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Single Family Renovation 2022 Model Reach Code

**Version 1.1**

**August 10, 2022**

## Changes from Prior Versions

Please check [LocalEnergyCodes.com](https://localenergycodes.com/content/resources) to obtain the latest version of this document. This document will be updated frequently to comport with new features in the [Cost Effectiveness Explorer](http://explorer.localenergycodes.com/).

Changes to Version 1.1:

* Modified definition of All-Electric to extend to gas lines within the property lines and enumerated additional end uses.
* Modified definition of Covered Project to specifically exclude buildings built after 2011.
* Clarified options for electric readiness and PV.
* Modified electric readiness for EVs to refer to CALGreen A4.108.8.1.

## Scope

* All single family buildings, other than Qualified All-Electric Buildings, that undergo a major improvement must include a set of energy efficiency, renewable energy and/or electrification measures that meet a specified energy-savings target.
* The energy savings target is expressed as a score and individual measures are assigned points weighted by site-energy savings. The target and points are specific to each climate zone and building vintage.
* The study and ordinance assume the requirements are structured to exceed the minimum state requirements. Alternatively, jurisdictions may allow measures otherwise required under the State Code to be credited toward compliance, however, savings may be lower than projected. If they are not, compliance could be more challenging, and a lower target score may be prudent.
* There are various exceptions.

## Introduction

This model ordinance language supports a reach code requiring stricter energy performance for major projects in existing single family homes. Of the many available policy options to encourage or require decarbonization in existing single family homes, local governments may wish to consider adopting a reach code that could be triggered by different events including additions, significant renovations or time of listing. Alternatively, an ordinance could set a schedule to require that certain upgrades are completed by a “date-certain”.

Because there are so many variables within existing homes, it is difficult to prescribe a comprehensive set of cost-effective measures applicable to a wide variety of projects. Accordingly, a performance pathway is proposed, which would establish a target score and a menu of individual measures with points weighted by site energy savings. Applicants would select a set of measures that meet or exceed the target. Local jurisdictions could adjust how comprehensive the requirements are by adjusting the score. The advantages of this approach are that it offers flexible compliance options, places a high value on electrification measures, and is grounded in bill-payer cost-effectiveness. Note, this is one of several possible policy approaches, including, for example, a replace-on-burnout policy; it is not intended to capture all opportunities.

Based on the [*2019 Existing Single Family Residential Building Upgrades Cost-Effectiveness Study*](https://localenergycodes.com/download/873/file_path/fieldList/2019%20Residential%20Retrofit%20Cost-eff%20Report%20(8/27/2021).pdf)*,* and an update for the 2022 code, the [Cost-Effectiveness Explorer](https://explorer-production-qa-flexiblepath.vercel.app/) produces a target metric that represents a user-defined fraction of the total site energy savings for all cost-effective retrofit measures – the *Target Score*. The Explorer also produces a table of all available measures, including those that are not cost-effective, that are weighted using the same site energy metric. Using these values, specific to each climate zone and home vintage, an applicant may install any combination of efficiency, solar and electrification measures that meet or exceed the target value.

As proposed below, such an ordinance could be structured to amend Title 24, Part 6, Section 150.0 to require compliance as part of a defined project scope. The intent is to target medium-sized projects that are not otherwise subject to more comprehensive requirements under the State Energy Code. The amendment includes a table with the targets and points available for each measure and home vintage. It also includes specifications for each measure and exceptions. Compliance could be supported by an addendum to the Certificate of Compliance and building inspector verification. The ordinance could also include mandatory electric-readiness measures.

Any amendments to the Energy Code (Title 24, Part 6) appear in strikeouts (deletions) and underlines (additions). These amendments must be approved by the [California Energy Commission](https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-3) (CEC) and must also be filed with the [California Building Standards Commission](https://www.dgs.ca.gov/BSC/Codes/Local-Amendments-to-Building-Standards---Ordinances).

Jurisdictions may wish to modify elements of the ordinance, such as those marked with the text “[Optional]”. When modifying the language, ensure all references are maintained and that the ordinance still meets the CEC requirements. Also, edit the Purpose section to reflect the changes.

The headings, footnotes and instructions (in blue) are for staff reference and should be removed from the final ordinance.

The draft ordinance text and CEQA determination language are provided as examples only. Ensure all ordinance materials are reviewed and verified by relevant jurisdiction staff and the city/county attorney.

## Reach Code for Major Single Family Projects

ORDINANCE AMENDING THE [CITY/COUNTY OF JURISDICTION] BUILDING CODE TO REQUIRE HIGHER ENERGY PERFORMANCE FOR CERTAIN SINGLE FAMILY PROJECTS

DELETE ALL BLUE TEXT AND FOOTNOTES

## Sample Amendments

Section 1: Amendments

The California Building Code, Title 24, Part 6, adopted by the [City/County of jurisdiction] codified under Chapter [municipal/county code reference (if not adopted in entirety, include local code references for each section)], is amended as specified below. Strikeouts and underlines indicate modifications to the State code.

### Purpose

Section 100.0 is modified to add a new section (i) as follows:

1. Single Family Building Remodel Energy Reach Code - Purpose and Intent.

In addition to all requirements of the California Energy Code applicable to Single Family building additions and alterations, the energy efficiency and renewable energy measures specified in Section 150.0(w) shall be required for Covered Single Family Projects of mixed-fuel buildings and buildings with electric resistance heat.

