6 Residential Building Stock Pie Chart

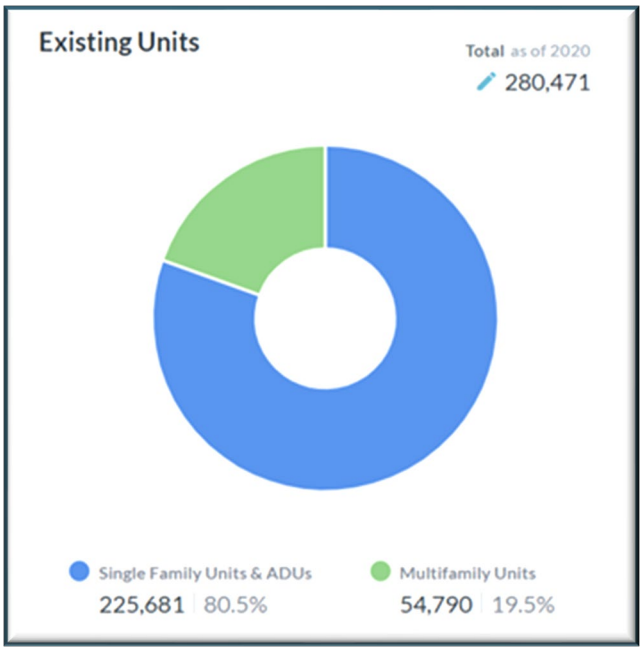
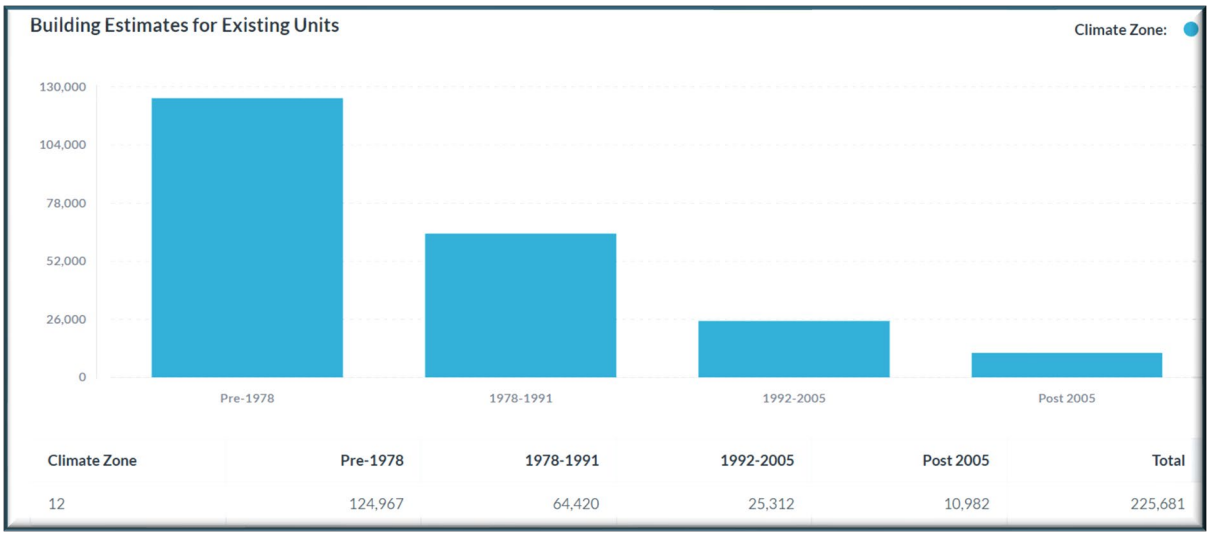


Figure 6 above shows that single family homes make up 80.5% of residential units for this specific jurisdiction. This suggests focusing on a single-family policy could impact more buildings and have a larger impact on emissions compared to a policy focused on multifamily. Many jurisdictions choose to start with a single-family policy for existing buildings before adding a multifamily policy.

Figure 7 shows an example of the age distribution of single-family buildings. Specifically, this figure shows over 95% of the existing single-family building stock was built prior to 2006, and 55% built prior to 1978. This suggests many homes have inefficient envelopes and mechanical systems that are approaching the end of their useful lives. As the savings potential is greatest in the oldest homes, this building type is a great opportunity for reach codes focused on equipment replacement and other renovations.

