

# User Guide and Glossary



**T**his section describes California’s current mandatory and voluntary building standards for solar energy as well as the expected 2020 update to California’s building code standards and policies. By understanding how renewable energy technology and policy are likely to develop in California, cities and counties will be better positioned to decide how the Bay Area Solar Photovoltaic (PV) Ordinance can support their own local energy and climate protection objectives.

The Bay Area Solar PV Ordinance can be adopted with no additional analysis beyond the tools included in this Toolkit. The ordinance template contained in this Toolkit provides a straightforward approach, making it more predictable for permitting staff, building developers and contractors.

For local governments that wish to expand the scope or adopt other renewable energy ordinances, the toolkit provides references and information about other relevant resources and studies. Adding more elements to the model ordinance may require additional analyses to demonstrate cost-effectiveness beyond what is included in this Toolkit. Enhancements local governments might consider include requiring solar thermal for water heating, expanding the ordinance to include high-rise multifamily and commercial buildings, or expanding the requirements beyond new construction to include major renovations.

**The model ordinance requires solar photovoltaics for single-family and low-rise multifamily new construction.**

## 2016 California Energy and Green Building Standards

State law requires that all local governments must adopt in its entirety the California Building Standards Code (CBSC), which includes the California Energy Code and the California Green Building Standards Code (CALGreen), and demonstrate that any local amendments conform with or exceed these state standards. The state updates the CBSC every three years—the next update (2019 edition) is scheduled to take effect on January 1, 2020.

Although the CBSC does not currently require installation of solar panels on residential buildings, there are existing state requirements that relate to renew-

able solar and renewable energy.<sup>1</sup> Specifically, the current Energy Code includes strict requirements that govern the energy efficiency of building envelopes (building exteriors) and building systems. The text below provides information on what is required in the current State Building Code, voluntary programs, and what changes are on the horizon.

## Mandatory Solar-Ready Requirements

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The current California Energy Code requires that certain new construction include “solar-ready” elements. New residential construction must, with certain exceptions, include 250 square feet of unshaded access for possible future solar installation and a pathway for interconnection with building energy systems. New nonresidential construction and additions that include 2,000 square feet of new roof area must, with certain exceptions, provide 15 percent of the total roof area as unshaded space and a pathway for possible future solar installations.

## Solar Credits

The 2016 California Energy Code includes energy efficiency requirements for new buildings. In the current Energy Code for all Bay Area climate zones, builders are allowed to trade off a portion of the required energy efficiency with solar PV. To qualify for the PV compliance credit, single-family homes must have at least 2 kW of electrical capacity installed per dwelling unit or 8 kW for multi-family buildings. The credit varies from approximately 3-23 percent, depending upon building type and climate zone. By contrast, the Bay Area Solar PV Ordinance would require builders to comply with the 2016 California Energy Code without the ability to use a solar PV credit.

## CALGreen

CALGreen standards are a mix of mandatory and voluntary measures.

CALGreen standards are a mix of mandatory and voluntary measures. Basic CALGreen standards include mandatory building requirements for water use, waste reduction and non-GHG air quality—they do not include additional standards beyond the regular statewide building code for energy efficiency or solar readiness. CALGreen tiers 1 and 2 offer voluntary standards that local governments can adopt to go beyond the statewide mandatory requirements. The voluntary measures have been pre-approved by the CEC, and therefore may simply be adopted by local ordinance without additional findings, cost-effectiveness analysis or further CEC approval. While there are no current CALGreen mandatory measures for solar PV in residential buildings, CALGreen does include voluntary measures for nonresidential (and high-rise multifamily residential) new construction, including on-site renewables for 1 percent of the building’s energy load, purchase of electrical energy with a renewable energy content of 50 percent if such a product is available, and solar thermal for restaurants.

## Beyond 2016 Standards – Local Reach Codes

Local governments may wish to amend their adopted CBSC based on local needs, such as seismic safety, fire safety, historic preservation, and energy and environmental factors. Local amendments to the CBSC that exceed the California Energy Code or California Green Building Code are referred to as “reach codes.” For local jurisdictions to adopt such amendments, these reach codes must meet the following standards and be approved by the CEC (see the Toolkit’s Local Adoption and State Approval Guide):

- ◆ demonstrate cost-effectiveness
- ◆ result in designs that consume no more energy than they would under the California Energy Code
- ◆ be reasonably necessary because of local climatic, geological, or topographical conditions, and
- ◆ comply with the California Environmental Quality Act (CEQA)

One common barrier to local government adoption of local reach codes is inadequate resources to develop an ordinance or conduct a cost-effectiveness analysis. To help local governments, Pacific Gas and Electric (PG&E), using ratepayer funds, produced a cost-effectiveness study for solar PV in new residential construction that is included in this Toolkit.

If a local reach code is cost-effective for its *required* measures, it can encourage alternative compliance strategies—such as substituting other forms of renewable generation—without having to demonstrate a similar cost-effectiveness.