### Definitions

Section 100.1(b) is modified by adding the following definitions:

**ALL-ELECTRIC BUILDING** is a building that contains no combustion equipmentor plumbing for combustion equipment (except for abandoned gas lines) serving space heating (including fireplaces), water heating (including pools and spas), cooking appliances (including barbeques), and clothes drying, within the building or building property lines, and instead uses electric heating appliances for service. An All-Electric Building may include solar thermal collectors. [Modify end uses as needed. The reference to solar thermal panels clarifies that solar thermal is an allowed energy source for heating.]

**COVERED SINGLE FAMILY PROJECT** shall mean

The definition of a “Covered Single Family Project” is at the discretion of the local jurisdiction. A few options are offered below. Building/Permitting staff should be consulted in this process. It is important to consider the definition in conjunction with the requirement level (the Target Score) to ensure that the requirements are appropriate for the scope of the project. In this respect, jurisdictions may wish to establish different levels of Covered Single Family Projects (by valuation, square footage, etc.) and have different target scores for each. It is also important to consider how certain triggers (e.g., modification of HVAC) might impact permit applications. The term Single Family may needs to be narrowed to conform to local usage.

[Option 1]

… any project in a Single Family residential building originally permitted for construction before 2011 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].

[Option 2]

… the addition, of any size or value, to a Single Family residential building originally permitted for construction before 2011, or alteration of such a structure with a building permit valuation of $25,000***[[1]](#footnote-2)*** [or other value] or higher. [Option: “The valuation shall include the sum of all addition or alteration permits issued within the past three years.”] A Covered Single Family Project shall not include a project that is considered to be a newly constructed building under the California Energy Code, Title 24, Part 6.

[Option 2***[[2]](#footnote-3)***]

…a Single Family residential project in a building originally permitted for construction before 2011 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: “The valuation shall include the sum of all addition or alteration permits issued within the past three years.”]* A Covered Single Family Project shall not include a project that is considered to be a newly constructed building under the California Energy Code, Title 24, Part 6.

[Option 4***[[3]](#footnote-4)***. If using this definition, it is recommended to include the optional exception capping the expenditure at 20% (or some other value)]

…the addition, alteration, or remodel of a Single Family residential [narrow this term as needed conform to local usage; the term single family can refer several different building types] building originally permitted for construction before 2011 or the alteration to such a structure [Option: “, performed within any three (3) year period,”] 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. 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 add no more than 75 square feet of fenestration; alterations that add 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. A Covered Single Family Project shall not include a project that is considered to be a newly constructed building under the California Energy Code, Title 24, Part 6.

**QUALIFIED ALL-ELECTRIC BUILDING** or **QUALIFIED ALL-ELECTRIC UNIT** is an All-Electric Building, or All-Electric Unit, that does not use electric-resistance space or water heating other than as allowed for water heating in dwelling units under 500 square feet under Exception 2 to Section 150.1(c)8; [Optional. If this definition is also used for a multifamily ordinance, it could be included as an exception] this exception shall also apply to units in multifamily buildings.

### Requirements

The first two paragraphs of Section 150.0 SINGLE-FAMILY RESIDENTIAL BUILDINGS – MANDATORY FEATURES AND DEVICES are modified to read as follows:

Single-family residential buildings shall comply with the applicable requirements of Sections 150(a) through 150.0(v); in addition, Covered Single Family Projects, other than projects in Qualified All-Electric Buildings, shall comply with the applicable requirements of Section 150.0(w).

NOTE: The requirements of Sections 150.0(a) through 150.0(v) apply to newly constructed buildings. Sections 150.2(a) and 150.2(b) specify which requirements of Sections 150.0(a) through 150.0(v) also apply to additions or alterations, with the exception that Covered Single Family Projects, other than projects in Qualified All-Electric Buildings, shall also be required to comply with Section 150.0(w).

A new Section, (w), is added to Section 150.0 as follows: [See FAQs below for information about how the score is set and estimated compliance costs]

1. A Covered Single Family Project, other than a project in a Qualified All-Electric Building, shall install a set of measures based on the building vintage from the Measure Menu Table, Table 150.0-J, [add reference to table(s) for additional climate zones, if applicable) to achieve a total Measure Point Score that is equal to or greater than the Target Score in Table 150.0-I [add reference to table(s) for additional climate zones, if applicable). In addition, all mandatory measures listed in Table 150.0-J shall be installed. Measure verification shall be explicitly included as an addendum to the Certificate of Compliance to be filed pursuant to 2022 Title 24 Section 10-103. Installed measures shall meet the specifications in Table 150.0-K.

Building vintage is the year in which the original construction permit for the building was submitted, as documented by building department records. Unless otherwise specified, the requirements shall apply to the entire dwelling unit, not just the additional or altered portion. Measures from the Measure Menu table that already exist in the home may be counted towards compliance with these requirements. Measures from the Measure Menu table that are to be installed to satisfy requirements under the California Energy Code, Title 24, Part 6, may not [Option: “may also”. Not counting measures that are required under State code will make compliance more difficult and it may be advisable to have a less aggressive target score. Allowing such measures to count will reduce projected savings] count towards compliance with these requirements. Where these requirements conflict with other California Energy Code requirements, the stricter requirements shall prevail.

**Exception 1 to Section 150.0(w)**: If the applicant demonstrates that the Energy Budget of the building under the proposed project would be less than or equal to the Energy Budget of the building under the project if it included any set of measures that would achieve compliance under this Section 150.0(w).

