

THE PROJECT APPROVAL PROCESS

Securing approval for a solar energy project involves several basic steps. First, a permit application is submitted to a local permitting agency, known within government as the “enforcing agency” and reviewed by that agency. Typically, a permit is submitted on behalf of a building owner by the contractor installing the solar energy system. Once the permit application is approved, the applicant has permission to build the solar installation. After the solar installation is constructed, it is inspected by the enforcing agency to ensure it complies with applicable building codes and local ordinances. Each of these steps is described in more detail below.

STEPS FOR PERMIT REVIEW AND APPROVAL

Local Enforcing Agency Review

Submit permit application and materials



Permit review and approval



Construction of solar PV system



Site inspection and final approval

Local Utility Approval

Submit request to “interconnect” the solar installation to the local electricity grid



Site inspection and interconnection approval

For solar PV installations, during the local agency project approval process the permit applicant should also contact the local utility provider to request permission to connect the solar installation to the local distribution grid. The solar PV system cannot be “turned on” until approval is granted by both the local agency and the local utility. Solar water heating systems do not require utility approval unless a grid-connected PV system is included (hybrid systems have both grid-connected PV and thermal energy collection).

Well-informed solar installers and knowledgeable, well-trained local agency staff are critical to achieve an efficient permit approval process. Please consult the Resources section of this Guidebook for information on training available to both solar contractors and agency staff. Effective training is one of the most important steps that local governments and the solar industry can take to ensure efficient permitting.

Permit Application and Plan Review

This section explains the permit review process for solar energy installations and common issues that must be addressed to minimize unexpected delays in the permit review process.

Enforcing Agency Review

The first step to build a solar installation requires applying for a permit to construct the installation from the local enforcing agency, which is most often the local building department. Each local enforcing agency is organized slightly differently, but all have an established process for receiving, reviewing and approving permits.

The local agency enforces all Title 24 requirements from the state as well as any local requirements on solar energy installations. In many cases, the local agency must interpret how state requirements apply to certain buildings. The enforcing agency must verify that the installation complies with structural requirements. For solar PV installations, the enforcing agency must verify that it meets electrical requirements and applicable fire safety ratings. For SWH installations, the enforcing agency must verify that it meets plumbing and mechanical requirements. Each of these areas is discussed in detail.

Structural Requirements

Installation of a solar energy system on the roof of a structure adds weight to the structure, commonly referred to as “dead load.” This additional weight must be accounted for to ensure that the building can safely bear the weight of the solar installation. In new construction, this additional load is usually addressed easily and at very little cost. Where a solar system is added to existing buildings, the cost and complexity of adding weight to the roof vary depending on the structure of the building and roof.

Solar panels also may impose loads generated by seismic forces and, in some areas, by snow accumulation. Solar panels must also resist wind forces.

The California Building Code and California Residential Code contain specific tables that determine the required size and spacing of structural support for a roof according to assumed design loads based on roof covering, roof slope and snow loads. These specific tables do not address structural support that is required for additional equipment on rooftops such as PV or SWH systems.

Roof structures are also designed to carry temporary construction loads, termed “roof live loads,” in addition to the self-weight of the structure. Solar arrays, if installed close to the roof surface, displace roof live loads such as workers and bundles of shingles. This displacement of roof live load creates reserve load-bearing capacity that can be used to justify additional dead and wind loads from solar arrays. This approach is the basis of the Structural Toolkit on pages 45 and 79 that enables “over-the-counter” permitting for prequalified systems without requiring project-specific structural calculations.

Building codes do provide design criteria that an engineer or architect can use to calculate the required structural support required for additional loads on rooftops, such as solar energy systems. The Solar Guidebook’s Structural Toolkit suggests criteria for when a licensed engineer or architect may need to be consulted when adding solar arrays to a roof structure and when a prequalified system does not require project-specific structural calculations. By reviewing a jurisdiction’s expedited procedures, permit applicants can learn when the local enforcing agency specifically requires the services of a licensed engineer or architect to verify proposed plans for a solar energy system and when the jurisdiction has an alternate method that waives such requirements.

Electrical Requirements (Solar PV systems only)

Individual components of solar PV systems must comply with the California Electrical Code. This requirement applies to several system components, including, but not limited to, the installation’s panels, modules, wire, inverters, connectors and disconnects. The California Electrical Code requires these components in the solar PV system to be “identified and listed for the application.” It is important to ensure that the solar system’s components are listed within a product standard that covers the proposed use.

Currently, no complete system listings exist for solar installations, but rather system listings exist for a solar PV installation’s individual components. Components that are identified and listed for solar PV installation application must be installed in accordance with both the California Electrical Code and the manufacturers’ installation instructions. Solar PV systems that use components listed for the application and are properly designed and installed constitute a code-compliant system from an electrical standpoint.