Figure 7 Building Vintages



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

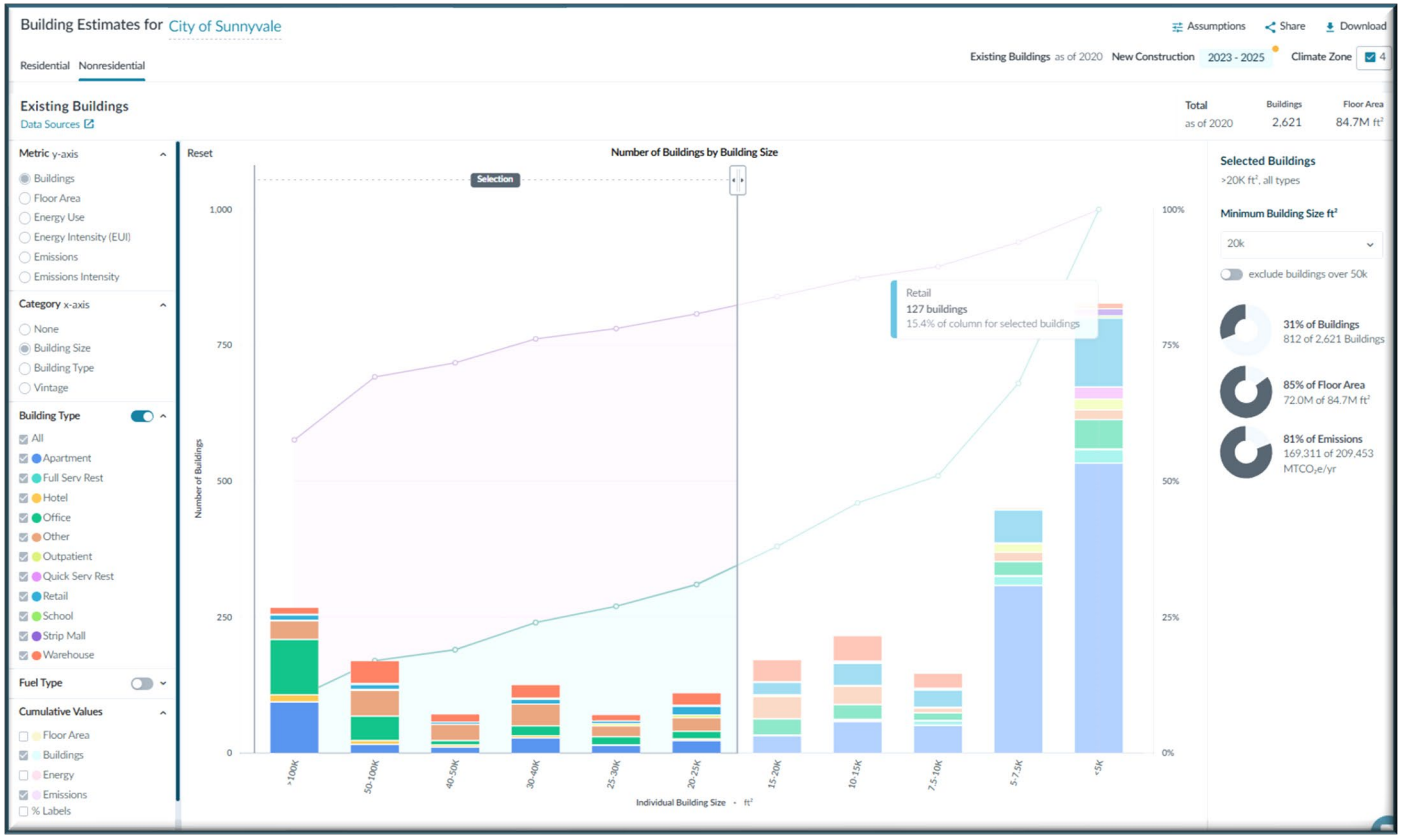
Many jurisdictions will see similar trends, with a significant portion of the building stock built before 1978. Knowing the approximate age range of the housing is important to inform the emphasis of the policy and to adequately understand the current housing conditions and likely impact of the reach code.

While building stock analysis helps jurisdiction staff identify which reach code policies will have the most impact on their building stock and emission reductions, a deeper dive into permit data provides more precise insight into the types and scopes of projects residents are choosing to pursue.

Nonresidential Building Stock

While the focus of this document is on single family policies, Figure 8 shows a snapshot of the nonresidential building stock for the same jurisdiction. It shows the total number of buildings by building size and breaks down the nonresidential building sector by square footage. Seeing the data broken down like this can help a jurisdiction, such as one pursuing a BPS policy, to decide what size nonresidential buildings would make an appropriate target.

Figure 8 Nonresidential Building Stock



3.5 Attachment 5: Permit Analysis

Permit data is an important tool that can help guide policy decision making. Specifically, when it comes to a FlexPath reach code, it is very helpful to understand the approximate impact from the policy to best set the criteria for when the requirements are applied. The example below demonstrates how permit data can be used to determine appropriate triggers and exceptions.

For this example, assume a jurisdiction is pursuing a FlexPath reach code for single family buildings. The jurisdiction has decided to base their reach code on the square footage of the proposed project. They are trying to determine how to set the threshold for the project size that will trigger the reach code. Staff reviewed permit data from the last 12 months for this analysis.