**Exception 2 to Section 150.0(w)**: Mobile Homes, Manufactured Housing, or Factory-built Housing as defined in Division 13 of the California Health and Safety 12 Code (commencing with Section 17000 of the Health and Safety Code).

**Exception 3 to Section 150.0(w)**: Due to conditions specific to the project, it is technically or economically infeasible to achieve compliance, the Building Administrator may reduce the Target Score and/or waive some or all of the mandatory requirements. [Guidance document under development]

**Exception 4 to Section 150.0(w)**: A measure that is necessary for compliance is beyond the authority of the homeowner because of an HOA covenant.

Optional Exceptions: The exceptions below are optional and may be included at the discretion of the jurisdiction.

**Exception** x **to Section 150.0(w)**: The Building Official may reclassify the vintage of the building based on existing conditions.

**Exception** x **to Section 150.0(w)**: A Covered Single Family Project that is limited solely to a newly created attached Accessory Dwelling Unit (ADU) or Junior Accessory Dwelling Unit (JADU). A newly created ADU and JADU shall include either additions or conversions of existing space. Note, this exception does not apply to a Covered Single Family Project of an existing ADU or JADU.

**Exception** x **to Section 150.0(w)**: Expenditures of more than 20% [or other amount] of the project valuation. If the least-cost set of measures that would be required for compliance exceeds 20% [or other amount] of the total project valuation, the Target Score may be reduced by subtracting the points associated with the lowest cost measures first, until the cost of the remaining measures does not exceed 20% [or other amount] of the project valuation. The project valuation shall exclude any measures that are required under this Section but shall include all measures that are otherwise required under the State Energy Code, Title 24, Part 6. [This exception is recommended if the definition of Covered Single Family Project does not include a valuation.]

**Exception** x **to Section 150.0(w):** [Option 1] Expenditures of more than 10% [or other amount] of the project valuation for a resident owner(s) or owner(s) of a residence occupied by a dependent that can demonstrate that they qualify as a low-income utility customer by being eligible for the California Alternative Rates for Energy (CARE) [or other criterion]. If the least-cost set of measures that would be required for compliance exceeds 10% [or other amount] of the total project valuation, the Target Score may be reduced by subtracting the points associated with the lowest cost measures first, until the cost of the remaining measures does not exceed 10% [or other amount] of the project valuation. The project valuation shall exclude any measures that are required under this Section but shall include all measures that are otherwise required under the State Energy Code, Title 24, Part 6. [This exception is recommended if the definition of Covered Single Family Project does not include a valuation.]

[Option 2] A resident owner(s) or occupant of residence or owner(s) of a residence occupied by a dependent who can demonstrate that they qualify as a low-income utility customer by being eligible for the California Alternative Rates for Energy (CARE) or Family Electric Rate Assistance Program (FERA) program [or other criterion] may comply by either installing the duct sealing measure or installing at least 1 kW of solar PV that meets the requirements of 2022 Title 24 Reference Appendix JA11.

**Exception** x **to Section 150.0(w)**: A Covered Single Family Project, other than an addition, that would not otherwise be subject to this section 150.0(w) but for installation of solar PV, solar water heating, EV charging, electrical upgrades for solar PV or EV charging, or energy storage.

**Exception** x **to Section 150.0(w)**: A Covered Single Family Project that consists solely of medically necessary improvements or solely of seismic safety improvements.

[Use the [**Cost-Effectiveness Explorer**](https://explorer.localenergycodes.com/) to generate customized tables to replace the sample tables below. If there is more than one climate zone in the jurisdiction, include tables for each. If desired, a separate Target Score may be applied for smaller projects. Select one of the several PV requirements offered in the tables. **IMPORTANT: While in the development phase, the tables from the Explorer need to be edited to change the names and order of the measures to match the names and order used in the measure specifications below.**

Table 150.0-I: Target Score [sample]

|  |  |  |  |
| --- | --- | --- | --- |
| **Climate Zone xx** | **Building Vintage** | | |
|  | **Pre-1978** | **1978-1991** | **1992-2010** |
| [OPTION: Tiers. Target Score for Projects Valued at More than $25,000 [or x] or affecting more than 10% [or y] of the floor area] | 13 | 11 | 8 |
| **Target Score** All Other Projects | 7 | 6 | 4 |

Table 150.0-J: Measure Menu *[sample]*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Climate Zone xx** |  | **Building Vintage** | | |
| **Measures** | **Table 150.0-K ID** | **Pre-1978** | **1978-1991** | **1992-2010** |
| LED lamps and Exterior Photocells | E1 | Mandatory | Mandatory | Mandatory |
| Water Heating Package | E2 | 1 | 1 | 1 |
| R-19 Attic Insulation | E3 | 7 | 4 | 1 |
| Air Sealing | E4 | 2 | 1 | 1 |
| Duct Sealing | E5 | 6 | 3 | 1 |
| New Ducts + Duct Sealing | E6 | 10 | 7 | 3 |
| Windows | E7 | 7 | 6 | 0 |
| R-13 Wall Insulation | E8 | 6 | 0 | 0 |
| Reserved for future use | E9 |  |  |  |
| Cool Roof | E10 | 1 | 1 | 0 |
| Heat Pump Water Heater (HPWH) | FS1 | 12 | 12 | 12 |
| High Efficiency Heat Pump Water Heater (HPWH) | FS2 | 13 | 13 | 13 |
| Heat Pump HVAC | FS3 | 19 | 14 | 12 |
| High-Efficiency Heat Pump HVAC | FS4 | 22 | 16 | 13 |
| Heat Pump Clothes Dryer | FS5 | 1 | 1 | 1 |
| Induction Cooktop | FS6 | 1 | 1 | 1 |
| PV | ER1 | 13 | 13 | 13 |
| [alternate] PV (points per kW) | ER1 | 5 | 5 | 5 |
| [alternate] PV + Electric Ready Pre-Wire | ER1 | 13 | 13 | 13 |
| [alternate] PV + Battery | ER1 | 13 | 13 | 13 |
| Electric-Readiness | ER2 | Required for PV Credit [or Mandatory] | Required for PV Credit [or Mandatory] | Required for PV Credit [or Mandatory] |