In some circumstances, a professional electrical engineer may be required to design the electrical portion of the proposed solar PV system. The enforcing agency determines if this is necessary based on the complexity of the system. In many cases, an electrical engineer is not required as licensed contractors are capable of completing the necessary sizing calculations and can specify the components needed to make smaller systems work safely and properly.

The California Electrical Code requires that portions of electrical systems, including solar PV systems, should only be accessed by qualified persons. This rule is intended to ensure that only people who have training or understand relevant hazards are allowed in certain areas of an electrical installation.

Plumbing and Mechanical Requirements (Solar Domestic Water Heating Systems)

Individual components of solar domestic water heating (SDWH) systems must comply with the California Building Standards Code, Title 24 as adopted by the California Building Standards Commission. This requirement applies to system components, including but not limited to the solar collectors, storage tank, controller, pump, heat exchanger, heat transfer fluid, piping and all temperature and pressure regulating components. SDWH systems for one- or two-family homes shall be certified by an accredited listing agency, as per California Government Code Section 65850.5 (f)(2).¹ Adopting a system certification will help local governments streamline permitting for small solar domestic water heating systems.

Plumbing and Mechanical Requirements (Solar Pool Heating Systems)

Individual collectors used in solar pool heating (SPH) systems are certified by accredited listing agencies. At the present time, certifications are not available for SPH systems.

Fire Classification, Safety and Roof Access and Pathway Requirements (Solar PV systems only)

Buildings in California may be required to have a fire resistant roof covering, depending on the type of construction, occupancy or geographical location of the building. The California Building and Residential Codes recognize three fire resistant roof ratings: Class A, B and C. These ratings are established through specific testing methods based on the ability of the roof covering to withstand fire that comes from a source on top of the roof structure. Roof materials with Class A fire resistance rating can withstand a high exposure to fire without allowing penetration or ignition of the structure, while Class B and C materials have lesser ability to withstand fire.

California statutorily requires all roof materials installed on buildings throughout the state to have a minimum Class C rating. Beginning in 2015, solar panels must have a fire resistant rating that conforms to the fire rating of the roof beneath.²

The installation of solar PV systems must also allow for fire department smoke ventilation operations. The California Building, Residential and Fire Codes outline the requirements for a roof access point and clear access pathways along the roof. The installation of solar PV systems may be subject to additional provisions adopted by the local enforcing agency.

Fire Service Approval (Solar PV systems only)

Permits for solar PV installations are reviewed to ensure compliance with fire safety requirements. In many communities, the enforcing agency coordinates directly with the fire department to ensure fire safety of PV projects and the permit applicant does not have any direct contact with the fire department.

¹ According to CA Government Code Sec. 65850.5 (f)(2), "Solar energy systems for heating water in single-family residences and solar collectors used for heating water in commercial or solar pool applications shall be certified by an accredited listing agency as defined by the California Plumbing and Mechanical codes." (CPC and CMC Section 214)

² Other requirements for higher classification may apply. Also see [California State Fire Marshal Bulletin 14-002](#) and [addendum](#).

In some areas, the local fire authority is a fire district or special service district organized to provide fire services. Unlike a fire department, which is typically part of a city or county government, a fire district operates independently under the direction of a locally elected board. Many jurisdictions have established a memorandum of understanding (MOU) between the local fire authority and the building official that allows the building official to determine and approve fire safety requirements.

In circumstances where the fire authority is separate from city or county government and no MOU established, applicants should contact the local fire authority early in the planning stages of a PV installation to determine if there are any unique requirements or approval processes within the specific jurisdiction.

In 2008, the California Office of the State Fire Marshal released a **final draft guideline** related to solar PV roof installations. This document was developed through collaboration with local fire departments and the solar industry with safety as the principal objective. The guideline's intent was to provide the solar industry with information to aid in designing, building and installing PV systems to meet this objective.

Portions of the 2008 State Fire Marshal guideline were adopted into the 2012 International Fire Code and were included in the 2013 California Building, Residential and Fire Codes. Additional revisions have since been made to the 2016 California Building, Residential, and Fire Codes that provided further enhancements for fire safety. Permit applicants should contact the local fire authority to determine if specific fire safety requirements beyond current state regulations have been adopted in the local jurisdiction.

Planning and Zoning

As noted earlier in this guide, California cities and counties have authority to adopt laws that govern local land use but are limited from restricting solar energy systems where energy is being generated for use on-site. Local governments have more latitude to determine where large, commercial energy generation can be located within their communities. For commercial solar energy projects, developers should determine what if any local plans, laws or regulations govern where the project can be located.

Site Inspection

After a solar energy system is installed, an inspector from the local enforcing agency physically inspects the installation. This field inspection is the last step before final project approval is granted by the local enforcing agency (note that a PV system cannot begin operating until it has received approval from both the local enforcing agency and the local utility). The field inspection ensures the solar energy system has been installed properly and according to the approved plans. Some local governments conduct “rough” or pre-inspections to ensure, for example, that roof penetrations are compliant with code or other requirements. Others may inspect the structural integrity of a building prior to installation.