3.5.1 Sorting Permit Data

The first step is to sort the permit data to work with a smaller group of permits. This jurisdiction has the following sub-categories of permit data:

- Residential Remodels
- Plumbing
- Roofing
- Electrical
- Mechanical
- Photovoltaic
- Windows
- Seismic Retrofit
- Demolition

Most of these categories are not relevant for this purpose. The dataset is refined so that only “residential remodels” are remaining. Within those residential remodels, projects that are multifamily projects are removed. Duplicate entries are removed so that each row in the worksheet represents one project.

In some jurisdictions, the square footage of the project is embedded in the description. Since this is an important metric for the reach code, it’s necessary to ensure this information is in its own column. If needed, one way to reduce the workload is to sort the entries based on the project valuation and focus only on those projects with a value of $25k and above. Projects with lower valuations typically impact small areas of the home, less than 100 square feet. As the FlexPath is generally focused on larger remodels and doesn’t impact very small, low-cost projects, those projects were removed from the analysis.

3.5.2 Analyzing Permit Data

Now the dataset is ready for analysis to figure out the impacts of selecting different square footage values as the trigger point for a reach code.

This jurisdiction decided that the following metrics are most important to their ability to set an appropriate threshold for the reach code:

- Number of yearly permits impacted
- Median project valuation
- Minimum project valuation
- Maximum project valuation

Using the parameters above, the data is sorted into size categories, as shown in **Table 3**.

Table 3. Example of Permit Data Analysis Results

Size Category (square feet)	Number of Permits per Year	Median Project Valuation	Minimum Project Valuation	Maximum Project Valuation
1,000 and greater	10	$613,000	$512,000	$1,430,000
500 to 999	95	$184,000	$50,000	$600,000
400 to 499	12	$165,000	$40,000	$550,000
300 to 399	86	$150,000	$38,000	$500,000
200 to 299	102	$58,000	$12,000	$365,000
100 to 199	210	$30,000	$1,000	$145,000

3.5.3 Making Decisions

Looking at the results, the jurisdiction can see there is a large difference between projects that are 300 square feet and larger compared to projects that are less than 300 square feet. The median project valuation of $58k at approximately 250 sf is less than half the value of projects in the next larger size range of 350 square feet on average. Including projects under 300 square feet could result in many cost exemptions and be burdensome for applicants and the building department.

Permits at 300 square feet and greater have similar median, minimum and maximum project valuations to permits 500 square feet and greater. The permit descriptions show those projects have similar scopes of work and likely make good candidates for the measures in the draft ordinance. Some of the projects may already include the measures voluntarily.

Excluding projects that are less than 300 square feet results in the proposed policy capturing approximately 193 permits per year. This past data can be used to estimate the

future impacts of the proposed policy. The jurisdiction believes this is enough projects to make a significant impact, while not adding significant work to the building department. Looking at the details for these 193 permits, they are generally consistent with the large projects intended to be captured by this reach code. There are a few exceptions, such as one permit where the only work is re-roofing and replacing all of the windows. The jurisdiction did not intend to capture this kind of project, so they make sure this exception is in the draft ordinance.

One exception the jurisdiction wants to include is a cost burden exception. They see that the minimum project valuation in the dataset is $38k and are worried that some of the smaller projects affecting larger square footages will be overburdened by this requirement. They decide a cost burden of 20% is appropriate, meaning that if a project valued at $38k costs more than $7,600 to comply with the reach code, the permit applicant can apply for an exception to reduce the burden.

3.5.4 Additional Considerations

Each jurisdiction has its own unique data collection processes and circumstances, including differences in permit volume, building type, age, and size, and different trends in renovation projects. A FlexPath policy can be modified to meet a wide variety of conditions, enabling jurisdictions to set the most appropriate triggers and requirements to balance community impacts and internal resource constraints.

Get In Touch

The adoption of reach codes can differentiate jurisdictions as efficiency leaders and help accelerate the adoption of new equipment, technologies, code compliance, and energy savings strategies.

As part of the Statewide Codes & Standards Program, the Reach Codes Subprogram is a resource available to any local jurisdiction located throughout the state of California.

Our experts develop robust toolkits as well as provide specific technical assistance to local jurisdictions (cities and counties) considering adopting energy reach codes. These include cost-effectiveness research and analysis, model ordinance language and other code development and implementation tools, and specific technical assistance throughout the code adoption process.

If you are interested in finding out more about local energy reach codes, the Reach Codes Team stands ready to assist jurisdictions at any stage of a reach code project.



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Contact

info@localenergycodes.com for no-charge assistance from expert Reach Code advisors



Explore

The Cost-Effectiveness Explorer is a free resource to help California local governments and stakeholders develop energy policies for buildings.



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Revision: 1.1
Last modified: 2026/03/31