The measures in the Measure Menu table shall conform to the specifications in Table 150.0-K. [Delete measures from the table that are not in the Measure Menu].

**Table 150.0-K: Measure Specifications**

|  |  |
| --- | --- |
| **ID** | **Measure Specification** |
| **Energy Measures** | |
| E1 | Lighting Measures – Replace all interior and exterior screw-in incandescent, halogen, and compact fluorescent lamps with LED lamps. Install photocell controls on all exterior lighting luminaires. |
| E2 | Water Heating Package: Add exterior insulation meeting a minimum of R-6 to existing storage water heaters. Insulate all accessible hot water pipes with pipe insulation a minimum of ¾ inch thick. This includes insulating the supply pipe leaving the water heater, piping to faucets underneath sinks, and accessible pipes in attic spaces or crawlspaces. Upgrade fittings in sinks and showers to meet current California Green Building Standards Code (Title 24, Part 11) Section 4.303 water efficiency requirements.  Exception 1: Water heater blanket is not required on water heaters less than 20 gallons.  Exception 2: Water heater blanket not required if application of a water heater blanket voids the warranty on the water heater.  Exception 3: Upgraded fixtures are not required if existing fixtures have rated or measured flow rates of no more than ten percent greater than 2022 California Green Building Standards Code (Title 24, Part 11) Section 4.303 water efficiency requirements.  Exception 4: Water heaters with factory installed insulation of R-24 or greater |
| E3 | Air Sealing: Seal all accessible cracks, holes, and gaps in the building envelope at walls, floors, and ceilings. Pay special attention to penetrations including plumbing, electrical, and mechanical vents, recessed can light luminaires, and windows. Weather-strip doors if not already present. Verification shall be conducted following a prescriptive checklist that outlines which building aspects need to be addressed by the permit applicant and verified by an inspector. Compliance can also be demonstrated with blower door testing conducted by a certified HERS Rater no more than three years prior to the permit application date that either: a) shows at least a 30 percent reduction from pre-retrofit conditions; or b) shows that the number of air changes per hour at 50 Pascals pressure difference (ACH50) does not exceed ten for Pre-1978 vintage buildings, seven for 1978 to 1991 vintage buildings and five for 1992-2010 vintage buildings. If combustion appliances are located within the pressure boundary of the building, conduct a combustion safety test by a professional certified by the Building Performance Institute in accordance with the ANSI/BPI-1200-S-2017 Standard Practice for Basic Analysis of Buildings[[1]](https://usc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-us&wopisrc=https%3A%2F%2Fmballc.sharepoint.com%2Fsites%2F2022ReachCodes%2F_vti_bin%2Fwopi.ashx%2Ffiles%2Fcda6b7c015fd465aa2aa8e62faf0dd28&wdenableroaming=1&mscc=1&hid=02f2a94f-f406-568a-4a73-2ef8527f8635-7419&uiembed=1&uih=teams&uihit=files&hhdr=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fteams.microsoft.com%22%2C%22pmshare%22%3Atrue%2C%22surl%22%3A%22%22%2C%22curl%22%3A%22%22%2C%22vurl%22%3A%22%22%2C%22eurl%22%3A%22https%3A%2F%2Fteams.microsoft.com%2Ffiles%2Fapps%2Fcom.microsoft.teams.files%2Ffiles%2F2572368870%2Fopen%3Fagent%3Dpostmessage%26objectUrl%3Dhttps%253A%252F%252Fmballc.sharepoint.com%252Fsites%252F2022ReachCodes%252FShared%2520Documents%252FReach%2520Codes%2520Collaborations%252FResource%2520Development%252FModel%2520Language%252FResidential%2520Retrofits%252FModelReachCode_SF_Renovation_2022_V1.0.docx%26fileId%3Dcda6b7c0-15fd-465a-a2aa-8e62faf0dd28%26fileType%3Ddocx%26ctx%3Dfiles%26scenarioId%3D7419%26locale%3Den-us%26theme%3Ddefault%26version%3D21120606800%26setting%3Dring.id%3Ageneral%26setting%3DcreatedTime%3A1652149056346%22%7D&wdorigin=TEAMS-ELECTRON.teams.files&wdhostclicktime=1652149056222&jsapi=1&jsapiver=v1&newsession=1&corrid=dc37cff8-f289-429b-866a-270f50b61aed&usid=dc37cff8-f289-429b-866a-270f50b61aed&sftc=1&sams=1&accloop=1&sdr=6&scnd=1&sat=1&hbcv=1&htv=1&hodflp=1&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush&rct=Medium&ctp=LeastProtected#_ftn1), the Whole House Combustion Appliance Safety Test Procedure for the Comfortable Home Rebates Program 2020[[2]](https://usc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-us&wopisrc=https%3A%2F%2Fmballc.sharepoint.com%2Fsites%2F2022ReachCodes%2F_vti_bin%2Fwopi.ashx%2Ffiles%2Fcda6b7c015fd465aa2aa8e62faf0dd28&wdenableroaming=1&mscc=1&hid=02f2a94f-f406-568a-4a73-2ef8527f8635-7419&uiembed=1&uih=teams&uihit=files&hhdr=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fteams.microsoft.com%22%2C%22pmshare%22%3Atrue%2C%22surl%22%3A%22%22%2C%22curl%22%3A%22%22%2C%22vurl%22%3A%22%22%2C%22eurl%22%3A%22https%3A%2F%2Fteams.microsoft.com%2Ffiles%2Fapps%2Fcom.microsoft.teams.files%2Ffiles%2F2572368870%2Fopen%3Fagent%3Dpostmessage%26objectUrl%3Dhttps%253A%252F%252Fmballc.sharepoint.com%252Fsites%252F2022ReachCodes%252FShared%2520Documents%252FReach%2520Codes%2520Collaborations%252FResource%2520Development%252FModel%2520Language%252FResidential%2520Retrofits%252FModelReachCode_SF_Renovation_2022_V1.0.docx%26fileId%3Dcda6b7c0-15fd-465a-a2aa-8e62faf0dd28%26fileType%3Ddocx%26ctx%3Dfiles%26scenarioId%3D7419%26locale%3Den-us%26theme%3Ddefault%26version%3D21120606800%26setting%3Dring.id%3Ageneral%26setting%3DcreatedTime%3A1652149056346%22%7D&wdorigin=TEAMS-ELECTRON.teams.files&wdhostclicktime=1652149056222&jsapi=1&jsapiver=v1&newsession=1&corrid=dc37cff8-f289-429b-866a-270f50b61aed&usid=dc37cff8-f289-429b-866a-270f50b61aed&sftc=1&sams=1&accloop=1&sdr=6&scnd=1&sat=1&hbcv=1&htv=1&hodflp=1&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush&rct=Medium&ctp=LeastProtected#_ftn2) or the California Community Services and Development Combustion Appliance Safety Testing Protocol. |
| E4 | R-49 Attic Insulation: Attic insulation shall be installed to achieve a weighted assembly U-factor of 0.020 or insulation installed at the ceiling level shall have a thermal resistance of R-49 or greater for the insulation alone. Recessed downlight luminaires in the ceiling shall be covered with insulation to the same depth as the rest of the ceiling. Luminaires not rated for insulation contact must be replaced or fitted with a fire-proof cover that allows for insulation to be installed directly over the cover.  Exception: In buildings where existing R-30 is present and existing recessed downlight luminaires are not rated for insulation contact, insulation is not required to be installed over the luminaires. |