Inspections focus on verifying that an installation is compliant with applicable building code, plumbing code, electrical code and fire safety requirements. To ensure building code compliance, an inspection will verify proper material selection, soundness of structural attachment to the roof or ground and that all components are securely fastened. Inspection of a solar PV installation's electrical system often focuses on wiring methods, circuit protection, grounding and safety signage. Inspection of a solar water heating system mostly focuses on preserving potable water quality, preventing leaks and preventing damage to the system. To ensure fire safety of a solar PV installation, the inspection verifies labeling of equipment to limit firefighter exposure to electrical voltage, space for firefighters to access the building or structure and limitations in roof installations due to firefighting suppression techniques.

Currently, inspection standards for solar energy systems can differ among jurisdictions due to differing interpretations of code standards and inconsistent expertise among field inspectors. Permit applicants should ask the local enforcing agency to provide a clear explanation of what the on-site inspection will entail, including what elements of the system the inspector will examine. This Guidebook provides a set of standard inspection criteria, which will eliminate much of this variation if adopted by jurisdiction. Local enforcing

agencies also schedule and execute site inspections differently. Many jurisdictions are able to complete a site inspection within one or two days of notice that construction of the solar installation is completed, while others may take longer. Similarly, some enforcing agencies are able to predict a narrow window of time within which an inspector will visit a property, which saves the permit applicant's time and money, while other agencies are less precise. Enforcing agencies should work to minimize the delay between the permit approval and site inspection and to minimize the inspection window. Finally, enforcing agencies should strive to eliminate "rough" or pre-inspections and, instead, ensure compliance with all applicable rules and requirements during the final inspection.

Local Utility Approval (Solar PV systems only)

All solar PV installations need the local utility's approval to link into the electricity grid, a process commonly referred to as "interconnection." This interconnection approval must be granted before a solar PV installation is allowed to operate and is completely separate from local government approval for the solar installation. Interconnection approval ensures that a solar installation will safely connect and operate on the electricity grid.

Understanding the utility's requirements and process is very important. Permit applicants should contact the local electric utility at the beginning of the project planning stage. Utilities provide information about required interconnection agreements and can also provide information about available financial rebates or incentives. A permit applicant may also apply to the local utility for incentives available for new solar systems under the California Solar Initiative. To qualify for rebates or other incentives, property owners may be required to complete an energy audit before installing a PV system.

California's local utilities differ regarding when they require or allow filing an interconnection application during the local enforcing agency review process. Electric utilities may require or request that a contractor submit their application to the utility for review before a building permit is issued by the local city or county. Also, utilities may require one or more on-site inspections of the project before approving the interconnection agreement. This inspection process is completely different from an inspection performed by the local permitting agency.

The **Public Utilities Code** requires that all electric utilities respond within 30 working days after receiving a completed application for interconnection. To help ensure an application is considered complete when first submitted, permit applicants should contact their electric utility to learn the specific information and forms that must be included in the application.

Each utility provides information on its process for interconnection approval for solar PV installations on its website. The Resources section of this Guidebook provides web links to this information for the state's largest utilities.

QUICK TIPS FOR CONTRACTORS & PROPERTY OWNERS WHEN APPLYING FOR A PERMIT

Permit applicants can save time and money by following these tips.

- **Take time to review permit requirements of the local jurisdiction**
Permitting rules and processes differ among different cities and counties. Understanding all local requirements will allow permit applicants to submit a complete and accurate permit application packet the first time.
- **Contact the local electric utility early in the permitting process (solar PV installations)**
Local electric utilities have a separate approval process from the local jurisdiction's permitting process. Some electric utilities may require that the solar project be reviewed before the local jurisdiction issues a building permit. Pursuing utility approval early in the permit process enables the solar PV system to become operational as soon as possible.
- **Make sure that the solar installation that is built matches the submitted plans**
The on-site inspector will verify that the installation aligns with proposed plans and any changes may require corrections and additional inspections.

QUICK TIPS FOR LOCAL PERMITTING AGENCIES

Local agencies can save valuable staff time and resources by following these tips.

- **Provide clear written instructions on the permitting process**
Making this information available on the Internet and at the department's counter are low-cost ways to reduce errors by permit applicants.
- **Take advantage of information technology**
Online or electronic application submittal and permit issuance, including use of e-signatures, can minimize or eliminate backlogs at the counter and, thus freeing up staff time to focus on more complex permit applications.
- **Use standardized forms**
Using standard forms that permit applicants easily fill out simplifies review for staff and reduces the possibility of omitted information.
- **Consider hosting contractor training events**
Partnering with the solar contractor community to train contractors on proper permit submittals represents a small investment of time that may avoid hours of staff work processing flawed permitting applications.
- **Standardize requirements across jurisdictions**
Using common permit materials, such as checklists and standard plans, across city and county lines reduces permit submittal errors among contractors working throughout a region.