## Examples of Solar Reach Codes

The CEC has approved local reach codes for renewable energy in San Francisco, San Mateo, Palo Alto, Brisbane, Fremont and Santa Monica, and is currently reviewing one proposed by the City of Lancaster. The requirements of each vary and have been based on cost-effectiveness studies specific to each climate zone and ordinance. These ordinances have taken different approaches, including requiring a certain amount of on-site generation capacity based on building floor area or number of dwelling units, requiring PV panel coverage based on roof area, or mandating buildings meet a greater overall energy performance requirement than required by the current Energy Code.

The CEC’s website provides background documentation, including the ordinances mentioned above, that support all approved and pending reach codes submitted by cities and counties. This information is available at <http://www.energy.ca.gov/title24/2016standards/ordinances/>.

## New and Upcoming Studies

Current tools in development and studies underway that could be useful to local governments contemplating additional reach codes include:

- ◆ a CALGreen cost effectiveness study to allow buildings to use the current PV solar compliance credit described above to offset a portion of the required energy efficiency
- ◆ a study proposed by the Natural Resources Defense Council for a model solar thermal ordinance
- ◆ various studies commissioned by the investor-owned utilities through the Statewide Codes and Standards Program on additional building code enhancements, available soon at the California State Codes and Standard website – [www.localenergycodes.com](http://www.localenergycodes.com).

## Emerging Renewable Energy Policies

### Electrification and the Transition to Zero-Net-Energy

We must transition our energy appetite from natural gas and other fossil fuels to electricity primarily produced from low-/no-carbon sources.

Most experts agree that to achieve the state's aggressive climate goals we must transition our energy sources from natural gas and other carbon-intensive fossil fuels to electricity primarily produced from low-/no-carbon sources. As the renewable content of electricity in California increases and energy storage becomes more available to accommodate electricity loads where most needed, that equation will tip distinctly in favor of all-electric buildings.

Adoption of a solar ordinance serves as a meaningful step towards providing all-electric buildings. Encouraging electrification will likely pave the way for further actions such as requiring electric vehicle infrastructure and increased electric panel capacity for permitted renovations to accommodate future efficient electrified space and water heating.

### Net Metering and Community Choice Energy

The state's investor-owned utilities and Community Choice Energy (CCE) providers offer **net metering** tariffs which enable customers to exchange power with the electric grid and be compensated for excess electricity they generate and export. **Virtual net metering** offers the same benefit to multifamily properties, allowing a multimeter property owner to allocate a solar system's energy credits to tenants. All five of the CCEs operating in the Bay Area (as of September 2017) offer net metering rates that provide more financial benefits for building owners' solar generation than those offered by the incumbent utility.

# Glossary

**California Building Standards Code (CBSC):** The state requirements for building construction and renovation, specifically California Code of Regulations (CCR), Title 24.

**California Energy Code or Energy Code:** Part of the CBSC that regulates building energy performance, specifically California Code of Regulations (CCR), Title 24, Part 6.

**California Energy Commission (CEC):** The state’s primary energy policy and planning agency tasked to ensure a safe, resilient, and reliable supply of energy.

**California Green Building Code, Green Building Code or CALGreen:** Part of the CBSC that regulates building and site environmental performance, specifically California Code of Regulations (CCR), Title 24, Part 11.

**Climate zone:** A numeric scale based on energy use, temperature, weather and other factors. There are four climate zones in the Bay Area.

**Conditioned floor space:** Total floor area (in square feet) of enclosed conditioned space on all floors of a building as measured at the floor level of the exterior surfaces of exterior walls enclosing the conditioned space.

**Net metering tariffs:** Allows customers to exchange power with the electric grid and be compensated at retail rates for energy they export to the grid, up to the point they export more than they consume.

**Photovoltaic system:** An energy system that converts sunlight into electricity and is commonly referred to as “PV,” “solar PV” or “solar power.”

**Solar thermal:** Energy from the sun used for water or space heating.

**Time dependent value (TDV):** Measures the value of electricity over the course of a day and throughout the year. It accounts for utility costs, consumer demand, and costs to society and the environment.

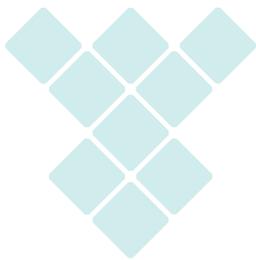
**Virtual net metering:** Enables a property with multiple utility meters to allocate a solar system’s energy credits to tenants even though that solar system is not directly connected to each individual meter.

**Zero-net-energy (ZNE):** Refers to a building that over the course of a year, generates as much electricity onsite as it consumes from the grid. This term only refers to the electrical load of a building and does not include natural gas or any other fossil fuel.

**Zero-net-carbon (ZNC):** Used to refer to a building designed to meet all its energy needs from zero-carbon sources such as solar or wind. To achieve this, buildings cannot use natural gas or other fossil fuels in their operation.

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## FOOTNOTES



- <sup>1</sup> It is notable that although California leads the nation in solar panel installations, most homebuilders and developers continue to build most projects without solar—in the first quarter of 2016, fewer than ten percent of new homes in California included a solar installation. ConSol, a California-based consulting and research firm, conducted a study which found 9.2% of homes built by top 10 builders in top 5 metropolitan statistical areas in California had PV systems: <http://www.energy.ca.gov/2016publications/CEC-300-2016-005/CEC-300-2016-005.pdf>