| E5 | Duct Sealing: Air seal all space conditioning ductwork to meet the requirements of the 2022 Title 24 Section 150.2(b)1E. The duct system must be tested by a HERS Rater no more than three years prior to the Covered Single Family Project permit application date to verify the duct sealing and confirm that the requirements have been met. This measure may not be combined with the New Ducts and Duct Sealing measure in this Table.  Exception: Buildings without ductwork or where the ducts are in conditioned space. |
| E6 | New Ducts + Duct Sealing: Replace existing space conditioning ductwork with new R-8 ducts that meet the requirements of 2022 Title 24 Section 150.0(m)11. This measure may not be combined with the Duct Sealing measure in this Table. To qualify, a preexisting measure must have been installed no more than three years before the Covered Single Family Project permit application date. |
| E7 | Windows: Replace all existing windows with high performance windows with an area-weighted average U-factor no greater than 0.32. |
| E8 | R-13 Wall Insulation: Install wall insulation in all exterior walls to achieve a weighted U-factor of 0.102 or install wall insulation in all exterior wall cavities that shall result in an installed thermal resistance of R-13 or greater for the insulation alone. |
| E9 | Reserved for future use |
| E10 | Cool Roof:  *[If designated as mandatory]:* Install a cool roof. For steep-sloped roofs (ratio of rise to run greater than 2:12) install a roofing product rated by the Cool Roof Rating Council to have an aged solar reflectance equal to or greater than 0.25, and a thermal emittance equal to or greater than 0.75. For low-sloped roofs, install a roofing product meeting the requirements of Section150.2(b)1Iiia, and insulate the roof in accordance with Section 150.2(b)1Iiib.  Exception 1: Projects that are not installing a new roof as part of the scope. Only areas of roof that are to be re-roofed are subject to the cool roof upgrade.  Exception 2: All exceptions as stated in the 2022 Title 24 Section 150.2(b)1Ii for steep-sloped roofs and 150.2(b)1Iiia for low-sloped roofs are allowed.  *[If included as an optional measure (i.e., assigned points)]:* Install a cool roof on at least 50% of the roof area of steep sloped roof (ratio of rise to run greater than 2:12). install a roofing product rated by the Cool Roof Rating Council to have an aged solar reflectance equal to or greater than 0.25, and a thermal emittance equal to or greater than 0.75. |
| **Fuel Substitution Measures** | |
| FS1 | Heat Pump Water Heater (HPWH): Replace existing electric resistance or natural gas storage water heater with a heat pump water heater. |
| FS2 | High Efficiency Heat Pump Water Heater (HPWH): Replace existing electric resistance or natural gas storage water heater with heat pump water heater with a Northwest Energy Efficiency Alliance (NEEA) Tier 3 or higher rating. |
| FS3 | HVAC Heat Pump: Replace existing gas space heating system or all existing electric resistance heating systems with an electric heat pump system. |
| FS4 | High Efficiency HVAC Heat Pump: Replace existing gas space heating system or all existing electric resistance heating systems with an electric heat pump system with a SEER rating of 21 or greater and an HSPF rating of 11 or greater. |
| FS5 | Heat Pump Clothes Dryer: Replace existing electric resistance clothes dryer with heat pump dryer with no resistance element and cap gas line. |
| FS6 | Induction Cooktop: Replace existing gas and electric resistance stove top with inductive stove top and cap the gas line. |
| **Solar PV and Electric-Readiness Measures** | |
| ER1 | PV+ Electric Ready Pre-Wire: Install a solar PV system that meets the requirements of 2022 Title 24 Section 150.1(c)14.  [Alternate]: PV+ Electric Ready Pre-Wire: Install a solar PV system that meets the requirements of 2022 Title 24 Reference Appendix JA11. The system shall be sized such that the estimated annual kWh production shall not exceed the projected annual kWh demand. Points are credited for each 1.0 kW DC up to a maximum of 3.0 kW. [or other value]. Upgrade the panelboard to meet the requirements of Item ER2 in this Table and install any one [or two] other measures from Item ER2.  [Alternate]: PV + Battery: Install a solar PV system that meets the requirements of 2022 Title 24 Section 150.1(c)14 and a battery system that meets the requirements of 2022 Title 24 Joint Appendix 12. |
| ER2 | Electric Readiness Measures required for PV + Electric Ready Pre-Wire credit: To claim credit for Item ER1, in addition to the solar PV system installed, upgrade the panelboard to meet the requirements of Item ER2.G and install any one [or two] of the other measures below to allow for installation of electric appliances at a future date.  [Option:] Electric Readiness Measures Required for Certain Scopes: If the service panel is being upgraded, install any one [or two] of the other measures below. If the laundry room is being remodeled, comply with Item ER2.C and upgrade the panelboard to meet the requirements of Item ER2.G. If the kitchen is being remodeled, comply with Item ER2.D and upgrade the service panel to meet the requirements of Item ER2.G.  A. Heat Pump Water Heater Ready, as specified in Section 150.0(n)1.  B. Heat Pump Space Heater Ready, as specified in Section 150.0(t).  C. Electric Clothes Dryer Ready, as specified in Section 150.0(v).  D. Electric Cooktop Ready, as specified in Section 150.0(u).  E. Energy Storage Systems (ESS) Ready, as specified in Section 150.0(s).  F. EV Charger Ready. Install a dedicated 208/240-volt branch circuit as specified in the California Green Building Code, Title 24, Part 11, Section A4.106.8.1,which otherwise applies to new construction.  G. Upgrade the panelboard serving the individual dwelling to provide circuit breaker spaces for a heat pump water heater, heat pump space heater, electric cooktop and electric clothes dryer as specified in California Energy Code Section 150.0 (n), (t), (u) and (v); or, provide electrical load calculations and appliance specifications for serving all of these end-uses with a minimum 100-amp panel.  Exception:If an electrical permit is not otherwise required for the project other than compliance with this Item, ER2. |

[[1]](https://usc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-us&wopisrc=https%3A%2F%2Fmballc.sharepoint.com%2Fsites%2F2022ReachCodes%2F_vti_bin%2Fwopi.ashx%2Ffiles%2Fcda6b7c015fd465aa2aa8e62faf0dd28&wdenableroaming=1&mscc=1&hid=02f2a94f-f406-568a-4a73-2ef8527f8635-7419&uiembed=1&uih=teams&uihit=files&hhdr=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fteams.microsoft.com%22%2C%22pmshare%22%3Atrue%2C%22surl%22%3A%22%22%2C%22curl%22%3A%22%22%2C%22vurl%22%3A%22%22%2C%22eurl%22%3A%22https%3A%2F%2Fteams.microsoft.com%2Ffiles%2Fapps%2Fcom.microsoft.teams.files%2Ffiles%2F2572368870%2Fopen%3Fagent%3Dpostmessage%26objectUrl%3Dhttps%253A%252F%252Fmballc.sharepoint.com%252Fsites%252F2022ReachCodes%252FShared%2520Documents%252FReach%2520Codes%2520Collaborations%252FResource%2520Development%252FModel%2520Language%252FResidential%2520Retrofits%252FModelReachCode_SF_Renovation_2022_V1.0.docx%26fileId%3Dcda6b7c0-15fd-465a-a2aa-8e62faf0dd28%26fileType%3Ddocx%26ctx%3Dfiles%26scenarioId%3D7419%26locale%3Den-us%26theme%3Ddefault%26version%3D21120606800%26setting%3Dring.id%3Ageneral%26setting%3DcreatedTime%3A1652149056346%22%7D&wdorigin=TEAMS-ELECTRON.teams.files&wdhostclicktime=1652149056222&jsapi=1&jsapiver=v1&newsession=1&corrid=dc37cff8-f289-429b-866a-270f50b61aed&usid=dc37cff8-f289-429b-866a-270f50b61aed&sftc=1&sams=1&accloop=1&sdr=6&scnd=1&sat=1&hbcv=1&htv=1&hodflp=1&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush&rct=Medium&ctp=LeastProtected#_ftnref1) <http://www.bpi.org/sites/default/files/ANSI%20BPI-1200-S-2017%20Standard%20Practice%20for%20Basic%20Analysis%20of%20Buildings.pdf>

[[2]](https://usc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-us&wopisrc=https%3A%2F%2Fmballc.sharepoint.com%2Fsites%2F2022ReachCodes%2F_vti_bin%2Fwopi.ashx%2Ffiles%2Fcda6b7c015fd465aa2aa8e62faf0dd28&wdenableroaming=1&mscc=1&hid=02f2a94f-f406-568a-4a73-2ef8527f8635-7419&uiembed=1&uih=teams&uihit=files&hhdr=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fteams.microsoft.com%22%2C%22pmshare%22%3Atrue%2C%22surl%22%3A%22%22%2C%22curl%22%3A%22%22%2C%22vurl%22%3A%22%22%2C%22eurl%22%3A%22https%3A%2F%2Fteams.microsoft.com%2Ffiles%2Fapps%2Fcom.microsoft.teams.files%2Ffiles%2F2572368870%2Fopen%3Fagent%3Dpostmessage%26objectUrl%3Dhttps%253A%252F%252Fmballc.sharepoint.com%252Fsites%252F2022ReachCodes%252FShared%2520Documents%252FReach%2520Codes%2520Collaborations%252FResource%2520Development%252FModel%2520Language%252FResidential%2520Retrofits%252FModelReachCode_SF_Renovation_2022_V1.0.docx%26fileId%3Dcda6b7c0-15fd-465a-a2aa-8e62faf0dd28%26fileType%3Ddocx%26ctx%3Dfiles%26scenarioId%3D7419%26locale%3Den-us%26theme%3Ddefault%26version%3D21120606800%26setting%3Dring.id%3Ageneral%26setting%3DcreatedTime%3A1652149056346%22%7D&wdorigin=TEAMS-ELECTRON.teams.files&wdhostclicktime=1652149056222&jsapi=1&jsapiver=v1&newsession=1&corrid=dc37cff8-f289-429b-866a-270f50b61aed&usid=dc37cff8-f289-429b-866a-270f50b61aed&sftc=1&sams=1&accloop=1&sdr=6&scnd=1&sat=1&hbcv=1&htv=1&hodflp=1&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush&rct=Medium&ctp=LeastProtected#_ftnref2) <https://comfortablehomerebates.com/wp-content/uploads/3.-2020-CHR-Whole-House-Combustion-Appliance-Safety-Test-Procedure.pdf>

## Other Sample Ordinance Sections

Section 2: CEQA

This ordinance is exempt from CEQA under 15061(b)(3) on the grounds that these standards are more stringent than the State energy standards, there are no reasonably foreseeable adverse impacts and there is no possibility that the activity in question may have a significant effect on the environment.

Section 3: Severability

If any word, phrase sentence part, section, subsection or other portion of this amendment or any application thereof to any person or circumstance is declared void, unconstitutional, or invalid for any reason, then such word, phrase, sentence, part, section, subsection, or other portion, or the prescribed application thereof, shall be severable, and the remaining provisions of this amendment, and all applications thereof, not having been declared void, unconstitutional or invalid, shall remain in full force and effect.  The [name of governing body] hereby declares that it would have passed this amendment and each section, subsection sentence, clause and phrase of this amendment, irrespective of the fact that any one or more sections, subsection, sentences, clauses or phrases is declared invalid or unconstitutional.

Section 4: Violations

Violation of the requirements of this Chapter shall be considered an infraction of the [jurisdiction Municipal/County Code], punishable by all the sanctions prescribed in [cite local reference to infractions].

Section 5: Effective Date

This ordinance shall become effective as of ***[DATE]***, except that the amendments to California Building Code, Title 24, Part 6 shall become effective as of ***[DATE]*** or upon the date the California Building Standards Commission (CBSC) accepts the ordinance for filing, whichever is later.

**FAQs**

These FAQs are for staff as they develop the policy. A separate FAQ will be available for applicants.

Q. What do the points represent?

1. The points in the *Measure Menu* table represent the relative **site energy savings** attributable to each measure. Thus, a measure with 4 points would provide twice as much savings as a measure with only 2 points.

The *Target Score* represents a user-defined (see below) percentage of the maximum cost-effective site energy savings, (the sum of points from all retrofit measures that have been found to be cost-effective). Thus, in the Cost-Effectiveness Explorer if the Target Score is set at 50% of the maximum score, the required measures would save about 50% as much energy as the energy savings attributable to installing all cost-effective measures.

Q. How are the *Target Score* and Measure Points calculated?

1. The Cost-Effectiveness Explorer calculates the Maximum *Target Score* and the points tables, which are available for export. The user (i.e., staff developing the policy) sets the required *Target Score* in the Cost Effectiveness Explorer.

Q. What is considered cost-effective?

1. Cost-effectiveness assumes that the bill payer will accrue a positive net-present-value from the measure. For the scope of this policy, the cost is assumed to be the full retrofit cost and is not contingent upon a project. Measures that are only cost-effective during replacements (e.g., cool roofs) are not part of the set of measures used to establish the cost-effective ceiling.

Q. Could points be based on GHG reductions?

1. Federal regulations appear to require local and state standards to be based on energy or energy cost savings. Site energy savings are generally proportionate to GHG emissions reductions.

Q. Why are some measures mandatory?

1. Cost-effective measures with very low costs and small savings (i.e., lighting) are recommended to be mandatory to prevent cream skimming.

Electric readiness is presented as mandatory because there are no directly attributable energy savings and therefore it cannot be scored relative to the other measures.

Q. How can I tell how much compliance might cost?

1. The cost of compliance will vary based on a) the Target Score, b) the scope of project, c) the existing conditions of the home and d) market conditions. By adjusting the Target Score in the Cost Effectiveness Explorer, the user alters the measure combinations that satisfy the requirements.

Typical initial measure costs, as reported in the cost-effectiveness study, are presented below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Typical Measure Costs – 1,665 Sq. Ft. Home** | | | |
| **Measure** | **Pre-1978** | **1978-1991** | **1992-2010** |
| Lighting | 40 | 40 | 40 |
| Air Sealing | n/a | n/a | n/a |
| Cool Roof at Replacement (increment) | 600 | 600 | 600 |
| Water Heating Package | 300 | 300 | 300 |
| Duct Sealing Only | 700 | 700 | 500 |
| New Ducts and Sealing | 4,000 | 4,000 | 4,000 |
| R49 Attic Insulation | 3,400 | 2,900 | 1,900 |
| R-13 Wall Insulation | 3,400 | n/a | n/a |
| Windows | 9,900 | 9,900 | n/a |
| PV (per kW DC) | 3,180 | 3,180 | 3,180 |
| PV + Storage (2 kW PV + 10 kWh Battery) | 11,100 | 11,100 | 11,100 |
| PV + Storage (4 kW PV + 10 kWh Battery) | 16,700 | 16,700 | 16,700 |
| HPWH at Water Heater Replacement (increment) | 2,500 | 2,500 | 2,500 |
| HPWH Water Heater - Full Cost | 4,000 | 4,000 | 4,000 |
| NEEA Tier 3 HPWH at Replacement (increment) | 2,600 | 2,600 | 2,600 |
| Heat Pump at HVAC Replacement (increment) | 400 | 400 | 400 |
| Heat Pump HVAC - Full Cost | 9,100 | 9,100 | 9,100 |
| High-Efficiency Heat Pump at HVAC Replacement (increment) | 2,600 | 2,600 | 2,600 |
| Induction Cooktop (increment) | 1,500 | 1,500 | 1,500 |
| Heat Pump Clothes Dryer Replacement (increment) | 1,100 | 1,000 | 1,100 |
| Electric-Readiness – Per Appliance | 500 | 500 | 500 |
| Electric Readiness – Panel Upgrade | 3,200 | 3,200 | 3,200 |

In addition to the information in the table above, the Cost Effectiveness Explorer produces an estimate of the typical compliance costs for a range of *Target Scores* specific to each climate zone and vintage.

Q. Why do some measures have points which exceed the Maximum *Target Score*?

1. The points are based on site energy savings; they do not vary based on the *Target Score*. Measures with values that exceed the *Target Score* save more energy than required.

Q. Can a jurisdiction alter the points and score?

1. Cities may alter the *Target Score* but may not change the measure points. Users will need documentation supporting the relative energy value of the measure(s) to alter the measure points.

Q. Can other measures be added to the list?

1. If there is documentation supporting site energy savings, additional measures may be added. Contact [info@LocalEnergyCodes.com](mailto:info@LocalEnergyCodes.com) to inquire about revisions.

Q. Why do some measures have no points for newer vintages?

1. Certain measures (e.g., windows, wall insulation) were required at the time of construction in newer vintages and are therefore not eligible for points.

Q. How would this ordinance be implemented?

1. Specific implementation details will depend upon the triggers, stringency, and scope of each adopted ordinance. Projects that are required to comply with the ordinance would be required to install a combination of measures from the menu that meets or exceeds the *Target Score*. Permit applicants would submit a supplemental form documenting that the measures selected and installed meet or exceed the *Target Score*. Collateral materials will be developed to assist implementation. These materials may include: an application checklist; an addendum to the certificate of compliance; air-sealing checklist; guidance for exceptions, including infeasible measures; and FAQs for applicants.

Q. What if compliance would be very onerous because only a few measures are applicable or technically feasible in the home?

1. There is an exception that allows the Building Administrator to adjust the *Target Score*. A guidance document will be published that specifies those measures that were used to establish the *Target Score*. If those measures are deemed to be not applicable (e.g., ducts in a home with hydronic heating) or infeasible (e.g., PV with excessive shading), the Administrator may reduce the *Target Score* by the value of those measures.

Q. Why does solar PV plus battery storage have fewer measure points than solar PV alone?

1. The measures points are based strictly on site-energy savings, and although battery storage may result in source-energy and cost savings, there are necessarily site-energy losses associated with storage. It is recommended that only one of these two measures be included in the measure table.

Q. How do the vintages account for code cycles that became effective mid-year?

1. Normally, codes become effective on January 1 of the year following the nominal code cycle. However, in some cycles the effective date was postponed to midyear. In these cases, the vintages are rounded down such that a home permitted anytime during that year is credited with the code effective in the latter half of the year.

1. Carlsbad = $60,000. Piedmont: $25,000 requires 1 measure; $100,000 requires 2 measures. [↑](#footnote-ref-2)
2. Largely based on Chula Vista ordinance. [↑](#footnote-ref-3)
3. Largely based on Chico draft ordinance. [↑](#footnote-ref-4)